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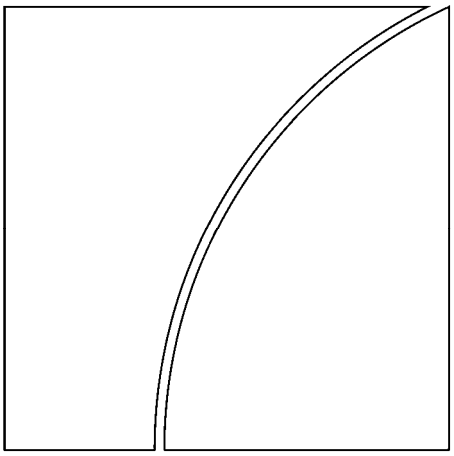

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Implementing the 1993 System of National Accounts

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Discussant:	Henk Lub, Netherlands Bank

Managing the implementation of the SNA, BPM and related international standards in a national statistical office context[1]

Derick Cullen[2] and Bernard Williams[3]

Introduction

The Australian Bureau of Statistics (ABS) is scheduled to implement the BPM6 and SNA 08 with the release of statistics for the September quarter 2009. The ABS will be one of the first national statistical agencies to implement the revised standards. The implementation will coincide with the introduction into the Australian national and financial accounts of an update to the industrial classification used by the ABS and Statistics New Zealand. Managing two concurrent significant changes to Australia's macroeconomic statistics is a major challenge that involves many different parts of the organisation.

This paper outlines the processes used and issues faced by the ABS in this implementation. In particular, the paper presents a number of principles which the ABS adopted to guide the implementation and mentions some particular issues that created difficulties. It is hoped that this paper will provide insights to other national statistical organisations as they prepare to implement the new standards.

The standards

The international framework for economic statistics centres around two key documents, the System of National Accounts (SNA) and the fifth edition of the Balance of Payments Manual (BPM5), both of which were released in 1993. Since the release of these key standards, a number of new economic phenomena have arisen or assumed greater importance as economies continue to develop in their complexity. In response to this, relevant international organisations and a range of national statistical agencies, including the ABS, have reviewed a series of conceptual and measurement issues that either were not clarified completely at the time of the release of the SNA 93 and the BPM5, or that have emerged as important measurement issues since that time. These issues are described in the information paper "Introduction of revised international standards in ABS economic statistics in 2009" (catalogue no 5310.0.55.001).

The international standards for national and international accounts were updated concurrently and the standards are compatible. The new standards are presented in the 2008 System of National Accounts (SNA 08) and the sixth edition of the Balance of

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[1] This is an updated version of the paper presented at the 57th Session of the International Statistical Institute, held from 16 to 22 August 2009 in Durban, South Africa.

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Payments Manual (BPM6). The Government Finance Statistics Manual is expected to be revised in the future.

The other major changes to the Australian System of National Accounts (ASNA) are due to the implementation of the Australian and New Zealand Standard Industrial Classification (ANZSIC 2006), which is compatible with the International Standard Industrial Classification of All Economic Activities, Revision 4 (ISIC Rev 4), and to changes in the Standard Economic Sector Classifications of Australia (SESCA 2008).

Management of change process

ABS management decided that a clean, single transition would minimise instability in macroeconomic series releases induced by changes in standards rather than by real world events and normal revisions. The alternative approach would have resulted in instability over a period of quarters or even years. Once this key decision was made, it was evident that the work programmes of a large number of statistical operations had to be coordinated, and that a user consultation and communications programme was needed.

These tasks were more straightforward in Australia, in comparison with countries that have more decentralised statistical systems, as the ABS is responsible for national accounts, the balance of payments and many of the data collections that feed into the macroeconomic datasets. Two major governance structures, in addition to line management, were charged with coordination: the ANZSIC Implementation Board and the Macroeconomic Steering Committee. There is some overlap in the membership of these bodies that ensures additional coordination.

The role of the ANZSIC Implementation Board was to ensure that the implementation of the new classification was coordinated across the many data collections and datasets. This was achieved by establishing implementation work programmes and periodic monitoring of progress against those plans.

The Macroeconomic Steering Committee was established to consider methodological changes in the national and international accounts. It also participated in the revision of the SNA and BPM by briefing participants in international conferences and reviewing drafts of the standards. Its role was extended to detailed approval of methodological and conceptual changes across the national and international accounts that resulted from the firming up of the standards. This committee included both relatively senior and operational staff to ensure that the full implications of changes were understood.

The Macroeconomic Steering Committee determined a set of principles for implementing the changes in standards, reviewed proposals for departing from the standards, ensured that user communications plans were adequate and reviewed the progress made in implementation, while continuing to monitor international developments.

Principles behind the implementation

Building on the experience of implementing previous upgrades to the international standards and other significant changes, the ABS identified the following principles to guide the implementation.

(a) Standards

Departures from standards should:

- be few in number; demonstrate a significant benefit or avoidance of an unwarranted cost (eg harmonisation with Australian financial reporting standards or businesses' inability to report the information within a reasonable cost)
- be carried through all accounts/statistics (ie no "local" departures), bearing in mind that some related standards, like government finance statistics, are updated on a different timetable
- enable a straightforward reconciliation with the standard where feasible
- be implemented only after extensive consultation and publicity.

(b) Timing of implementation

- Changes affecting gross domestic product (GDP) should be implemented at the same time (as far as is feasible) and in conjunction with the introduction, for the 2008–09 annual national accounts, of ANZSIC 2006. This meant that data changes were required in ABS annual business data collections for the 2006–07 reference year.
- Other changes should be made as is practicable.

(c) Coordination and consultation

- Implementation must be centrally coordinated so that there is consistent treatment across the ABS and clients receive a consistent message about plans.
- Clients must be provided with sufficient opportunity to consider the changes being introduced and all clients must have equal access to this information.

Methods boards

ABS has established change management processes to support the implementation of changes in methods and data sources in macroeconomic accounts. Details of the proposed changes are approved by methods boards or referred for consideration by the Macroeconomic Steering Committee. The key methods board for the SNA and BPM implementation is a joint body consisting of national accounts and balance of payments operations personnel. The record of proposals for changes in methods and decisions made about them forms a key body of documentation about the national accounts and the balance of payments.

Backcasting, bridging, parallel runs, seasonal adjustment

The ABS maintains a long time series for national accounts, the balance of payments and the international investment position. A large proportion of these series is maintained in original, seasonally adjusted and trend variations. The introduction of changes like the SNA 08 and BPM6 can result in a shift in the level of components and total series. If the shift in level is sufficient to distort the seasonally adjusted time series (if available), the ABS revises the historical series to make the time series of estimates as continuous as possible.

With some changes, such as moving repairs from goods to services, it is relatively easy to adjust the time series. However, in some cases there is insufficient detail available to directly adjust the historical series (eg the separate identification of technical reserves in the international investment position and the requirement for more detailed industry classes in the property and business services division). In these cases the ABS estimates the shift in the level of the series by comparing estimates at one point in time for both the current and

the new basis (although comparison with additional periods is desirable). The historical series are revised to take account of this shift in the level.

Ideally, any change in the level of a series would be measured over a sufficient period to enable any seasonal patterns to be observed. This may be possible for some modelled estimates, but for estimates based on surveys, the cost of producing two estimates for one or more time periods can be expensive both in terms of processing costs and of provider burden. For example, for the Survey of International Trade in Services and the International Investment Survey, differences between estimates on a BPM5 and BPM6 basis will be measured for one quarter and the differences used to revise the level of historical series. One quarter is used for measurement because of the cost and complexity of compiling estimates on both bases, the lead time necessary to change questionnaires and systems, and because the changes generally add further detail to the information currently being collected rather than introducing completely different requirements.

To ensure consistent treatment of time series, the ABS has established a standard approach to measuring shifts in the level of series. The size of the level shift induced by a methodological or measurement change is assessed using regression analysis techniques on the ratios between the current published estimates and actual or simulated estimates produced by the revised methodology. If the level shift is found to be significant in the seasonally adjusted series, the historical series are backcast to make the time series of estimates as continuous as possible while maintaining, as far as possible, the integrity of the period-to-period seasonally adjusted movements.

Where it is not possible or necessary to maintain a long time series, the ABS adopts an approach of “bridging” the current published estimates and the estimates produced by the revised methodology. This means that estimates on both the current and the new basis are produced for one point in time and both sets of estimates are released along with analysis to help clients understand the differences between the series. This approach is often used for the annual economic surveys.

Because of the large number of changes being implemented concurrently, together with normal revisions, the impact of the different changes cannot be interpreted with any precision. This is not only a difficulty for users, but also an issue for quality assurance of ABS output.

Timing of implementation

Changes to the ASNA resulting from revised international standards will be implemented with the 2008–09 issue (catalogue no 5204.0), which will be released on 8 December 2009. The new standards will also be reflected in the September quarter 2009 issue of *Australian National Accounts: National Income, Expenditure and Product* (catalogue no 5206.0) and the 2008–09 issue of *Australian National Accounts: State Accounts* (catalogue no 5220.0), which is consistent with the timing of the new standards being implemented in the Australian international accounts. The September quarter publication of *Australian National Accounts: Financial Accounts* (catalogue no 5232.0) will be released on 24 December 2009.

Changes to the international accounts and the indicator series related to the national and international accounts will also be implemented in respect of the 2008–09 or the September quarter 2009 reference periods. For example, the changes were implemented in the June 2009 issue of *Retail Trade* (catalogue no 8501.0) and the August 2009 issue of *International Trade in Goods and Services* (catalogue no 5368.0) and will be implemented in the September quarter 2009 issue of *Balance of Payments and International Investment Position, Australia* (catalogue no 5302.0).

To accommodate the additional processing required to compile the national and international accounts according to the revised standards, the release of key series will be delayed. The September quarter 2009 issue of *Balance of Payments and International Investment Position, Australia* will be delayed one week, until 8 December 2009, and the September quarter 2009 issue of *Australian National Accounts: National Income, Expenditure and Product* will be delayed two weeks, until 16 December 2009. Future issues of these publications will be released according to the standard timing.

Communicating with users

Consistent with the policy that the changes will be implemented only after extensive consultation and publicity, a comprehensive communication plan was developed. The main features of this plan include:

- Early presentation of the implementation plans to the Australian Statistics Advisory Council, which is the key advisory body to the Statistician on statistical services;
- Early presentation of the implementation plans and updates on progress to the Economic Statistics User Group, which is the key advisory body on economic statistics;
- The release in 2004 of an information paper on ANZSIC 2006 development, followed by a paper in 2006 on ANZSIC 2006 implementation plans with an update on those plans in 2008;
- Consultation, beginning in 2007, with the key government agencies using macroeconomic statistics;
- Following this consultation, the release to all stakeholders in 2007 of an information paper outlining the key SNA and BPM changes and the implementation plans;
- The release from June to September 2009 of an information paper for each of the affected publications, describing the main changes affecting that publication, the timing for implementing the changes, the impact on time series in the publication and the impact on the presentation of statistics in the publication; this included the provision of mock-ups of the publication and time series spreadsheets as they would appear after the implementation of the changes;
- The release in October 2009 of an information paper summarising the main changes and quantifying, to the extent possible, the impact on key aggregates; for some of the more significant changes, detailed methodological information will be provided;
- The inclusion, in the first release of each publication, of the statistical impact of the changes.

The October 2009 information paper “Implementation of new international statistical standards in ABS national and international accounts, September 2009” (catalogue no 5310.0.55.002) is available from http://www.abs.gov.au/ausstats/abs@.nsf/mf/5310.0.55.002?OpenDocument.

The communication plan will provide clients with the opportunity to obtain as much detail as they consider necessary. Even more information on statistical impact could be provided to clients if each series (eg the quarterly national accounts) was fully released on the current and the new basis for a point in time. The ABS attempted this when implementing the SNA 93 and decided that it was not feasible this time owing to the cost, complexity, risk and undue pressure it places on staff to fully process two sets of accounts simultaneously.

The ABS produces a range of manuals describing the underlying concepts and structure of key accounts such as the ASNA, the balance of payments and the international investment position. These manuals outline the sources, methods and terms used in compiling the accounts. The current versions of these publications reflect SNA 93 and BPM5 concepts and

a number of references to data sources and methods are, or will be, out of date. Revised publications on concepts, sources and methods are scheduled for release in late 2010.

The SNA and BPM changes

The revised international standards have changed the measurement of a number of components of the national and international accounts, although there has been no major change to the structure of the accounts. The changes include:

- The introduction of research and development as capital formation
- The movement of some types of defence expenditure to capital formation
- The inclusion of reinvested earnings of investment funds
- Supplementary market valuation measures for loans and deposits
- Changes to the measurement of costs of ownership transfers
- Improvements in the recording of mineral exploration expenditure
- A change to the definition of economic territory
- Changes to allocation of transactions between goods and services in the balance of payments current account
- Changed concepts with regard to wealth transferred by migrants
- Clarification of recording of transactions resulting from activation of guarantees
- A more detailed sectoral classification for financial corporations, including separate identification of investment funds
- A more detailed disclosure of components of international reserves
- A revised treatment for unallocated gold accounts.

Ongoing research and divergence

The ABS reviewed all the changes in the standards and also reviewed instances in which current practices did not comply with previous standards that remained unchanged in the new standards. In a small number of instances, the ABS is not complying with standards in the SNA 08 or BPM6. These instances, which will not have a significant impact on GDP or the current account, are as follows:

- The continued treatment of repurchase agreements as security trades
- The continued treatment of interest on debt securities on the creditor principle
- The treatment of transactions between non-residents in Australian securities
- The treatment of holding companies
- A shorter version of the classification of financial instruments.

In a number of instances, the ABS is continuing to investigate issues with the intention of implementing the standards if appropriate methodologies and data sources can be identified. These include recommendations with regard to software originals and copies, databases, employee pension schemes, employee stock options, and goodwill and other non-produced intangibles.

Further explanations concerning these areas of non-compliance can be found in the information paper “Implementation of new international statistical standards in ABS national and international accounts, September 2009” (catalogue no 5310.0.55.002).

Additional changes

ANZSIC was revised in 2006 (the previous version being the 1993 revision), and is compatible with ISIC Rev 4. The revision involved a systematic supply side approach: categories are based on common attributes of the activities of the producers of goods and services, ie the production function. The following table demonstrates the scope of the changes. In addition, a number of activities were moved to different divisions, subdivisions or groups.

Table 1

ANZSIC 1993 and ANZSIC 2006 Structure

	ANZSIC93	ANZSIC06	Difference
Divisions	17	19	+2
Subdivisions	53	86	+33
Groups	158	214	+56
Class	465	506	+41

In terms of workloads in the ABS, the change in industry classification has more impact than the SNA 08 or BPM6. The industry classification is a fundamental component of most economic statistics collection and processing systems. A new classification requires changes to the fundamentals of systems and also raises challenges for the interpretation of results.

In addition to the industry classification, the ABS will implement a number of changes that it did not implement when moving to the SNA 93 in 1998, or changes that are an improvement on existing practices, including:

- The implementation of orchard growth in the capital account
- The transfer of financial auxiliaries to the financial sector
- The inclusion of non-employing companies within the scope of the Quarterly Business Indicators Survey and Capital Expenditure Surveys
- The new scope of the “market” sector for productivity analysis
- The new scope of “farm” and “non-farm” GDP (“farm” no longer includes services to agriculture)
- The sectoral classification has an expanded number of subsectors for the financial sector and a revised definition of market activity.

The changes to the SNA, BPM and particularly the ANZSIC in some cases required system re-engineering, creating additional change management workloads.

Changes to data collections

Apart from changes to data collections consequent on the ANZSIC changes, there have been some changes in data sought to support the SNA 08 and BPM6. While the changes to the ABS Annual Integrated Collections were minor, the International Investment Survey and Financial Statistics Surveys required significant modifications. Although most of the SNA 08 and BPM6 changes required a changed interpretation of existing administrative data, eg tax data, some additional data items are required in datasets compiled by the Australian Prudential Regulation Authority, the financial institution regulator.

Future developments

The International Monetary Fund's Government Finance Statistics Manual will be updated from the 2001 edition, consistent with the SNA 08, but the timing is to be confirmed. This may result in some additional changes for some economic categories.

It appears that Canada and the United States will probably convert to the SNA 08 in 2012, and the European Union countries in 2014. This may result in the emergence of best methodological practice closer to these dates as these countries consider their implementation in detail.

Conclusion

The decision of the ABS to implement concurrently two major changes to macroeconomic statistics was taken with a view to best outcomes for users of the statistics. The alternative of progressive implementation with instability in data series over a possibly protracted period was not acceptable. However, the decision created a significant management and coordination task in order to ensure:

- The multiplicity of changes
- An ambitious timetable
- The interpretation and quality assurance of ABS output.

Furthermore:

- The alignment of SNA and BPM implementation with that of the ANZSIC required the SNA and BPM work to be undertaken before the standards were finalised and, more importantly, without the benefit of other countries' experience. Best practice with regard to a number of standards is still emerging.
- The changes to the SNA, BPM and particularly the ANZSIC in some cases required system re-engineering, creating additional change management workloads.

The already ambitious timetable has been subject to additional pressure because of the measurement issues raised by the global financial crisis and the response of government.

Progress on the implementation programmes for the 2008 System of National Accounts (SNA 08) and the Balance of Payments and International Investment Position Manual, sixth edition (BPM6)[1]

Ivo Havinga,[2] Ralph Kozlow[3] and Paul Schreyer[4]

1. This paper presents strategies to facilitate the adoption by countries of the 2008 System of National Accounts (SNA 08) and the Balance of Payments and International Investment Position Manual, sixth edition (BPM6). It elaborates briefly on the Organisation for Economic Co-operation and Development (OECD) strategy for the implementation of the SNA 08. The SNA 08 was adopted as the international standard by the United Nations Statistical Commission in 2008 (vol 1) and 2009 (vol 2) and the BPM6 was released as planned in early late 2008 on the website of the International Monetary Fund (IMF). Both normative documents represent the culmination of seven years of work by international and regional agencies in collaboration with advisory groups, committees, organisations and individuals worldwide.

Strategy for the 2008 SNA implementation

2. This summary of the strategy for the 2008 SNA implementation provides an overview of the main features for which the Statistical Commission expressed strong support at its recent session in February 2009. Further information is included on how the Intersecretariat Working Group on National Accounts (ISWGNA) plans to promote the strategy through specific instruments and modalities and specific activities planned by its member organisations. The coordination, monitoring and reporting mechanisms and funding strategy were also integrated into the implementation strategy.

3. The strategy for the implementation of the SNA 08 takes into account, as a point of departure, the different levels of implementation of the SNA in various countries and regions. It is recognised that the detailed strategy should reflect the need for regional and subregional coordination, given the different levels of statistical development between countries.

4. The strategy builds on the results of regional consultations undertaken by the ISWGNA member organisations between 2006 and 2008, elaborating on principles for the implementation and reflecting the perspectives of users, producers and those engaged in policy formulation and analysis. Among these events was the International Conference on International Outreach and Coordination in National Accounts for Sustainable Growth and

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1 The views expressed herein are those of the authors and should not be attributed to the United Nations, the IMF, the OECD or its management.

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3 The section on BPM6 implementation was prepared by the International Monetary Fund Statistics Department. E-mail: RKozlow@imf.org.

4 The section on OECD strategy was prepared by the Organisation for Economic Co-operation and Development. E-mail: Paul.SCHREYER@oecd.org.

Development, held in Luxembourg in May 2008, from which the Luxembourg Recommendations emerged.

Objective of the implementation strategy

5. The 2008 SNA implementation strategy aims to support sound macroeconomic management and evidence-based policy formulation through the sustained compilation and reporting of national accounts and related source data by national, regional and international statistical systems.

Basic principles of the implementation strategy

6. The implementation strategy for the SNA 08 is based on the principles of strategic planning, coordination, monitoring and reporting, and improving statistical systems. With regard to these three main principles, the ISWGNA will pay particular attention to improving basic economic statistics and to the need for consistency and harmonisation across sectoral statistics from other macroeconomic frameworks with the national accounts.

7. Strategic planning is a key principle in mobilising political and financial support for investment in statistics. The SNA implementation uses strategic planning frameworks to connect the national development objectives with a programme of work for statistical capacity building. Strategic planning can identify current strengths and weaknesses of statistical capacity to produce key economic indicators and basic source data. This approach could also lay out a schedule of tasks to mitigate the weaknesses. It can be used by countries to produce the information needed for monitoring their own economic development programmes and in consulting users.

8. The principle of coordination, monitoring and reporting ensures that the roles of international and regional organisations, other donors and recipient countries are clear and that their actions are complementary and effective. Coordination comprises the timing and sequencing of events. Monitoring comprises assessing the efficiency of technical assistance programmes, evaluating lessons learned, and using resources effectively. Reporting communicates progress and operational issues to interested stakeholders. Better coordination, monitoring and reporting collectively help meet national and regional goals, as well as providing a means to evaluate international indicators against agreed benchmarks to assess the progress of expanding the scope of the national accounts and achieving their compliance. Monitoring, reporting and evaluating should also be used to identify risks to the implementation process so that timely interventions can be made to keep plans on track.

9. The principle of statistical system improvement is undertaken through the strengthening of the national statistical system, which covers each of the building blocks of the statistical production process. The statistical system will be enhanced by using a common and coordinated national, regional and international programme for the implementation of the SNA 08 and related economic statistics for strengthening and building national capacity to produce better official statistics.

Modalities of the implementation strategy

10. The 2008 SNA implementation strategy rests on five modalities: training, technical cooperation, handbooks, research and advocacy. The implementation strategy retained but refocused four modalities used in the 1993 SNA implementation by providing training and delivering technical cooperation, preparing manuals and handbooks, and sponsoring research. These modalities will now focus more than in the past on the various stages of the statistical production process that precede the integration of the data into the national

accounts, namely on the collection and processing of basic source data and the institutional context. The strategy extends the scope of modalities by adding a fifth modality, advocacy.

11. National and regional training seminars and workshops will be organised in support of the transfer of knowledge in national accounting and related economic statistics at the country level. Existing regional training networks will be mobilised to collaborate with the ISWGNA to develop and deliver training and teaching programmes on the SNA and related macroeconomic standards. Extending the SNA 08 website will establish a knowledge base on economic statistics and macroeconomic standards, compilation guidance and best practices hyperlinked to other organisations.

12. Technical cooperation will be provided through advisory missions by working directly with the staff of national offices. These activities will advance the use of the SNA 08 as the principal integration framework for national statistical systems.

13. These training and technical cooperation programmes need to focus more than in the past on (a) the design and maintenance of business registers and data collection programmes to generate relevant source data, and (b) the institutional processes and structures through inter-agency agreements, creating advisory committees and strengthening the legislative and regulatory framework on data sharing. Training and technical cooperation programmes for countries requesting assistance put a further emphasis on direct country involvement and on the integration of statistical capacity building in national planning.

14. To meet the challenges of national accounts development in countries with less advanced statistical systems in the next decade, training and technical cooperation activities need to give greater emphasis to institutional capacity building and development of data sources. At the same time, countries with advanced statistical systems have programmed a sequence of activities to implement the SNA 08, in many cases with specific deadlines. European Union countries and a great majority of OECD countries have indicated their intention to implement the SNA 08 by 2015.

15. Publishing methodological handbooks and new compilation guides and revising existing ones will be an ongoing activity of the ISWGNA in support of the 2008 SNA implementation. The purpose of these manuals is to elucidate best practices in establishing modern institutional environments, compiling registers and frames, collecting survey and administrative data, implementing and maintaining integration frameworks and disseminating data on the national accounts and related economic statistics. The manuals will also address data quality and data dissemination issues. Responsibility for the preparation of the manuals will be shared among the ISWGNA member organisations in collaboration with other international institutions.

16. Research will be conducted to maintain the relevance of SNA recommendations in a changing economic environment. It will be undertaken in support of drafting related methodological guidelines and contributing to the development of new areas of accounting. Research efforts will focus in particular on the implementation of concepts from the SNA 08 and guidance on compilation. An output of this research should be guidance by the ISWGNA on improving the scope, periodicity and timeliness of the national accounts statistics of the “core accounts”, given the different levels of statistical capacity of countries. Under the SNA research agenda the United Nations Statistics Division, in collaboration with other international organisations, will continue its coordination function in organising work among the various contributors. The involvement of national accounts experts of various countries and advisory services of members of the Advisory Expert Group on National Accounts in the discussions will be ensured. A broader and sustained dialogue with representatives from academia, the business accounting sector, the regulatory authorities and the corporate sector will be developed.

17. Advocacy has been included in the implementation strategy as an additional modality with the aim of stimulating the demand for national accounts data and encouraging the use of the accounts. Advocacy will play an important role in encouraging national support

for acquiring and maintaining viable economic statistics and national accounts programmes and communicating their policy relevance. As an integral component of the implementation strategy, advocacy aims to support an ongoing dialogue among statistical producers, the various levels of government, the business sector, the academic community, and the general public about user needs for official statistics and the progress in meeting those needs. This recurrent communication can be established through targeted workshops, conferences, press releases and promotional materials to highlight the overarching framework of the SNA. The promotion of good quality national accounts statistics through advocacy is essential in establishing a sound macroeconomic policy. Through statistical integration of basic statistics with macroeconomic accounts, a coherent set of statistics and indicators can be derived for evidence-based policy formulation.

Institutional framework of implementation

18. In the multi-stakeholder environment for the SNA implementation strategy, a mechanism is needed to coordinate, monitor and report progress at the subregional, regional and international level. The purpose of this mechanism is to share information on the development and execution of the SNA implementation strategy.

19. The SNA implementation strategy uses a programme information structure to support programming and monitoring that are vital for overall coordination at the regional and country level in the multi-stakeholder environment. The ISWGNA has begun working with the regional commissions to seek the adoption of such an information system, which is highly desirable for effective project programming, monitoring and reporting. The project information model will be used to facilitate cooperation among agencies in delivering the programme elements of the SNA implementation strategy. It is expected that this coherent information system will assist in providing timely notice of possible synergies and impending duplications and gaps in work programmes. In addition, a standard programme documentation structure will be applied across the participating agencies.

20. The regional commissions and their advisory committees play an important role in facilitating coordination and regional cooperation in the SNA implementation programme. It is expected that existing regional coordination mechanisms, such as statistical committees or working groups, will be mobilised, in addition to new steering groups where needed, with the regional commissions acting as secretariats. Only when strictly necessary would the creation of new coordinating mechanisms be envisaged. Through the initiatives of the regional commissions and other development partners, broader collaboration among countries in the implementation of the SNA 08 can be achieved.

21. The ISWGNA proposed to establish a mechanism that could function in the form of an inter-agency and intergovernmental advisory group. This group, consisting of representatives of regional coordinating mechanisms, would advise the ISWGNA on maintaining and managing a coherent programme of work for the implementation of the SNA 08.

22. More detailed information on the ISWGNA strategy can obtained from the background document “Implementation strategy for the System of National Accounts, 2008”, available at http://unstats.un.org/unsd/statcom/doc09/BG-SNA2008.pdf.

Implementation of the SNA 08 – OECD strategy

23. The OECD countries’ plans for the implementation of the SNA 08 are staggered at present. Australia, Canada and the United States aim to implement the most important changes (employers’ pension schemes, capitalisation of research and development, military expenditures) between 2009 and 2013, the countries of the European Union are targeting the

year 2015, and some countries have not yet formulated implementation plans. These differences in the timing of implementation will not be conducive to international comparability of national accounts data during the transition period. To work through the transition period, the OECD and its National Accounts Working Party are pursuing a three-tier strategy.

24. First, countries accepted the need to supply estimates under both the old and the new standards for one period (according to the SNA 1993 and 2008 definitions) while the new standard is being adopted. This should help to provide users with a sense of the orders of magnitude involved in the changeover. These quantitative indications will be made available as part of the OECD national accounts metadata.

25. Second, during the transition period, implementation handbooks are being developed to maximise comparability of estimates by the time they find their way into countries' national accounts. This concerns in particular an OECD handbook on intellectual property products and a revised OECD manual on the measurement of capital. Other international work will also be useful in this respect, eg the work led by the United Nations Economic Commission for Europe on the impact of globalisation on national accounts, which deals with one far-reaching change in the SNA, the treatment of goods for processing. The OECD and Eurostat will also provide guidance on the treatment of emission permits on the basis of the SNA 08, although this issue has not been a major point of discussion during the SNA revision.

26. Third, the research agenda that was set as part of the SNA 08 is being pursued. Work on the research agenda should be an ongoing preoccupation of the OECD National Accounts Working Party. The same body will also be a platform for transmitting practical experience with the implementation of the SNA 08 from those countries that are first in the process to those that come later on.

27. Implementation of the SNA 08 is likely to be challenging – for OECD countries and beyond. It will be important for OECD countries to share their experience in the process with other countries outside the OECD area.

Progress in the implementation of the Balance of Payments and International Investment Position Manual, sixth edition (BPM6)

28. The IMF has already made substantial strides in implementing the BPM6. The following summary reviews the accomplishments to date as well as the steps that remain to be taken to ensure effective implementation.

A. Accomplishments

General awareness of the new standards

29. As noted, the work that led to the timely release of the BPM6 was accomplished through an inclusive process that involved extensive consultation with economies. Thus, most economies are now aware of the major changes in standards – indeed, they may have contributed insights in connection with particular changes being considered. Partly as a result of this, many economies have already begun implementing changes to their data collection and compilation systems in order to generate data on the new basis.

Specific outreach efforts

30. The IMF Statistics Department staff have engaged in extensive outreach efforts, including regional seminars, courses for compilers, and training of IMF economists. With

regard to regional seminars, the Statistics Department conducted nine such seminars in 2008 to advise compiling agencies of the major changes in the BPM6. In addition, the courses that the IMF conducts on balance of payments statistics (including the extended course at IMF headquarters and the abbreviated course in regional centres around the world) have now been switched to the BPM6 basis; we have completed eight of these courses. Finally, the IMF Statistics Department has conducted a training seminar for Fund economists and dealt with compilation questions on an ad hoc basis. Such ad hoc inquiries have been frequent and quite intensive.

Conversion matrix

31. The Statistics Department has prepared a conversion matrix to assist compilers in linking BPM5 to BPM6 components for both the balance of payments and the international investment position (IIP) accounts. The matrix explains the differences in content of these items where applicable so as to facilitate the conversion to the new manual.

Survey questionnaire to assess implementation

32. In order to obtain input from compilers on the preparation of a new balance of payments compilation guide, the Statistics Department has prepared a questionnaire that has been sent to compilers in Fund member countries, seeking their comments on the statistical importance of the major changes and the degree(s) of difficulty in implementing them.

Remittances

33. The Statistics Department has prepared a Remittances Compilation Guide[5] with chapters authored by the members of the Luxembourg Group. This guide will facilitate the collection of source data under the new standards.

B. Further work

Guides and similar material

34. As noted, the Statistics Department has begun work on the preparation of a new balance of payments compilation guide. The purpose of the compilation guide is to show how the conceptual framework described in the BPM can be implemented in practice. A completion date has not yet been set, but most of the writing and review of the document will take place in 2009 and 2010. Other agencies will collaborate in the preparation of the document. For example, the World Tourism Organization is working with the Statistics Department to update the guidance on travel, and other interested parties with relevant experience will be involved in writing selected sections.

35. Once the compilation guide is completed, the Statistics Department will revise the balance of payments textbook. The textbook is designed to provide illustrative examples and applications of concepts, definitions, classifications, and conventions contained in the manual.

36. Also, the Inter-Agency Task Force on Finance Statistics has agreed to update *External debt statistics: a guide for compilers and users*. This guide provides information on

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[5] *International transactions in remittances: guide for compilers and users* is based on the concepts in the BPM6. It is available at www.imf.org/external/np/sta/bop/remitt.htm.

the concepts, definitions, and classification of external debt data, the sources and techniques for compiling these data, and their analytical uses. It is expected to be released in 2013.

Additional regional outreach, regional seminars, training of IMF economists

37. During 2009 and 2010 the Statistics Department will undertake further outreach and regional seminars. It will also conduct training sessions for Fund economists, for individual or small groups of departments, and for outside experts who conduct technical assistance for the IMF.

Conversion of the Balance of Payments Yearbook (BOPSY) and International Financial Statistics (IFS)

38. The Statistics Department's current plans are to convert the BOPSY and the IFS to the BPM6 presentation basis in 2012, with regard to data for 2011. This conversion relates to the new ***format*** for IMF publications. The conversion must occur reasonably soon and at the same time for all countries so that global totals and subtotals can be calculated. The Statistics Department recognises that the adoption of the new methodological standards by most countries will be undertaken over an extended period.

Collaboration with inter-agency partners

39. The Statistics Department will continue to collaborate with its inter-agency partners in the implementation of the new standards. Ongoing work on overall statistical standards for cross-border activity is coordinated through the IMF Committee on Balance of Payments Statistics, which comprises 15 member countries, as well as representatives of six other international organisations. The Committee meets once a year and produces an annual report, which is posted to its website, along with the papers and reports discussed at the meetings.

Coordinated Direct Investment Survey to be conducted based on the BPM6

40. Since 2001 the Statistics Department has conducted an annual survey (the Coordinated Portfolio Investment Survey (CPIS)) in order to obtain the portfolio investment asset positions of jurisdictions by counterpart country of issuer, broken down between equity and debt instruments. Over 70 jurisdictions participate in the CPIS. In the light of the success of the CPIS, the Statistics Department has launched a similar survey for direct investment (the Coordinated Direct Investment Survey (CDIS)), which will begin collecting data as of end-2009. Preliminary data are to be reported to the Statistics Department in September 2010; they are expected to be released in late 2010 or early 2011, with revised data to be reported in March 2011 for mid-year release. Approximately 130 jurisdictions have indicated a willingness to participate in the CDIS. The CDIS is being conducted on the basis of the BPM6, and a number of economies participating in the CDIS have already updated their direct investment data collections to be consistent with the new standards.

Implementation of the 2008 SNA and BPM6 in the area of financial accounts

Reimund Mink[1]

A. Introduction

The UN Statistics Division, at its 39th and 40th sessions in February 2008 and February 2009, adopted the new System of National Accounts (2008 SNA) as the international statistical standard for national accounts and encouraged countries to implement it.[2] In the area of balance of payments, the revised IMF Balance of Payments and International Investment Position Manual, 6th edition (BPM6) was published at the beginning of 2009 and the new OECD Benchmark Definition of Foreign Direct Investment (BD4) was released in 2008.

The revision of the European System of National and Regional Accounts (1995 ESA) as a legal framework for EU countries based on the 2008 SNA is under way.[3] Eurostat's timetable foresees that the revised Regulation will be adopted by the European Parliament and Council in 2011 and implemented from 2011 to 2013, so that the new data can be compiled and transmitted by all EU countries in 2014. A crucial step in preparing the coordinated implementation of the revised ESA in the European Union will be to review the current legal acts related to economic and financial statistics within the European Community (EC) and to assess what amendments are necessary to comply with the new standards. This exercise will cover, notably, the ECB Regulations and also some EC Regulations with an overall impact on the compilation of euro area accounts (EAA).

This paper highlights the changes in the new 2008 SNA (and also in the BPM6) in the area of financial accounts compared to the 1993 SNA (and the BPM5) before focusing on implementation issues. It refers, in particular, to the European situation, where the implementation of the new ESA will be based on a legal act. The worldwide implementation of the 2008 SNA is likely to be subject to different national timetables. This paper then discusses some key elements to be implemented, namely, a more detailed sectorisation of financial corporations, the functioning of securitisation schemes, the description of specific financial assets and liabilities, and the design of from-whom-to-whom financial accounts by embedding monetary aggregates. It also refers to the support provided to the implementation process by two Handbooks co-drafted by the ECB: the BIS/ECB/IMF *Handbook on securities statistics* and the UN/ECB *Handbook on financial production, flows and stocks*.

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1 European Central Bank (e-mail: reimund.mink@ecb.int). The views expressed in this paper are those of the author and do not necessarily reflect the views of the European Central Bank. The author would like to thank Steven Keuning for his useful comments.

2 The 2008 SNA will be released in one volume. Countries are recommended to use the 2008 SNA as the framework for integrating economic and related statistics and in the international reporting of national accounts. The Inter-Secretariat Working Group on National Accounts (ISWGNA) will shortly make available an edited version of the 2008 SNA on the project website. The ISWGNA has also been asked to formulate a strategy for the implementation of the 2008 SNA, taking into account the different levels of implementation of already existing international statistical standards in the various countries.

3 Council Regulation (EC) No 2223/96 on the European system of national and regional accounts in the Community.

B. Changes in the new 2008 SNA and BPM6 compared to the 1993 SNA and BPM5

The update of the 2008 SNA was essentially based on a list of 44 issues for discussion.[4] Some of them were linked to topics related to relatively new financial phenomena. Table 1 of Annex 1 provides an overview of the issues related to financial products. In order to obtain a more complete picture of the updating process, it is also necessary to look at the issues for discussion in the context of defining institutional units and of classifying sectors. One of the central topics refers to questions on how to determine the relevant features of institutional units and how to group them into institutional sectors or subsectors. In this context, the financial corporation sector has been refined through the specification of nine subsectors, as shown in Table 2 of Annex 1. Another issue focuses on how to separately identify financial corporations involved in financial intermediation activities such as securitisation transactions, securities lending and repurchase agreements. As many of these activities are increasingly cross-border, a related issue deals with the question of how to determine the main residence criteria of a unit (Table 3 of Annex 1).

Taking into account that many refinements of the SNA may have adverse effects on the continuity of statistical data, there has long been some inertia towards substantially changing the system as a whole. This is also in line with the request of many researchers and analysts to keep macroeconomic time series as "stable" as possible over a long period of time. Nevertheless, financial innovations need to be incorporated into the SNA, as recommended in the current update, keeping the overall relevance of the system in policy and analysis up to date.

C. Governance structure of the implementation process in Europe

Looking at the implementation of the 2008 SNA from a European perspective, the revision process of the 1995 ESA is under way. However, its importance goes far beyond that of the SNA as a recommended statistical standard, as it is a legal instrument with a significant impact on key policy decisions in the European Union. Among other things, it refers to the so-called excessive deficit procedure (EDP), the contribution to the EU budget allocation of regional funds by the European Union and the contributions of member states to the capital of the ECB. Consequently, any changes in the new SNA will need to be carefully assessed in the current ESA revision process.

According to Eurostat, the tentative timetable foresees that the Regulation will be adopted by the European Parliament and Council and published in the Official Journal in 2011. The new ESA methodology will thereafter be implemented and the national accounts will be revised, including the back series, so that the new data can be transmitted by all countries in 2014. Three task forces will facilitate the implementation of the revised ESA: the task force on pensions, on research and development, and on bank services.

In the area of balance of payments, the BPM6 and new BD4 are seen as the basic statistical standards to be implemented. As balance of payments and international investment position data are seen as an essential building block for the euro area rest of the world account, the revised results will become available somewhat earlier than those of the other sector accounts. In this context, it was agreed that the BD4 should be implemented beforehand (in 2010) taking into consideration the decision of the OECD Council to implement the new version of the benchmark definition with 2009 as a reference year.

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[4] The 44 issues for discussion are listed on the UN Statistics Division website: http://unstats.un.org/unsd/sna1993/issues.asp.

D. What needs to be implemented?

From an ECB monetary policy perspective, it is important to integrate new elements reflecting financial innovation into the revised ESA and also into the economic and financial statistics available at the ECB. This essentially refers to the framework of euro area accounts, which require rather precise specifications of the institutional units and their classifications. Economic activities are described by transaction and other changes in position, and the architecture of the system is based on a complete sequence of accounts, including balance sheets. Therefore, implementation is necessary in terms of: institutional units and their classification in sectors and subsectors; new financial instruments; and a more detailed presentation of the accounts.

1. Financial corporations

The subsectors of the financial corporations sector have been expanded to allow a more useful presentation of their activities in the context of financial innovation. The definition of the units making up the various subsectors was changed to reflect the nature of their output (financial services) rather than their activities. Risk management and liquidity transformation were added to financial intermediation as activities which better capture the nature of the performance of the various financial corporations. Accordingly, the list of subsectors has been expanded to nine to accommodate the more detailed description of financial corporations as illustrated in Table 2 of Annex 1.

Combining the subsectors "central bank", "credit institutions" and "MMFs" (money market funds) coincides with "MFIs" (monetary financial institutions) as defined by the ECB.[5] MFIs cover those financial intermediaries through which the effects of monetary policy are transmitted to other entities of the economy. They are the central bank, deposit-taking corporations and MMFs. Financial intermediaries dealing with the pooling of risk are included in the subsectors "insurance corporations and pension funds". The "other financial institutions" cover the subsectors "investment funds except MMFs", "other financial intermediaries", "financial auxiliaries" and "captive financial institutions and money lenders".

Of particular importance are "investment funds except MMFs" as collective investment undertakings investing in financial and/or non-financial assets with the sole objective of investing capital raised from the public by issuing shares or units. Investment funds can be open or closed (open- or closed-end investment funds). Some investment funds invest in other funds ("funds of funds"). Hedge funds as a type of investment fund cover a heterogeneous range of collective investment schemes, typically involving high minimum investments, light regulation, and a wide range of investment strategies. Private equity funds are used for making investments in equity securities and are typically limited partnerships with a fixed term of 10 years (often with annual extensions). At inception, institutional investors make an unfunded commitment to the limited partnership, which is then drawn over the term of the fund.

Some efforts have been made to clarify the classification of specific institutional units within the financial corporations sector. These units are financial vehicle corporations engaged in the securitisation of assets (FVCs) and other institutions such as special purpose entities (SPEs), conduits and brass plate companies. The new SNA classifies FVCs as part of the subsector "other financial intermediaries, except insurance corporations and pension funds" (Table 4 of Annex 1). The new ECB Regulation, approved in December 2008, foresees the

[5] Regulation (EC) No 2423/2001 of the ECB of 22 November 2001 concerning the consolidated balance sheet of the monetary financial institutions sector (ECB/2001/13) and its corrections and amendments.

collection of data on these types of financial corporations. The Regulation defines FVCs as institutional units carrying out securitisation transactions. They incur debt securities, the credit risk of which is transferred to the investors in these debt securities, and they also acquire assets underlying the issuance of debt securities. FVCs may be constituted under contract law (as common funds managed by management companies), trust law (as unit trusts), company law (as public limited companies) or any other similar mechanism.[6]

FVCs are distinguished from entities that are created solely to hold specific portfolios of financial assets and liabilities. When the entity does not bear market or credit risk, it is combined with its parent corporation, if resident in the same country as the parent corporation. When the entity is set up outside the economic territory in which the parent corporation is located, it is considered resident in the country in which the entity is incorporated, even if it has little or no physical presence. In such cases, it is treated as a separate institutional unit of the financial corporation subsector "captive financial institutions and money lenders" of the host economy.

2. Securitisation

The securitisation of assets or future income streams is a well-established process that has already been operating for several decades. However, financial innovation has led to the establishment and extensive use of new financial corporations to facilitate the creation, marketing and issuance of debt securities. Furthermore, securitisation schemes have become increasingly sophisticated and are driven by different considerations such as cheaper funding costs than those available through banking facilities, a reduction in regulatory capital requirements, risk transfer and the diversification of funding sources. Securitisation results in debt securities for which coupon or principal payments (or both) are backed by specified financial or non-financial assets or future income streams.[7] A variety of assets or future income streams may be used including: residential and commercial mortgage loans; consumer loans; corporate loans; government loans; credit derivatives; and future revenue.

Securitisation schemes vary within and across debt securities markets. The schemes can be grouped into three broad types. The first type, usually known as on-balance sheet securitisation, involves debt securities backed by an income stream generated by the assets. The assets typically remain on the balance sheet of the debt securities issuer (the original asset owner) as a separate portfolio. The issuance of debt securities provides the original asset owner with funds. The second type of scheme, often referred to as "true sale" securitisation, involves debt securities issued by an FVC where the underlying assets have been transferred from the original asset owner's balance sheet. The proceeds received from selling the debt securities to the investors fund the purchase of the assets. The income stream from the pool of assets (ie typically the interest payments and principal repayments on the loans) is used to make the coupon payments and principal repayments on the debt securities.

The third type of scheme, often referred to as "synthetic" securitisation, involves the transfer of credit risk related to a pool of assets without transferring the assets themselves. The original asset owner buys protection against possible default losses on the pool of assets using credit default swaps (CDS). The proceeds from the issuance of the debt securities are

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[6] Regulation (EC) No 24/2009 of the ECB of 19 December 2008 concerning statistics on the assets and liabilities of financial vehicle corporations engaged in securitisation transactions (ECB/2008/30).

[7] This definition of securitisation is broader than the one specified in the ECB Regulation, which is similar to the second and third types of securitisation scheme described above.

placed by an FVC on a deposit, and the interest accrued on the deposit, together with the premium from the CDS, finances the coupon payments on the debt securities issuances. If there is a default, the original asset owner continues to receive the coupon and principal payments, as some of these funds are redirected away from some investors to cover the default losses. Synthetic securitisation without an FVC occurs when the original asset owner issues credit-linked notes (CLN). CLN are debt securities that are backed by reference assets, such as loans and bonds, with an embedded CDS allowing credit risk to be transferred from the issuer to the investors. The investors sell the credit protection on the reference assets to the protection buyer (or issuer) by making an upfront payment to the buyer. If no default occurs during the life of the note, the redemption value of the note is paid to the investors at maturity. If a default occurs, the investors receive the redemption value of the note less the value of the default losses.

Implementing the new ECB Regulation will enable the collection of data on FVCs and will cover the transactions and positions of these institutional units vis-à-vis other market participants, specifically MFIs. Given the role of MFIs as originators and loan servicers for many FVCs, an integrated reporting scheme is planned for FVCs and MFIs in order to limit the reporting burden as far as possible, and to achieve the best possible quality of statistics. In particular, data on securitised loans granted by these institutions, but which originated and continue to be serviced by MFIs, and by other resident sectors and non-residents will have to be reported. However, questions remain on how to establish reporting schemes to collect data on FVCs created outside the euro area and by non-MFIs.

3. Categories of financial assets and liabilities

Several refinements of the various financial asset and liability categories have been included in the new SNA (see also Table 5 of Annex 1). In relation to the accounting of repurchase agreements, some detailed changes have been included, such as the statement that “on-selling is common” and that, in this case, a negative asset is recorded for the lender to avoid double-counting. Furthermore, repos should be covered not only in terms of cash collateral but also in terms of security collateral, as well as gold swaps, loans and deposits.

For securities, a more detailed breakdown is recommended: equity is split into shares (listed and unlisted), other equity, and investment fund shares or units. In addition, a more comprehensive specification of debt securities is foreseen, taking into account the development of security-by-security databases. Debt securities are described with breakdowns by (original) maturity, currency, and type of interest. For financial derivatives, borderline cases between them and securities are discussed. Furthermore, a distinction is made between options and forwards, while employee stock options are shown separately. Further breakdowns are suggested as supplementary items such as credit derivatives or embedded derivatives.

Detailed consideration has been given to the accounting treatment of insurance technical provisions, specifically, pension entitlements, guarantees and reinsurance technical provisions.

4. Pension entitlements

Questions arose as to whether all pension entitlements should be covered within the asset and liability boundary. This question is closely linked to the issue of how far provisions, as shown in business accounting, should be treated as financial assets and liabilities. For the time being, the institutional differences among countries related to pension schemes (capitalised versus pay-as-you-go) generate significant differences in the accounts, making international comparisons difficult, even though such institutional differences also lead to different economic behaviour. In particular, pension assets (in other words, future pension rights) in countries with mainly capitalised systems are recorded as household wealth, while

future pension rights in countries with government-sponsored pay-as-you-go schemes (like in France, Germany, Italy and Spain) are not recorded. Of course, the entitlements are also more certain in the former case.

The future treatment of such government-sponsored pay-as-you-go schemes in the new SNA was especially controversial. In essence, there is now consensus on distinguishing between pension schemes sponsored by general government, which should be recorded in the core national accounts, and schemes that should be recorded only in a supplementary table on pensions. The updated SNA will include such a new mandatory table showing the flows and stocks of all pension schemes. For the benefit of the users of the accounts, all countries will be expected to produce the new table, and it was suggested that this table should be compulsory for all EU countries through the new ESA Regulation.

In 2007, the work of the Eurostat/ECB Task Force on Pensions concentrated on the design of the supplementary table for social insurance pension schemes. The overall logic of the table is to present the opening and closing stocks of pension entitlements for all social insurance pension schemes (including social security), and the transactions and other economic flows during the period that account for the difference between the opening and the closing positions, thus systematically showing the pension obligations for all these schemes and facilitating international comparability (see also Table 6 of Annex 1).

5. Guarantees

Guarantees have a significant impact on the behaviour of economic agents, both by influencing their decisions on production, income, investment or saving and by modifying the lending and borrowing conditions in financial markets. Some borrowers would have no access to loans in the absence of guarantees, while others would benefit from comparatively low interest rates. Guarantees are particularly significant for the general government and public sectors as government activities are often linked to the issuance or activation of guarantees.

The 1993 SNA indicates that only guarantees that are classified as financial derivatives should be recorded in the standard accounts, with supplementary information to be provided where contingencies are important for policy and analysis. In the 2008 SNA, three types of guarantees are distinguished: CDS; standardised guarantees; and one-off guarantees.[8] While general agreement on the treatment of CDS (as financial derivatives) and one-off guarantees (as contingencies) was achieved, some questions remain concerning the treatment of standardised guarantees.

Guarantees for which the probability of default can be established but do not meet the definition of a financial derivative, and hence are related to an actual financial arrangement between the lender and the borrower, are treated as standardised guarantees. Classic examples are export credit guarantees or student loan guarantees. The expected loss to be considered is a probability-weighted concept. Although each individual guarantee is unlikely to be called, it is likely for the group as a whole that some payments will have to be made. So, for each individual guarantee, an amount is recorded that would be a percentage of the loan guaranteed based on loans of similar risk. The estimated future payments would be discounted and would take account of any likely recoveries where payment under the guarantee gives the guarantor rights over defaulting assets or other collateral.

The guarantee may be contracted by either the creditor or the debtor, but the asset is always recorded in the balance sheet of the entity that holds the right to claim and receive funds

[8] See also IAS 37 on Provisions, Contingent Liabilities and Contingent Assets.

from the guarantor. Rerouting transactions is necessary when the entity that pays the premium is not the one that holds the asset. Given the similarity of such cases with insurance contracts (both relying on the spreading of risk over a large number of independent contracts), they are treated as insurance technical provisions. Its valuation would be consistent with the treatment of guarantees as provisions.

The expected losses are recorded as paid to the guarantor, becoming reserve assets of the guarantor who also incurs a matching liability at the same time. An equivalent asset would be added to the balance sheet of the sector receiving the guarantee, ie that of the entity which granted the initial loan. It is recognised that this could imply an overstatement of its assets and net worth. This situation may have already arisen in the 1993 SNA, where a lender buys a credit derivative for protection against a deterioration of the creditworthiness of the borrower. Some additional information on loan provisioning made by the creditor in the case of non-performing loans will be provided as a memo item or in a set of supplementary accounts in the new SNA to assist analysts assessing this "overstatement" on the asset side.

6. Reinsurance technical provisions

With reinsurance, specific financial transactions take place between reinsurers and direct insurers: transactions in reinsurance technical provisions and transactions in financial claims with ceding corporations. Reinsurance technical provisions due to reinsurance contracts are shown as the direct insurer's financial claims on the reinsurer without consolidating them. Reinsurance technical provisions are included in various subcategories of insurance technical provisions. To separate them, they may have to be identified by type of insurance (non-life, life, pensions) or by type of provision (unearned premiums, unpaid claims, insurance provisions).

Financial claims of reinsurers with ceding corporations are financial assets that reinsurers have with direct insurers (the ceding corporations) – as collateral provided to cover insurance liabilities that a direct insurer retains from the liquid funds which it has to pay to a reinsurer under a reinsurance contract. Such claims are established based on short- or long-term reinsurance contracts with no significant underwriting risk transfer. They include the recognition and measurement of a deposit asset or liability at the inception of such contracts. Such claims are usually classified as long-term loans.

7. Embedding money into from-whom-to-whom accounts

Monetary aggregates comprise money stock, and changes in it, and are reflected in the developments of the so-called counterparts of money, which are derived by exploiting certain accounting identities. All countries measure monetary developments; in many cases, it is considered that monetary growth is related to developments in economic activity and, over the longer term, in inflation, and that it contains valuable information concerning financial stability. Numerous definitions of money are possible; the national choice is likely to be an empirical matter, depending on what measure or measures best relate to developments in the national economy.

An initial step has been made towards allowing the integration of money into the new SNA, taking into account the appropriate breakdowns of financial institutions and instruments.[9] A three-dimensional system of the financial accounts and balance sheets, with a breakdown of the financial corporation sector and of the financial asset and liability categories as proposed for the new SNA and by counterpart, opens up the possibility of identifying money in a matrix,

[9] This was already included in the 1995 ESA as Annex 5.1: "Link with measures of money".

and, thus, of analysing monetary developments in the widest possible financial framework and in a way that allows them to be related more easily to the economic developments recorded in the production and income accounts.

A system to be developed identifies the relevant holders, issuers, and financial assets and, among the holders, distinguishes between financial and non-financial sectors, since their money holdings may have different implications for economic activity and inflation. The money-issuing sector is assumed to consist of the resident MFIs. Money holders are the remaining resident sectors, including the remaining financial corporation subsectors. Modifications might have to be made in cases where central government is treated as a money issuer and the remaining government subsectors as money holders. Holdings of money by the money-issuing sector itself are netted out. The rest of the world is assumed to be money-neutral. Financial assets as monetary variables are considered to comprise: currency; liquid deposits with the central bank and deposit-taking corporations; marketable short-term debt securities issued by the money-issuing sector; and shares or units issued by MMFs.[10]

E. Support provided to the implementation process by handbooks co-drafted by the ECB

1. BIS/ECB/IMF *Handbook on securities statistics*

The *Handbook on securities statistics* prepared by the BIS, the ECB and the IMF develops a framework on how to present relevant, coherent and internationally comparable securities statistics used in financial stability analysis and monetary policy formulation. Hence, the Handbook will assist policymakers and analysts in these areas, as well as national agencies that prepare securities statistics within their existing presentation frameworks.

Part one of the Handbook (as already posted on the IMF website) deals with debt securities issues. It outlines how to classify debt securities according to existing international statistical standards, and extends these groupings by also discussing new classifications. Essentially, five classifications are applied: by issuing sector, currency, maturity, interest rate, and market. Specific attention is also dedicated to the description of securitisation and structured debt securities.[11] It is envisaged that the Handbook will be extended to cover debt securities holdings and other types of securities.

2. UN/ECB *Handbook on financial production, flows and stocks*

Some support is intended to be provided to the implementation process by a future UN/ECB *Handbook on financial production, flows and stocks*. It may explain how to compile transactions, other flows and balance sheets for financial corporations in the context of institutional sector accounts. The Handbook will be for use by staff in statistical institutions, central banks and other institutions engaged in collecting, compiling and disseminating national accounts data as well as for users requiring a better understanding of such data.

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[10] R Mink, "Money, financial investment and financing", paper presented at the ISI Conference in Lisbon, August 2007.

[11] The Handbook has been released to the public on the IMF's website: www.imf.org/external/np/sta/wgsd/index.htm.

F. Revision and implementation of the new European System of National and Regional Accounts (ESA)

1. Implementing the new manuals and amending the current ECB legal acts

To ensure full consistency of the various datasets at the European level, a suitable approach for the revision of the ECB legal acts appears to be to wait until the 1995 ESA has been revised and to integrate the changes thereafter. This means that the preparatory work and the subsequent drafting of the texts may start in 2010 (commencing with the legislative process for the ESA Regulation).

A crucial step in preparing the coordinated implementation of the manuals is the review of the current ECB legal acts (Annex 2) and the assessment of which amendments are necessary to comply with the new standards. For that purpose, all ECB legal acts must be amended. The results of this review are included in the attached tables (Annex 3). This would enable the amendment process of all legal acts to be completed well in advance of their implementation date (assuming the legislative procedure for amending the ESA follows the envisaged schedule). If they are all approved by 2012 at the latest, taking into account the statistical domains where there is a need to set up new data collection systems and/or to adjust national legislation (eg in the area of external statistics), sufficient time will be left for their implementation by national central banks and reporting agents, to the extent necessary. In the meantime, it is advisable to anticipate the changes emanating from the new standards at the earliest possible occasion, in view of the requirement to provide back series according to the new methodology.

2. Necessary amendments of current EC legal acts

The same review applies to EC Regulations with an overall impact on the compilation and dissemination of quarterly national accounts and EAA. With regard to quarterly government accounts, data requirements were laid down in four Community Regulations which must be amended.[12] They refer to the provision of quarterly government revenue, expenditure, deficit, financial accounts and balance sheet data. The fourth Regulation concerns the provision of quarterly government debt broken down by financial instrument.

Further adjustments will be needed to update the Regulation dealing with the compilation of quarterly non-financial accounts by institutional sector, in collaboration with the European Commission. The provision of such national non-financial accounts was prepared by a Joint ECB/Commission Task Force and laid down in a European Parliament and Council Regulation on quarterly sector accounts in 2005.[13]

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[12] Regulation (EC) No 1221/2002 of the European Parliament and Council on quarterly non-financial accounts for general government; Commission Regulation (EC) 264/2000 on the implementation of Council Regulation (EC) No 2223/96 with respect to short-term public finance statistics; Regulation (EC) No 501/2004 of the European Parliament and Council on quarterly financial accounts for general government; and Council Regulation (EC) No 1222/2004 concerning the compilation and transmission of data on the quarterly government debt.

[13] See Regulation (EC) No 1161/2005 of the European Parliament and Council of 6 July 2005 on the compilation of quarterly non-financial accounts by institutional sector. Member states with less than 1% of EU 25 GDP are not required to provide quarterly non-financial accounts by institutional sector except for general government and the rest of the world.

Annex 1

Table 1

Issues related to new financial products discussed in the context of the SNA update

Issue	Item
1	Repurchase agreements
2	Employer retirement pension schemes
3	Employee stock options
4	Valuation of non-performing loans, loans and deposits
4a	Non-performing loans
4b	Valuation of loans and deposits; write-off and interest accrual on impaired loans
5	Non-life insurance services
6	Financial services
35	Tax revenue, uncollectible taxes and tax credits (recording of taxes)
37	Activation of guarantees (contingent assets) and constructive obligations
42	Retained earnings of mutual funds, insurance corporations and pension funds
43	Interest and related issues
43a	Treatment of index-linked debt instruments
43c	Fees payable on securities lending and gold loans
44	Financial assets classification

Source: http://unstats.un.org/unsd/sna1993/issues.asp

Table 2

Subsectors of the financial corporations sector in the 2008 SNA and draft ESA

2008 SNA/draft ESA	Grouping as described in the draft ESA
Central bank	Monetary financial institutions (MFIs)
Deposit-taking corporations except the central bank	
Money market funds (MMFs)	
Investment funds, except money market funds	Other financial institutions
Other financial intermediaries	
Financial auxiliaries	
Captive financial institutions and money lenders	
Insurance corporations	Insurance corporations and pension funds
Pension funds	

Table 3

Issues related to institutional units, groupings of units and residence of units

Issue	Item
24	Public-private partnerships (PPPs) (including buy-own-operate-transfer (BOOT) schemes)
25	Units
25a	Ancillary units
25b	Holding companies, special purpose entities (SPEs), trusts; treatment multi-territory enterprises; recognition of unincorporated branches
25c	Privatisation, restructuring agencies, securitisation and special purpose vehicles (SPVs)
38a	Change of economic ownership (as term)
39	Residence
39a	Meaning of national economy
39b	Predominant centre of economic interest (as term)
39c	Clarification of non-permanent workers and entities with little or no physical presence
C26	Currency unions
C30	Financial corporations classification

Source: http://unstats.un.org/unsd/sna1993/issues.asp

Table 4

Subsector "other financial intermediaries, except insurance corporations and pension funds" and its subdivision

Other financial intermediaries, except insurance corporations and pension funds
o Financial vehicle corporations engaged in securitisation transactions (FVCs)
o Security and derivative dealers
o Financial corporations engaged in lending
o Specialised financial corporations

Table 5

Financial assets and liabilities classification (issue 44) by category (2008 SNA)

Financial asset and liability category/subcategory	Issues discussed within the context of updating the 1993 SNA and BPM5
Monetary gold and SDRs	
Monetary gold	Treatment of subcomponents of monetary gold
	Fees payable on gold loans (43c)
SDRs	SDRs as an asset and as a liability
Currency and deposits	
Currency	
Transferable deposits	Repurchase agreements (1)
Interbank positions	Valuation of loans and deposits (4b)
Other transferable deposits	Financial services (6)
Other deposits	
Debt securities	Treatment of index-linked debt instruments (43a)
Short term	Fees payable on securities lending (43c)
Long term	
Loans	Repurchase agreements (1)
Short term	Non-performing loans (4a)
Long term	Valuation of loans and deposits; write-off and interest accrual on impaired loans (4b)
	Financial services (6)
Equity and investment fund shares or units	
Equity	
Listed shares	
Unlisted shares	Valuation
Other equity	
Investment fund shares or units	Retained earnings of investment funds (42)
Money market fund shares or units	
Other investment fund shares or units	
Insurance technical provisions	Retained earnings of insurance corporations and pension funds (42)
Non-life insurance technical provisions (including provisions for calls under standardised guarantees)	Non-life insurance services (5)
	Activation of guarantees (contingent assets) and constructive obligations (37)
Life insurance provisions	
Pension entitlements	Employer retirement pension schemes (2)
Provisions for calls on standardised guarantees	
Financial derivatives and employee stock options	
Financial derivatives	
Options	
Forwards	
Employee stock options	Employee stock options (3)
Other accounts receivable/payable	Tax revenue, uncollectible taxes, and tax credits (recording of taxes) (35)
Trade credits and advances	
Other accounts receivable/payable	

Table 6

Supplementary table on pension schemes in social insurance

Rela-tions	SNA code	*Row No*	**Recording** / **Sponsor** / *Column number*	Core national accounts: Non-general government: Defined con-tribution schemes A	Core national accounts: Non-general government: Defined benefit schemes and other[1] non-defined contri-bution schemes B	Core national accounts: Non-general government: Total C	Core national accounts: General government: Defined contri-bution schemes D	Core national accounts: General government: Defined benefit schemes for general government employees[2]: Classified in financial corpora-tions E	Core national accounts: General government: Defined benefit schemes for general government employees[2]: Classified in general govt F	Not in the core accounts: Classified in general govern-ment G	Not in the core accounts: Social security pension schemes H	Total pension schemes I	Counter-parts: pension entitle-ments of resident house-holds[4] J
			Opening balance sheet										
	F63	1	Pension entitlements										
			Changes in pension entitlements due to transactions										
Σ 2.1 to 2.4	D52 01	2	Increase in pension entitlements due to social contributions										
	D52 01	2.1	Employer actual social contributions										
	D52 11	2.2	Employer imputed social contributions										
	D52 31	2.3	Household actual social contributions										
	D52 41	2.4	Household social contribution supplements[5]										
		3	Other (actuarial) change of pension entitlements in social security pension schemes										
	D53 21	4	Reduction in pension entitlements due to payment of pension benefits										
2 + 3 – 4	D7	5	Changes in pension entitlements due to social contributions and pension benefits										
		6	Transfers of pension entitlements between schemes										
		7	Changes in pension entitlements due to pension scheme reforms										
			Changes in pension entitlements due to other flows										
		8	Changes in entitlements due to revaluations[6]										
		9	Changes in entitlements due to other changes in volume[6]										
			Closing balance sheet										
1 + Σ 5 to 9	F636 12	10	Pension entitlements										
			Related indicators										
	P1	*11*	*Output*										
		12	*Assets held at the end of the period to meet pensions*[7]										

Notes: [1] Such other non-defined contribution schemes, often described as hybrid schemes, have both a defined benefit and a defined contribution element. [2] Schemes organised by general government for its current and former employees. [3] These are non-autonomous defined benefit schemes whose pension entitlements are recorded in the core accounts. [4] Counterpart data for non-resident households will only be shown separately when pension relationships with the rest of the world are significant. [5] These supplements represent the return on members' claims on pension schemes, both through investment income on defined contribution schemes' assets and for defined benefit schemes through the unwinding of the discount rate applied. [6] A more detailed split of these positions should be provided for columns G and H based on the model calculations carried out for these schemes. [7] This row includes financial and non-financial assets held for the sole purpose of paying future pensions, excluding claims by the pension scheme on its sponsor; an explanation should be provided of which assets have been included.

The cells shown as ▉ are not applicable; the cells in ▒ will contain different data from the core accounts.

Annex 2:
ECB legal acts in the area of statistics

Monetary financial institutions and markets statistics

(a) Regulation (EC) No 2423/2001 of the ECB of 22 November 2001 concerning the consolidated balance sheet of the monetary financial institutions sector (ECB/2001/13), OJ L 333, 17.12.2001, p 1.

(b) Regulation (EC) No 993/2002 of the ECB of 6 June 2002 correcting Regulation ECB/2001/13 concerning the consolidated balance sheet of the monetary financial institutions sector (ECB/2002/4), OJ L 151, 11.6.2002, p 11.

(c) Regulation (EC) No 2174/2002 of the ECB of 21 November 2002 amending Regulation ECB/2001/13 concerning the consolidated balance sheet of the monetary financial institutions sector (ECB/2002/8), OJ L 330, 6.12.2002, p 29.

(d) Regulation (EC) No 1746/2003 of the ECB of 18 September 2003 amending Regulation (EC) No 2423/2001 (ECB/2001/13) concerning the consolidated balance sheet of the monetary financial institutions sector (ECB/2003/10), OJ L 250, 2.10.2003, p 17.

(e) Regulation (EC) No 2181/2004 of the ECB of 16 December 2004 amending Regulation (EC) No 2423/2001 (ECB/2001/13) concerning the consolidated balance sheet of the monetary financial institutions sector and Regulation (EC) No 63/2002 (ECB/2001/18) concerning statistics on interest rates applied by monetary financial institutions to deposits and loans vis-à-vis households and non-financial corporations (ECB/2004/21), OJ L 371, 18.12.2004, p 42.

(f) Regulation (EC) No 4/2007 of the ECB of 14 December 2006 amending Regulation (EC) No 2423/2001 (ECB/2001/13) concerning the consolidated balance sheet of the monetary financial institutions sector (ECB/2006/20), OJ L 2, 5.1.2007, p 3.

(g) Regulation (EC) No 1489/2007 of the ECB of 29 November 2007 amending Regulation (EC) No 2423/2001 (ECB/2001/13) concerning the consolidated balance sheet of the monetary financial institutions sector (ECB/2007/18), OJ L 330, 15.12.2007, p 20.

(h) Regulation (EC) No 63/2002 of the ECB of 20 December 2001 concerning statistics on interest rates applied by monetary financial institutions to deposits and loans vis-à-vis households and non-financial corporations (ECB/2001/18), OJ L 10, 12.1.2002, p 24.

(i) Regulation (EC) No 2181/2004 of the ECB of 16 December 2004 amending Regulation (EC) No 2423/2001 (ECB/2001/13) concerning the consolidated balance sheet of the monetary financial institutions sector and Regulation (EC) No 63/2002 (ECB/2001/18) concerning statistics on interest rates applied by monetary financial institutions to deposits and loans vis-à-vis households and non-financial corporations (ECB/2004/21), OJ L 371, 18.12.2004, p 42.

(j) Notice of the ECB on the imposition of sanctions for infringements of balance sheet statistical reporting requirements, OJ C 195, 31.7.2004, p 8.

(k) Regulation (EC) No 1027/2006 of the ECB of 14 June 2006 on statistical reporting requirements in respect of post office giro institutions that receive deposits from non-monetary financial institution euro area residents (ECB/2006/8), OJ L 184, 6.7.2006, p 12.

(l) Regulation (EC) No 958/2007 of the ECB of 27 July 2007 concerning statistics on the assets and liabilities of investment funds (ECB/2007/8), OJ L 211, 14.8.2007, p 8.

(m) Regulation (EC) No 24/2009 of the ECB of 19 December 2008 concerning statistics on the assets and liabilities of financial vehicle corporations engaged in securitisation transactions (ECB/2008/30).

(n) Guideline of the ECB of 1 August 2007 on monetary, financial institutions and markets statistics (recast) (ECB/2007/9), OJ L 341, 27.12.2007, p 1.

Financial accounts and government finance statistics

(a) Guideline of the ECB of 21 November 2002 on the statistical reporting requirements of the ECB in the field of quarterly financial accounts (ECB/2002/7), OJ L 334, 11.12.2002, p 24.

(b) Guideline of the ECB of 17 November 2005 amending Guideline ECB/2002/7 on the statistical reporting requirements of the ECB in the field of quarterly financial accounts (ECB/2005/13), OJ L 30, 2.2.2006, p 1.

(c) Guideline of the ECB of 20 April 2006 amending Guideline ECB/2002/7 on the statistical reporting requirements of the ECB in the field of quarterly financial accounts (ECB/2006/6), OJ L 115, 28.4.2006, p 46.

(d) Unofficial consolidated text [1 (a)–(c)]. Produced by the Office for Official Publications of the European Communities 28.4.2006.

(e) Guideline of the ECB of 15 November 2007 amending Guideline ECB/2002/7 on the statistical reporting requirements of the ECB in the field of quarterly financial accounts (ECB/2007/13) OJ L 311, 29.11.2007, p 47.

(f) Guideline of the ECB of 17 February 2005 on the statistical reporting requirements of the ECB and the procedures for exchanging statistical information within the European System of Central Banks in the field of government finance statistics (ECB/2005/5), OJ L 109, 29.4.2005, p 81.

(g) Guideline of the ECB of 3 February 2006 amending Guideline ECB/2005/5 on the statistical reporting requirements of the ECB and the procedures for exchanging statistical information within the European System of Central Banks in the field of government finance statistics (ECB/2006/2), OJ L 40, 11.2.2006, p 32.

(h) Guideline of the ECB of 18 December 2006 amending Guideline ECB/2005/5 on the statistical reporting requirements of the ECB and the procedures for exchanging statistical information within the European System of Central Banks in the field of government finance statistics (ECB/2006/27), OJ C 17, 25.1.2007, p 1.

(i) Guideline of the ECB of 15 November 2007 amending Guideline ECB/2005/5 on the statistical reporting requirements of the ECB and the procedures for exchanging statistical information within the European System of Central Banks in the field of government finance statistics (ECB/2007/14), OJ L 311, 29.11.2007, p 49.

External transactions and positions

(a) Guideline of the ECB of 16 July 2004 on the statistical reporting requirements of the ECB in the field of balance of payments and international investment position statistics, and the international reserves template (ECB/2004/15), OJ L 354, 30.11.2004, p 34.

(b) Guideline of the ECB of 31 May 2007 amending Guideline ECB/2004/15 on the statistical reporting requirements of the ECB in the field of balance of payments and international investment position statistics, and the international reserves template (ECB/2007/3), OJ L 159, 20.6.2007, p 48.

(c) Unofficial consolidated text of Guideline ECB/2007/3 [as corrected by a corrigendum, published in OJ L 244, 19.9.2007, p 30]. Produced by the Office for Official Publications of the European Communities, 10.7.2007.

(d) Recommendation of the ECB of 16 July 2004 on the statistical reporting requirements of the ECB in the field of balance of payments and international investment position statistics, and the international reserves template (ECB/2004/16), OJ C 292, 30.11.2004, p 21.

(e) Recommendation of the ECB of 31 May 2007 amending Recommendation ECB/2004/16 on the statistical reporting requirements of the ECB in the field of balance of payments and international investment position statistics, and the international reserves template (ECB/2007/4), OJ C 136, 20.6.2007, p 6.

Annex 3

Monetary financial institutions and markets statistics

(a) Regulation concerning the consolidated balance sheet of the monetary financial institutions sector (ECB/2001/13) and its corrections or amendments:[14] www.ecb.int/ecb/legal/pdf/l_33320011217en00010046.pdf.

Item	Number of Whereas (…) or Article …	Reference to 1995 ESA	Need for change
Consolidated balance sheet of MFIs Branches, head offices, etc Definition of sectors Definition of assets	(1), (2), (12), Annex I.3	Chapter 2	Check new text Check new text Check new text and codes Check new text
Asset and liability categories (by maturity, currency)	Annex I.1; III.4–8		Check new text and codes
Asset and liability terminology: Securities other than shares Shares and other equity	Annex I.2, various tables		Modify text for: debt securities; equity; money market fund shares/units; investment fund shares/units other than MMF shares/units
Deposits (breakdowns by subsector, maturity/currency, use of balances representing prepaid amounts in the context of electronic money)	(13), (17)		Check new text
Loans (breakdowns by subsector, maturity/currency, type, write-offs/writedowns, reclassifications)	(13), (14), (15), 4.1		Check new text
Securities (valuation changes)	(14), (15), 4.1		Check new text
Debt securities (covers money market paper)	(16)		Check new text
Definition of reporting agents, reporting population, resident, residing	1, 2		Check new text
Sector and subsector classification **Asset and liability categories by counterparty**	Annex I.2, various tables III.9; IV.3–5, 8; V.9	Reference to sectors and subsectors: S.11, S.123, S.124, S.125, S.13, S.1311-S.1314, S.14, S.15	New subsector classification of financial corporations; check new text and codes
MFIs	3 Annex I.1.8	Reference to subsectors S.121 and S.122	Check new text and codes
MMFs	4.6 Annex I.1.7		Check new text
Mergers	Annex II		Check new text

[14] A new Regulation, including a recast, is expected to have been approved by the end of 2008. The work mentioned below would then apply to this new text, related Guideline and guidance notes.

(b) Regulation (EC) No 63/2002 (ECB/2001/18) concerning statistics on interest rates applied by monetary financial institutions to deposits and loans vis-à-vis households and non-financial corporations (ECB/2004/21) and amendments.

Item	Number of Whereas (…) or Article …	Reference to 1995 ESA	Need for change
MFIs as reporting population	(1), (5)		Check new text
Credit institutions and other institutions	1.3–5, 2		Check new text (new subsector of financial corporations)
Definition of reporting agents, reporting population, resident, residing	1.1		Check new text
Sector classification: households and non-financial corporations	(1), 1	Sector codes	Check new text and codes
Asset and liability categories: deposits and loans (by currency)	(1), 1.4–5		Check new text

(c) Regulation (EC) No 958/2007 of the ECB of 27 July 2007 concerning statistics on the assets and liabilities of investment funds (ECB/2007/8).

Item	Number of Whereas (…) or Article …	Reference to 1995 ESA	Need for change
Investment funds (IF) as reporting population	(1), (3), (6), (7), (8), 1–6, 8		Check new text (new subsector of financial corporations)
NCB, MFIs, OFIs	1, 2.2		Check new text
Residency and institutional sector	Annex I.2–3 Annex II.3	Definition of sectors and subsectors, reference to paragraphs in ESA	Check new text and codes
Asset and liability categories	Annex I.3 Annex II.1	Asset categories with reference to paragraphs in ESA	Check new terminology

Financial accounts and government finance statistics

(d) Guideline of the ECB of 21 November 2002 on the statistical reporting requirements of the ECB in the field of quarterly financial accounts (ECB/2002/7) and amendments.

Item	Number of Whereas (…) or Article …	Reference to 1995 ESA	Need for change
ECB requirements in the field of quarterly euro area financial accounts	(4), 2	1995 ESA	Check text
Sector and subsector classification	2, Annex I, III	Reference to 1995 ESA sectors and subsectors	New subsector classification of financial corporations; check new text and codes
Asset and liability categories	Annex I, III	Reference to ESA 1995 categories and subcategories	Check new text and codes

(e) Guideline of the ECB of 17 February 2005 on the statistical reporting requirements of the ECB and the procedures for exchanging statistical information within the European System of Central Banks in the field of government finance statistics (ECB/2005/5) and amendments.

Item	Number of Whereas (…) or Article …	Reference to 1995 ESA	Need for change
ECB requirements in the field of quarterly government finance statistics	(6)–(9),	1995 ESA	Check text
Revenue and expenditure	Annex I, T1 Annex II.2	Reference to 1995 ESA categories	Check new text and chapter on general government
Deficit-debt adjustment	Annex I, T2 Annex II.2		
Debt	Annex I, T3 Annex II.2		
Sector and subsector classification	Annex II.1	Reference to 1995 ESA sectors and subsectors	New subsector classification; check new text and codes
Definitions (debt, revenue and expenditure, deficit-debt adjustment)	1		Check new chapter on general government

External transactions and positions

(f) Guideline of the ECB of 16 July 2004 on the statistical reporting requirements of the ECB in the field of balance of payments and international investment position statistics, and the international reserves template (ECB/2004/15) as amended by Guideline ECB/2007/3 of 31 May 2007.

Item	Number of Whereas (…) or Article …	Need for change
Time of recording of dividends	Annex III.1.1	Dividends to be recoded when the shares go "ex dividends" for quoted shares
Explanations of the scope of direct investment, and of the directional principle. The issue of whether the OFBV is a close proxy for market value may also need to be examined	Annex III.1.3	Add a reference to "fellow enterprises" and to transactions with fellow enterprises
Recording of monetary gold	Annex III.1.7	Check if the sentence on this sub-item is still fully valid
Breakdowns to be reported	Annex II – tables	Sectors to separately identify "other financial corporations" Changes in direct investment standard components

EC legal acts in the area of statistics and manuals

http://eur-lex.europa.eu/JOIndex.do?ihmlang=en

Discussant comments on session IPM17: Implementing the 1993 System of National Accounts

Henk Lub[1]

Mink's paper provides detailed insight into some important methodological changes in the financial account. Balance of payments compilers are faced with the problem of collecting the necessary source data. The full harmonisation of the rest of the world account and the balance of payments in the 2008 System of National Accounts (SNA) and Balance of Payments Manual 6 (BPM6) means that they have to deal with some standard items for which information is hard to find. One example is the new standard component "insurance, pensions and standardised guarantee schemes" in the financial account. With respect to pension entitlements, households, which are the holders of the claims, are not easy to survey and, moreover, are known to have little insight into their pension claims. On the other hand, the information on liabilities can most probably be acquired easily. For this purpose, only a limited number of pension funds have to be surveyed. As a solution, therefore, I advocate deriving the pension claims of resident households from an exchange of information on pension liabilities of non-resident pension funds. International organisations can provide assistance in setting up such a data exchange.

Cullen and Williams provide us with a frank description of implementation issues. As the Australians are far ahead of other countries in the implementation of the new standards, national accountants and balance of payments compilers from other countries can derive valuable insights from this paper.

The Australian paper is different from the other two because it does not take the official methodology for granted. It identifies four principles for dealing with deviations from the international standards. This is an issue that is ignored by the international organisations, as they are focused on advocating the official methodology. The first principle is that departures from the standard should be few in number. Countries should adhere to the international standards, but it should also be admitted that some methodological aspects are irrelevant for particular countries. The second principle is that deviations from the standard methodology should be carried through all statistics to preserve statistical consistency. The third principle is that, where feasible, a straightforward reconciliation with the standard should be enabled. While I fully agree with the first two principles, I am somewhat puzzled by the third one. If information is available, it is not clear why statisticians would want to deviate from the standard, unless, of course, they do not agree with the standard methodology. The fourth principle is that departures from the standard can only be implemented after extensive consultation and publicity. Again, I agree. Any deviations from the standard should, of course, be accounted for in the metadata.

The exchange of opinions on concrete implementation issues will prove to be very helpful to compilers of statistics. In this respect, it would be useful to organise meetings on actual experiences with implementation issues in addition to the outreach meetings and training seminars organised by the international organisations. I am far from proposing that we all start deviating from the handbooks. I believe that close adherence to the official methodology should be our goal, as it improves the comparability and other quality aspects of statistics. On the other hand, one should also realise that compiling statistics involves costs and a

[1] Netherlands Bank.

reporting burden to society, so a frank and open discussion between national accountants and balance of payments compilers about this trade-off would be useful. This is a task that the Irving Fisher Committee on Central Bank Statistics (IFC) can fruitfully perform. As the IFC is a club of central bankers, it could be the right forum to discuss balance of payments issues. The general principles described in the Australian paper are a good starting point for such a discussion.

Invited Paper Meeting 67

Models of modern data and metadata systems

Chair: Steven Keuning, European Central Bank

Papers:

Innovative technologies for statistical production: experiences of Statistics South Africa
Matile Malimabe and Ashwell Jenneker, Statistics South Africa

A model data producer: the importance of sound metadata management – Botswana's case
Sabata Legwaila, Bank of Botswana

Metadata at Statistics Canada: implementation opportunities and challenges
Michel Cloutier and Alice Born, Statistics Canada

SDMX as the logical foundation of the data and metadata model at the ECB
Gérard Salou and Xavier Sosnovsky, European Central Bank

Integrative analysis of cancer genomic data
Steven Shuangge Ma, Yale University

Documenting the research life cycle: one data model, many products
Mary Vardigan, Peter Granda, Sue Ellen Hansen, Sanda Ionescu and Felicia LeClere, University of Michigan

Chairman summary of session IPM 67: Models of modern data and metadata systems

Steven Keuning[1]

The design and operation of modern data and metadata systems pose a number of challenges. They require sophisticated information technology (IT) systems, including increasingly complex data warehouses. Systems also need to be able to communicate with one another, which requires the development and implementation of international, preferably global, data exchange standards such as XBRL for accounting information and SDMX for statistical information. The six papers (four on official statistics and two on research) covered the following topics:

- Lessons learnt in developing data and metadata management systems for statistics production and data access and analysis
- Data and metadata management and governance in statistical institutions, from micro to macro and from respondents to final users
- Strategic opportunities from a central metadata store: improved data quality, better management information
- The benefits and opportunities for organisation of data and metadata management within the SDMX service-oriented architecture and data framework
- Web-based technologies for decision-makers and the public in accessing, retrieving and using statistics and metadata
- Making independent data sets relatable through metadata
- Standardising documentation using an international standard in XML and a relational database, for the content and exchange of metadata describing social science data (the Data Documentation Initiative).

Discussant: Lars Thygesen (Statistics Denmark)

The discussant advised participants not to be over-ambitious in setting up metadata systems or statistical information systems; a modular and stepwise approach should be applied, making sure that modules can be used independently. He emphasised the need to see whether solutions developed by other organisations could be used rather than "re-inventing the wheel". He stressed the need for standardisation within and across organisations and said that it is necessary today to be SDMX-compliant. He argued that developing common data structure definitions (DSDs) was vital to inter-agency standardisation, and that DSDs should be built based on a conceptual model of the reality that statistics need to depict.

[1] European Central Bank.

Concluding remarks

The issues covered today went beyond IT challenges and looked at the impact on data quality, statistical capability, response burden and costs. They can change the way decision-makers and citizens could access and use statistics in the future.

Future work should promote standardisation, encompassing the use of best practices, such as those described in the session, in data and metadata management and governance and in statistical and research institutions, from micro data to macro statistics and from respondents to final users. The vision for databases, input data warehouses and statistical processes lies in an input system in which information is supplied only once and is produced and disseminated in harmonised formats which should be based on widely used international standards (such as SDMX). A vision for IT applications that can read and understand statistical data independently of their location, origin and IT implementation would support re-usability and management and staff expertise and would lower metadata development costs. Web-based technologies will enable these visions for systems using metadata to be realised.

In conclusion, it may be appropriate to organise a similar session in two years' time in order to take stock of any progress made in globally harmonised data structure definitions and to review the possibility and necessity of introducing developments in metadata within official statistics to bioinformatics.

Innovative technologies for statistical production: experiences of Statistics South Africa

Matile Malimabe[1] and Ashwell Jenneker[2]

1. Introduction

Statistics South Africa's development of the metadata management system has its origins in the organisation's need to develop a data warehouse. This idea came about because the organisation wanted to improve the quality of the statistics it produced. It was believed that the data warehouse would play a major role in positioning the organisation within its vision of becoming the preferred supplier of quality statistics. To begin our data warehouse initiative, we paid exploratory visits to various statistical organisations that had embarked on data warehouse developments in order to learn from their experiences. These visits taught us a number of things about the complexities, difficulties and peculiarities of developing a data warehouse. In particular, our visit to the Australian Bureau of Statistics showed us that for a data warehouse to have any chance of succeeding in a statistical organisation, it needs to have a strong foundation of standards and policies that govern the statistical production processes. Standardisation of concepts and their definitions, as well as classifications of the terms of the actual survey process, were all found to be necessary for the production of quality statistics. To be successful, a data warehouse also needs to operate in this environment.

1.1 Metadata strategy

A formal process for standardisation was developed through consultation with standards experts. A standards development and implementation life cycle was devised to monitor the standardisation process. The following is the standards development life cycle (see Appendix A).

The next step for us was to investigate the strength of our standards and policy foundation. In the course of this investigation, a number of gaps were identified. Chief among these was the lack of standard metadata in the organisation. The need for standardisation of metadata necessitated the development of a metadata management system. However, this system had to form a good mix with all the other ingredients identified as necessary for the production of quality statistics.

Strategically, our metadata management system forms part of a larger system of applications called the End-to-End Statistical Data Management Facility (ESDMF). As its name implies, the ESDMF will consist of tools and applications to support the whole statistical production process. Within this facility there is a metadata subsystem which plays a central role, as the ESDMF was conceived to be metadata-driven. In a statistical organisation, a metadata-driven system is inevitable because metadata are used and generated at every stage of the statistical production process.

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As a data factory, a statistical organisation needs to organise and package data in ways that make it useful for the end user. Produced data must also meet certain minimum quality standards. To satisfy both these requirements, the use of metadata is indicated. In packaging its data and statistical products, a statistical organisation must ensure that they are accompanied by metadata for ease of analysis and interpretation by their users. Metadata also play a key role in ensuring that the end products of this data factory are of good quality. Such metadata include descriptions of concepts used in the organisation, classifications of these concepts, methodologies and business rules.

The development of a metadata management system was informed by the following principles:

- *Maintenance of trust in official statistics*: descriptions of data collection methods, data processing and storage needed are part of how statistical data are presented to the end user. Such presentation engenders trust in the users.
- *Facilitation of correct interpretation of statistical data*: metadata accompany datasets and other statistical products.
- *Quality of statistics*: standard metadata contribute to the improvement of a number of quality dimensions. Standardisation of concepts and their definitions and classifications are essential ingredients of standardised metadata.

This project is aimed at supporting the strategic theme “Enhancing the quality of products and services”. Within the Data Management and Information Delivery (DMID) project, the metadata management system, more than any of its components, addresses this strategic theme.

1.2 Overall project objective

Statistics South Africa’s metadata management system therefore forms part of the organisation’s broader objective to continuously improve the quality of its products. As the driver of the overall facility, the metadata management system is the first deliverable of the DMID project. The metadata management system is also divided into smaller logical units based on the organisation’s classification of its metadata. Survey metadata, consisting of elements for providing the overall description of a statistical survey, are the first of these metadata deliverables. The survey metadata component is fashioned along the lines of Statistics Canada’s Integrated Metadata Data Base (IMDB) Metastat.

The survey metadata component is followed by the definitional metadata component. This will incorporate into the metadata management system the standardised organisation-wide concepts and their definitions and classifications as well as other components that form part of definitional metadata.

2. Statistical metadata

The essence of Stats SA’s meta-information system is captured by how the organisation uses the metadata. Metadata are used within the organisation to enable statistical production processes. This means that metadata are used during various stages of statistical production as essential inputs to production processes. However, the production processes, in turn, produce metadata. These metadata are also important in documenting the trail of activities during the statistical production process. The documentation of production activities informs related metadata issues, such as the assessment of data quality and data interpretation.

2.1 Metadata classification (categories of metadata)

Because of the diversity of uses to which metadata are put, it was decided that the contents of the meta-information system should be aligned with these uses. The logical consequence of this decision was to undertake a project to classify all of the organisation's metadata. The following is a list of the categories of metadata adopted by Stats SA.

2.1.1 Survey metadata

Often referred to as dataset metadata, survey metadata are used to describe, access and update dataset data structures. Stats SA chose to call this type of metadata "survey" rather than "dataset" because some of the metadata, such as information about the population which the data describe, refer to the broader aspects of the survey and not only to the dataset.

2.1.2 Definitional metadata

These are metadata describing the concepts used in producing statistical data. These concepts are often encapsulated into measurement variables used to collect statistical data. Descriptive text is used to define individual concepts; however the concepts are further grouped into logical topics. These main topics are effectively classifications of data. Hence, included in Stats SA's package of definitional metadata are classifications drawn from different study domains.

2.1.3 Methodological metadata

These metadata relate to the procedures by which data are collected and processed. These may include sampling, collection methods, editing processes, etc.

2.1.4 System metadata

"System metadata" refers to active metadata used to drive automated operations. Some examples of system metadata are:

- Publication or dataset identifiers, date of last update
- File size
- Mapping between logical names and physical names of files
- Dataset input flows
- Methods of access to databases
- Coordinates as kept in the metadata store
- Table and column definitions, schema and mappings of data.

2.1.5 Operational metadata

These are metadata arising from and summarising the results of implementing the procedures. Examples include respondent burden, response rates, edit failure rates, costs and other quality and performance indicators, etc.

The different components of Stats SA's meta-information system are logically grouped according to these categories of metadata. This means that the database for the meta-information system has different data structures corresponding to these metadata categories.

3. Metadata management tools

The developed metadata management application allows Stats SA staff members to perform a number of tasks in the metadata management process. Currently, the ESDMF consists of the following ***tools***:

3.1 Access control tool

Provides a central point for creating and managing access to all ESDMF tools.

3.2 Metadata registration tool

Provides a central registry for the registration, revision and relating of administered items.

3.3 Metadata browser

Enables users to browse and search for administered items in the central registry.

3.4 Quality tool

Enables users to set up the quality framework that is based on the South African Quality Assessment Framework (SASQAF) document, and forms the foundation for the assignment of quality indicators to surveys, the capturing of quality metadata for a survey and conducting a quality assessment of a survey.

3.5 ESDMF reporting tool

Allows users to generate static and ad hoc reports based on the data contained in the various ESDMF tools.

3.6 Survey metadata capture tool

Manages the metadata for a survey on series and instance level.

3.7 Access control tool

Provides a central point for creating and managing access to all ESDMF tools. Tools are linked to resources that can be linked to roles, and roles can be linked to users. This association establishes highly customisable user access privileges that are encapsulated in a single sign-on process. This allows a user to sign on once and then access any tool to which the user has privileges.

4. Standards and formats

4.1 Metadata registration tool

The metadata registration tool is based on the International Organization for Standardization (ISO) 11179 Part 6 standard, with some customisation for Stats SA purposes.

4.2 Quality tool

The quality tool is based on the SASQAF standard, which in turn is based on the IMF Data Quality Assessment Framework.

4.3 Metadata revisions and version control

Metadata are expected to change owing to revisions of concepts and their definitions, changes in classifications, business rules and user requirements. Sometimes more than one version of certain metadata used for the same purpose may exist at the same time.

In the current survey metadata tool, the “edit” functionality of the application allows for the revision of captured survey metadata. These revisions may only be performed by users with the requisite permissions. For changes to be effected, revised/edited metadata must be approved by an assigned approver. Survey metadata can only have a single version. This means that the edit process serves to update the metadata repository.

Version control will be introduced when metadata categories with metadata that can have more than one version are incrementally built into the system.

It is important to note that version control will be built into every aspect of the ESDMF.

5. Organisational and cultural issues

5.1 Roles in metadata/statistical life cycle management

In order to understand user requirements, we engaged the survey divisions as pilot groups. We involved them in verifying our understanding of the requirements, which was used to design and implement the system. These pilot groups were also involved during user acceptance testing (UAT).

The survey metadata capture tool can be used by different users depending on the roles that they were assigned. For example, a capturer could capture metadata, but this must be approved by an approver, who is usually the supervisor or manager. There is also a role of viewer, whereby metadata could be viewed but the rights are restricted. For example, a viewer cannot edit, change or approve metadata.

The network infrastructure for both development and user environments is supported by the IT department. This includes configuring the environments as well as housing the different servers in the data centre of the organisation. The databases are also managed by the IT department. The ESDMF is based on the Linux open source operating system. Because the IT department does not have the skills to service and maintain this environment, we have outsourced these services from a private company. However, this is done in conjunction with the IT department, who are in the process of raising their skill level in order to be able to support the ESDMF in the Linux environment.

During UAT, any identified defects were logged on the CA Unicentre system, which is used for IT help desk support. With the aid of the IT help desk technicians, we were able to customise the system so that the unique categories of defects for the ESDMF system could be recorded.

The development of the ESDMF was not done in isolation from the existing projects within Stats SA. For example, the following projects were ongoing and in parallel with the development of the ESDMF:

- SAS 9 migration
- Re-engineering of other surveys

- Community Survey 2007
- Census 2011.

Some members of these other projects were also involved in the development of the requirements and review of the architecture of the ESDMF. The goal is to ensure that we do not do things in isolation so that we can share our knowledge and ease the integration of the new system into existing systems.

Staff from the Methodology and Standards division were seconded to the ESDMF project. Their role was to develop policies, procedures and standards for the system. In our development process, policies are first developed and approved. Thereafter, procedures and standards are developed. So for each phase, the policies are used to develop and implement the system deliverables for that phase.

For example, for the first phase, we developed a policy for data quality and a policy for metadata. As a result, phase 1 was focused on capturing metadata (metadata policy) in order to ensure the quality of the output product (data quality policy). For the second phase, we already have approved policies for concepts and definitions as well as for classifications.

5.2 Partnerships and cooperation between agencies

In Latvia, we learned that during the development of their system, their outsourced supplier took a while to understand the business of the statistical organisation. It came as no surprise when we ran into similar problems with our supplier, much as we were not happy about it.

The Latvian Integrated Statistical Data Management System (ISDMS) uses Bo Sundgren's model of a metadata system, which they used as a foundation for the theoretical definition of metadata. We learned the importance of having a solid foundation for the definition of metadata.

In Ireland, we learned about the cultural issues regarding communication between the customer and the supplier. Additionally, they had the same problem as in Latvia in that the development of their system also took longer than originally planned. This happened even after Ireland provided very detailed documentation on most of the major aspects of the system.

In Slovenia, the metadata model is also based on Bo Sundgren's model, with some modifications in areas where they believe that their components are adequate to meet Bo Sundgren's requirements for a metadata system.

The Slovenian development model is to build the system in-house and outsource when they get to the maintenance phase. They continuously re-skill and train their staff as they bring new technologies on board.

We adopted a few practices from New Zealand. For example, we brought the statistical value chain into Stats SA. This is how we view the business of statistical production processes within Stats SA. We also adopted the way they broke down metadata into five categories, namely, definitional, operational, system, dataset and procedural/methodological metadata. One of their experts helped us to evaluate the respondents to the tender for the development of the ESDMF.

In Australia, we learned that in order to have a successful data warehouse project, there is a need to develop policies and standards which will define how the system should be designed. When we returned to South Africa from that trip, we restructured the team into two groups, the policies and standards team and the technology team. The standards and policies team developed policies and standards which were used by the technology team in the development and implementation of the ESDMF.

Experts from Sweden occasionally came to Stats SA to advise us on various aspects of metadata and statistical production processes. For example, a few years ago, Bo Sundgren, a well known expert on metadata, came to Stats SA to advise us on how to proceed in the development of a metadata system. Recently, another expert from Stats Sweden came to conduct a workshop on SCBDOK, the Stats Sweden metadata template. He also conducted training on quality definition and quality declaration of official statistics. This gave us a better idea on how to develop a data quality template, as well as how data quality should be reported on.

In 2006, we met Alice Born (from Stats Canada) when we attended the METIS conference. We engaged her regarding her agency's efforts to develop its metadata system, the Integrated Metadata Data Base (IMDB). We applied that knowledge during the development of our survey metadata capturing tool.

Consultants from Canada help us in other projects within Stats SA. During their tenure we engage them for advice and other consultation.

We used the Corporate Metadata Repository (CMR) model by Dan Gillman, from the US Bureau of Statistics, in our understanding of the metadata model, especially with regard to the ISO 11179 specification. We also sent our metadata model to him and other metadata experts for review and critique.

6. Organisational change management

6.1 Climate and culture assessment

Preliminary organisational change management (OCM) initiatives necessitated a review of the operating culture at Stats SA in order to understand the "lie of the land" in which the system will be introduced. The information contained in the culture and climate assessment was obtained through a number of OCM diagnostic interventions, targeted specifically to internal stakeholders. This was done by holding focus groups as well as running an online survey via the Stats SA intranet.

A key challenge to Stats SA is to focus the organisation on the strategic importance of the DMID project, not only insofar as it assists individuals in their immediate job function, but even more importantly, how it contributes to the overall well-being of South African society at large and the contribution it makes to strategic decision-making at the governmental level.

6.2 Change readiness assessment

A change readiness assessment was conducted to determine the current capacity of Stats SA to change, and to identify areas of resistance towards DMID requiring OCM interventions.

The following change readiness dimensions are integral to enabling commitment to the DMID and formed the basis of the change readiness assessment:

- Clear vision
- Effective leadership
- Positive experience with past change initiatives
- Motivation to carry out the project
- Effective communication
- Adequate project team resources.

6.3 What is change readiness?

OCM is a critical, although often bypassed, element in organisations. It focuses on the human response to change, helping people to understand, accept and commit to a new way of working. One of the key first steps in the change process is the change readiness assessment.

The change readiness assessment is a process used to determine the levels of understanding, acceptance and commitment likely to affect the success of the planned change. Change readiness is gauged along an axis known as the change commitment curve (see Appendix B).

As the DMID project phases roll out, different stakeholders will need to be at specific levels of commitment. The level of commitment required will be dependent on the role they play in the DMID project and their ability to influence the programme. The change commitment curve will provide a framework for understanding and tracking the requisite levels of commitment that stakeholders need to be assisted in attaining so that OCM interventions can be developed accordingly.

A change readiness assessment will become an obligatory OCM intervention prior to the rollout of a new phase of the DMID project.

6.4 Findings

The following were the findings from the assessments:

- Executive management does not have the same understanding of the DMID project.
- Lack of communication between management and subordinates makes it difficult for subordinates to understand the purpose of the project and the impact it has on their working lives.
- Lack of support from executive management will result in resistance to the project and make success difficult.
- If management does not communicate, does not understand, and does not promote the project, it will have difficulty in delivering the message and obtaining “buy-in” from staff in the organisation.

6.5 Next steps from the findings

The findings of the assessments made it possible to identify where some of the key staff members belonged on the change commitment curve. In general, most were in the “setting the scene” and “achieving acceptance” area bounded in time by “contact” (“I know something is changing”) and “understanding” (“I know the implications for me”). Obviously, a lot of effort is needed in order to move from that area to “achieving commitment”, as demonstrated by “internalisation”, wherein staff can claim that “This is the way I do things”.

Another outcome of these assessments was to organise a leadership alignment workshop. In this workshop, the Executive Committee was given a presentation of the findings and the path forward. The path forward is to ensure that the leadership understands the goals of the project and how they line up with the vision of Stats SA. The leadership was also instructed on how to communicate the same message about the project.

7. Lessons learned

The supplier had a difficult time understanding the business of Stats SA, which is statistical production processes. Additionally, the goal of the project is to improve quality, which will help support the vision of Stats SA to be the preferred supplier of quality statistics. Even in the face of this vision, the supplier failed to recognise that quality was a primary business objective.

Under pressure of meeting the deliverables, the supplier ignored the skills transfer plan, with the result that the Stats SA developers were not involved in the final design and development of the system.

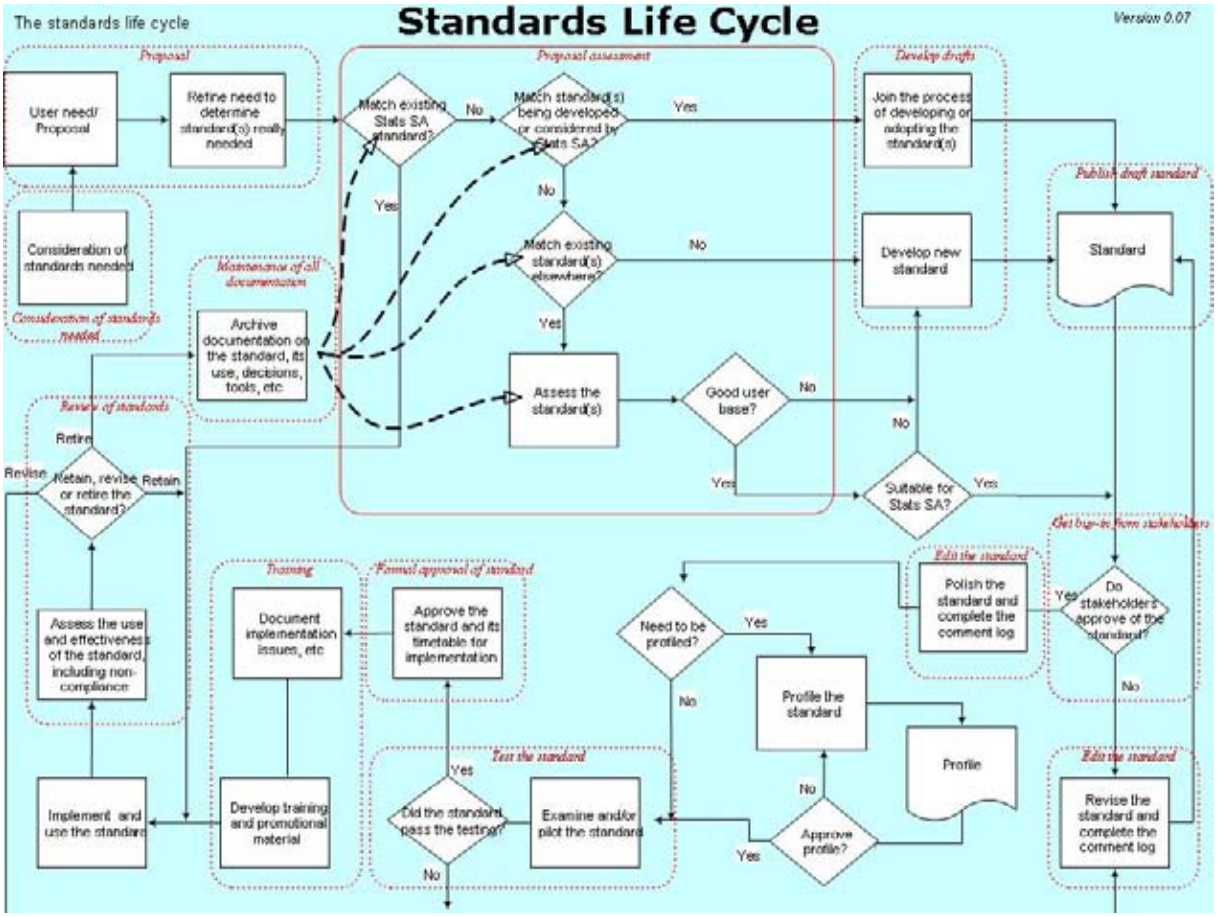
For a project of this magnitude (three years) and complexity, we decided to break down the deliverables into 12 phases. Each phase was planned to be three months long. Also, each phase was envisaged as a complete deliverable in its own right, even though the next phase was designed to build on the previous phases. The first phase was delivered late mainly due to the lack of understanding that the supplier demonstrated. The key is that clear understanding of the requirements is very important in meeting the deliverables as well as milestones for those deliverables.

Phase 1 took a very long time, in view of the time allocated for the project, owing to challenges uncovered in the capabilities of the service provider, as this was a new undertaking for it, and in capacity as a result of staff turnover (for both Stats SA and the service provider).

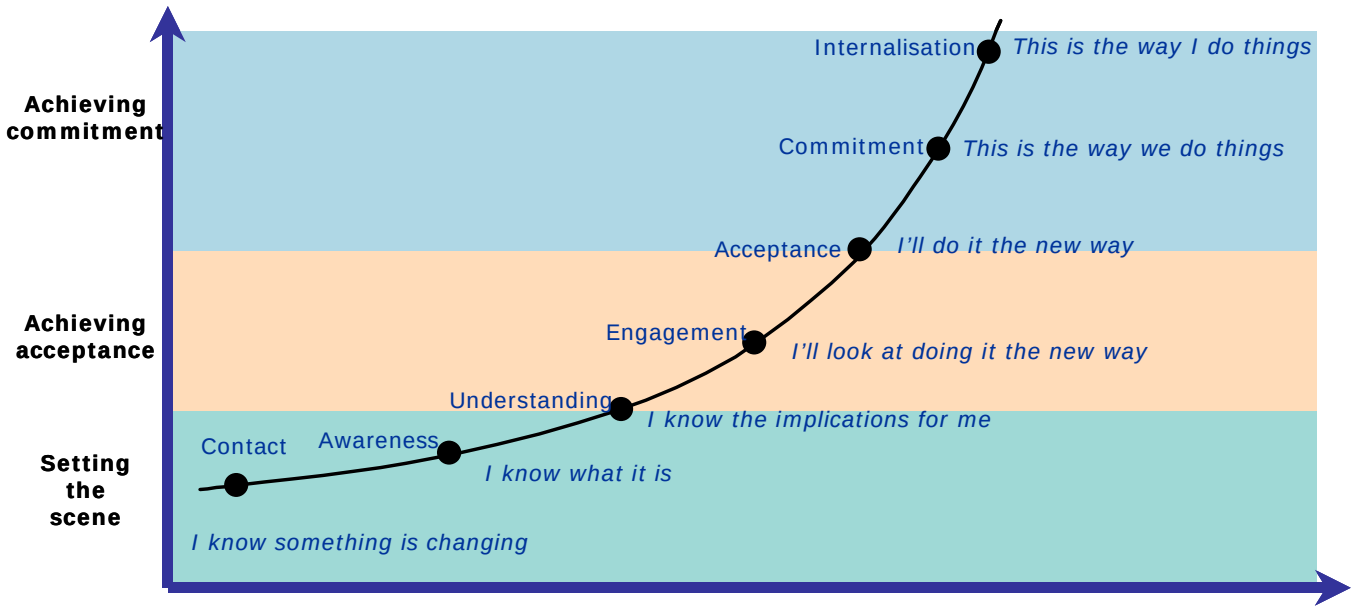
It became evident that the approach was not effective, as the project was only in phase 2 out of 12 phases after two thirds of the time allocated had elapsed. An alternative approach was then put in place for progress to be based on tool delivery versus the phase approach.

It was during this process that the service provider instituted some claims against Stats SA, which has led to a disassociation pending a legal conclusion, thus endangering the DMID project. At this stage only seven out of 52 tools have been delivered.

Appendix A:
Standards development life cycle



Appendix B:
Change commitment curve



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A model data producer: the importance of sound metadata management – Botswana's case

Sabata Legwaila[1]

Introduction

The availability of quality statistics is a prerequisite for the formulation of appropriate macroeconomic and financial policies. Therefore, the importance of statistics cannot be overemphasised. Activities throughout the modern economy, in the government and private business sectors, as well as other spheres of the broad economy, increasingly require up-to-date and accurate statistics, especially given that credibility is the key to policy effectiveness. Like all modern and up-and-coming economies, Botswana has come to recognise the importance of quality and timely and transparent statistics, the production of which is guided by internationally accepted standards.

Because of demand for quality statistics by users, statistics producers now emphasise producing timely, internationally comparable and transparent statistics. For there to be transparency, there is a need to document the processes of data production through the use of metadata. Metadata are simply a description of how the data were produced, be it the production processes, description of concepts and terminology, classification and standards, statistical methods and software used, as well as the creators of the data.

One of Botswana's statistical objectives has been to produce timely, accurate and transparent statistics. This has taken the form of the country taking an active part in international data improvement initiatives, in particular that of the International Monetary Fund (IMF), through the United Kingdom Department for International Development (DFID)'s financial assistance. Such efforts have helped give a broad range of official statistics in Botswana, compiled across several agencies, backbone and discipline towards improvement efforts, through a focus on metadata issues.

The purpose of this paper is to outline Botswana's experience of attaining modern data producer standards through metadata management. In addition, the paper also discusses the benefits that the country has achieved with reference to the aforementioned statistics, and the way forward for the production of statistics in Botswana, especially in utilising modern data and metadata management systems. The main focus of the paper is on the country's experience with the production of monetary and balance of payments statistics, as this is where the author has the most experience. But this is not to downplay the effort made in other areas to overcome the many and diverse challenges.

An overview of models of modern data and metadata systems

Data are public goods; hence their production cannot be limited to use by nationals. With the world's economies operating in a global arena, the need for quality data is at the forefront, to enable timely and accurate policy decisions, especially with the advent of recessions and

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financial turmoil. Ultimately, the value of statistics depends upon their quality[2]. The producers of statistics and the methods and standards employed in statistics production must have credibility. With the advent of technology and global competition, it is becoming more apparent that national, international, and transnational data are needed for policy formulation and evidence-based decision-making at national and international levels. As such, national data enter the international statistical systems, where standardisation is necessary to produce consistent, international datasets. Hence, models of national data are, to a large extent, influenced by international data systems and models.

The international community, such as the IMF and the World Bank, therefore plays an important role in statistical development by promoting and implementing internationally agreed standards, methods and frameworks for statistical activities. Since the international community has a stake in national statistical systems, it ensures that statistics are compiled using common methods which enable international comparisons of statistics and enhance coherence of statistics across subject areas through the use of standardised concepts and definitions. By providing a common basis for comparison, international guidelines make statistics more useful and offer more transparent reporting of outcomes. They also help to establish benchmarks or standards against which national statistical systems can measure their performance and through which they can strive to reach even higher standards. This has led statistics producers to adopt models of data to meet modern data needs, and to put in place metadata systems that not only enhance transparency, but also increase ease of usability.

Metadata are essential in all stages of the statistical production process in that they assist the user in understanding the data and all the processes involved in their production. Users can utilise sources of information more effectively if they know the definition of concepts and classifications behind the data and how they have been produced. There is, therefore, a wide variety of metadata systems being developed by specialists in various fields, some simple and others more sophisticated (Dragon, 1995–2000) in relation to their compilation and management[3].

A quest for quality in statistics: Botswana's case

Background to statistical developments in Botswana

To be effective, statistical systems must be backed up by legislation that provides both safeguards of confidentiality for the providers of raw data and assurances of integrity and accessibility for users. The nature and organisation of national statistical agencies vary from country to country. In decentralised systems, separate agencies have independent mandates to compile and disseminate statistics in particular areas. But even in highly centralised systems, responsibilities may be divided. Central banks, for example, are usually mandated with the collection of data on money and banking and other areas such as the balance of payments. Thus, a national statistical system is often a network of agencies whose activities are usually coordinated by legislation, administrative practices and professional standards, which is essential for avoiding discrepancies in data.

In Botswana, the main agency responsible for producing national statistics is the Central Statistics Office ((CSO), which is due to be transformed from a government department into an autonomous agency, the National Statistics Office). However, the Bank of Botswana has

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2 See World Bank (2002).

3 See T J Lukhwareni et al (2005).

responsibility for balance of payments and monetary statistics, while the Ministry of Finance and Development Planning provides government finance statistics. Necessary intra-agency coordination is provided through various working groups and a high-level Statistics Producers Committee (SPC). The overall statistical objective is to promote good governance in statistics, which entails transparency and accountability, and hence leads to well-guided policy formulation and decision-making by stakeholders, including government, households and businesses.

While, through the CSO, Botswana has for many years enjoyed a reputation for the production of relatively reliable statistics, the quest for a coordinated approach to adopting an overall framework of good statistical processes started in 2001 with the preparation by IMF staff of a data Report on the Observance of Standards and Codes (ROSC)[4]. The ROSC carried out in Botswana assessed statistics covered by the General Data Dissemination System (GDDS), namely real sector, prices, government finance, monetary and balance of payments, against benchmarks set out in the IMF's Data Quality Assessment Framework (DQAF). The report noted that Botswana's statistics were of generally good quality, but that there were shortcomings in terms of both compilation and, in particular, periodicity and timeliness of dissemination. To help address these, since 2001 Botswana has participated in the GDDS Project for Anglophone Africa, through which technical assistance is provided jointly by the IMF and the World Bank, and funded by the DFID. Initially, the project was intended to last for three years, but was subsequently extended to a second phase, due to end in October 2009; a third phase is then scheduled to commence. While the length of the project indicates the extent of the work that is needed, the continuing financial support from the DFID is itself a clear indication of the positive impact across the range of countries covered by the project.

The following major recommendations were made under the various statistical areas:

- Monetary statistics: expansion of data coverage to include other depository corporations that were not covered in the then monetary survey, in order to produce a full depository corporations survey; proper application of the concept of residency by banks; banks to submit data electronically; and there was a need for the development of statistical database software;
- Balance of payments: improving periodicity by moving to quarterly as opposed to annual data as well as improving coverage and/or methodology for various balance of payments items, most importantly trade in services;
- Government finance statistics: adopting the 2001 GFS Manual, timely dissemination of budgetary central government accounts as well as compilation of consolidated data of general government (both local and central government);
- Real sector: acceleration of work programme for implementing the System of National Accounts (SNA) 1993 with respect to national accounts and producing and disseminating the producer price index , as well as regular updates of the consumer price index (CPI) weights, every five years.

With respect to documentation, prior to 2001, at the Bank of Botswana, except for internal working documents, there was no publicly available documentation on how the data were produced. Moreover, while the data were disseminated on a timely and regular basis (the Bank's *Botswana Financial Statistics* publication is produced on a monthly basis, and the annual report contains an extensive range of statistical tables; both are available on the Bank's website), there was no publicly available metadata documentation in this respect. Thus, apart from experience, data users had no well-based expectation about when they

[4] See Appendix 1 for a summary of the mission.

could expect to receive data updates, what the policy is regarding revisions, or confidence that other users did not have more favourable access.

Implementing plans for improvement

Participation in the anglophone GDDS Project has led to the development of metadata outlining appropriately prioritised plans for improvement, which were first published in the IMF Dissemination Standards Bulletin Board (DSBB) in August 2002[5]. To initiate the actual implementaion of plans for improvements, the country's authorities requested technical assistance from the IMF through the GDDS Project, both under phase 1 and phase 2, which adopted a modular approach. The main purposes of the technical assistance (TA) missions were to assist with implementation of plans for improvements in specific areas.

With regard to monetary statistics, the first TA mission took place in 2003. During the follow-up missions in August 2004 and 2005, the actual expansion of monetary data took place. The monetary statistics framework recommended by the IMF's Monetary and Financial Statistics Manual (MFSM) was adopted and data were published using standardised report forms. The missions also addressed, among others, issues of instrument classification and proper definition of institutional units as laid out in the monetary and financial statistics framework recommended by the MFSM and the MFS Compilation Guide.

With regard to BoP, the major objective was to compile and publish the quarterly balance of payments accounts, which was achieved in January 2008. The challenge remains to investigate the large errors and omissions, an exercise that started with a technical assistance mission during February 2009.

Efforts over the last few years have focused on ensuring that the monetary and financial statistics and the balance of payments statistics at the Bank were in conformity with the 2000 Monetary and Financial Statistics Manual (MFSM) and the 1993 Balance of Payments Manual, fifth edition *(*BPM5), which provide practical guidance for compiling monetary and financial statistics and balance of payments statistics, respectively, as well as dissemination issues. Because data improvements are an ongoing process, efforts are still continuing to achieve further improvements, through phase II of the GDDS project.

Achieving data quality through metadata management

As important as it is to document data production processes, it is worth noting that production of metadata is not a one-off activity. It has to be maintained and managed to meet the demands of modern-day data requirements, for ease of use by both users and producers.

As mentioned before, Botswana was one of the very first countries to meet the prerequisites of the GDDS by producing and posting its metadata on the IMF DSBB. This act was followed up with deliberate steps to implement the plans for improvements. Focusing on metadata issues has helped to highlight what needed to be done to effect improvement, and also has added backbone and discipline to Botswana's statistical effort, including improved data quality, dissemination and coordination among agencies and between datasets.

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[5] Botswana made noteworthy progress in this regard. It is not an exaggeration to say that prior to the ROSC mission, metadata was a largely unknown concept to compilers of statistics in the country. Nevertheless, Botswana was the first country, ahead of the other 14 countries in the project, that subscribed to the GDDS to produce and publish its metadata on the IMF DSBB.

Data quality improvements

By implementing plans for improvements with seriousness, Botswana was able to achieve a remarkable improvement in the quality of its data. The country, in particular the Bank of Botswana, was able to publish survey data for the monetary statistics according to the framework for monetary and financial statistics recommended in the MFSM within three years of subscribing to the GDDS project. With regard to the balance of payments, quarterly balance of payments estimates are now published, although there are some concerns with respect to the accuracy of the data, as indicated by the persistently large errors and omissions.

Improved dissemination

With regard to dissemination, the monetary statistics are submitted on a monthly basis for publishing in the IMF's *International Financial Statistics* (IFS), in the standardised report formats.[6] Data are also published on the Bank of Botswana website on a monthly basis. Metadata are published on the DSBB and currently updated on an annual basis or when there are changes to data. A link to the metadata is provided on the Bank of Botswana website, which is currently under review to make further improvements to data accessibility issues.

Coordination among data producers

Concentrating on effecting improvements in data has also resulted in coordination among data-producing agencies, namely the Bank of Botswana, the CSO and the Ministry of Finance and Development Planning, through forums such as the SPC and a national GDDS committee, which both comprise representatives from the three statistics agencies. This has also resulted in accountability in following through with agreed goals in terms of what data need to be produced and when.

Lessons learnt and challenges

Lessons

Although the Bank has made tremendous progress in improving its data, it has become evident that while the country needs to be vigilant in taking action where statistics improvements are concerned, there is a need to avoid being overambitious. Plans for improvement should set targets, but they should not be so demanding as to be unachievable. Statistics development and improvements are long continuous objectives, which cannot be achieved overnight, such as with regard to the graduation to Special Data Dissemination Standards (SDDS). This involves issues regarding both institutional capacity and policy practices; for example, the issue of timeliness of reporting of monetary data that uses the central bank balance sheet (which has a bearing for the reserve template, a requirement for graduation to SDDS).

It is also worth noting that achieving certain standards can compromise others. For instance, modern data models and data standards, such as the GDDS, emphasise timelines, which risks putting quality in second place (ie get the data out on time whatever the costs). There

[6] Botswana was among the first few countries that published data in the IFS supplement, using the standardised report formats.

are also practical issues, especially for countries with limited manpower. For example, cooperation between data producers and users makes sense, but there are risks of violating rules prescribed by the data standards, in particular, privileged access to data by some users. An example is cooperation between the Bank of Botswana and the CSO in producing national accounts estimates; this means involvement of data users, which violates the rule against privileged access for certain users prior to publication.

Regular reviews of progress that come with data standards are an asset to any data producer. For example, the second ROSC mission in 2006 was most useful for both the Bank of Botswana and the IMF because it enabled stocktaking and refocusing, which brought to the fore the realities of how much progress had been and could be expected to be made.

Documenting plans for improvement based on metadata is good for guiding prioritisation for technical assistance. For Botswana, this has promoted clearer prioritisation within and among the three data-producing agencies. This also, in a sense, creates peer pressure for Botswana to benchmark itself against countries that have achieved higher data quality standards, hence instilling discipline in ensuring perseverance in data improvement efforts.

Challenges

The next expected step for GDDS subscribers is to graduate to SDDS. One of the major requirements for subscription to SDDS is to produce and publish the country reserve template. This has been a challenge for Botswana due to confidentiality issues. The authorities are however, studying practices in other countries for guidance on the matter.

Other stumbling blocks emanate from the fact that other statistics producers in the country lag behind in terms of meeting the basic requirements, even for the GDDS, for example, the country's government finance statistics are still produced on the basis of the 1986 GFS manual instead of the latest one. This has been stalled on their part by capacity challenges, and this will in turn hamper the whole process of graduating to SDDS.

On other improvements, such as the project on compiling and disseminating other financial corporations (OFCs) data, there are challenges as the project is a joint effort between the Bank of Botswana and the newly formed Non-Bank Financial Institutions Regulatory Authority (NBFIRA). Due to the infancy of the institution, there are still capacity challenges which will slow the progress on the project.

Recommendations and conclusion

Botswana has gone a long way in improving its statistics, and has done it right the first time by being disciplined in using metadata to focus on issues of data improvements. The coordination among data-producing agencies is commendable, and is something that has to be given momentum going into the future. It will be wise for the country to keep pushing despite the challenges, to develop and improve data further.

Even though there are challenges to issues such as graduating to SDDS, it is worth the effort to continue being involved with international agencies, which have gone the extra mile in helping with the development of the country's statistics in general. Despite the fact that other agencies in the country are lagging behind in some statistics, there have been marked improvements. The country can learn from others in terms of adopting and utilising modern data models, and develop world-class metadata systems to ensure that data production and use are done with ease.

Appendix 1:
Summary on ROSC[7] mission

The ROSC report on Botswana

The IMF ROSC mission commenced in early October 2001 and lasted for two weeks. It focused on the following data categories: national accounts; prices (consumer and producer); government finance; monetary statistics and balance of payments. Neither socio-demographic nor labour market statistics were included at this stage, although the subsequent GDDS project has covered some of these areas through the provision of TA.

The final report of the mission was presented to the government in early December at the same time as the workshop to launch the regional GDDS project, which was held in Gaborone. The report included an assessment on the quality of Botswana statistics together with key short- and longer-term recommendations for improvement. After discussions with the Government and the Bank of Botswana, the report, together with "The Response of the Authorities", was posted on the IMF website. Overall, the quality of Botswana statistics was generally seen as good, and in some cases very good.

For example, the CPI, on which inflation measures are based, was assessed as being of SDDS quality, and the report emphasised that a concerted effort could quickly move Botswana within striking distance of SDDS requirements more generally. The major deficiency in terms of quality was in the area of producer prices, which the CSO candidly admitted was a concern and that assistance would be required to effect necessary improvements.

Another major area where improvements were found to be needed was that of dissemination. This was in terms of both timeliness and ready availability to all users. Some indication of this can be seen from Table 1, which divides the main ROSC recommendations according to sector. Of the 31 recommendations, nine (about 30 per cent) were in the "general" category and, of these, eight dealt with dissemination issues ranging from the need to establish advance release calendars to providing more extensive information on methodology, including on data limitations. (The ninth was a recommendation regarding the need for training.) Six of these recommendations were identified as achievable in the short term.

TABLE 1: BOTSWANA ROSC RECOMMENDATIONS

	General	National Accounts	Prices	Government Finance	Monetary Statistics	Balance of Payments	Total
Short term	6 (2)	1 (1)	2 (1)	2 (1)	4 (2)	2	17
Med term	3	2	2	4	1	1 (1)	13
Long term			1				1
Total	9	3	5	6	5	3	31

Note: figures in brackets are the number of recommendations which were given high priority

Source: Botswana ROSC Report

Some of the sector-specific recommendations also dealt with dissemination issues, notably timeliness. The relatively high number of recommendations for government finance was due in part to the difficulties associated with incorporating local government finances fully into the framework of regular reporting. A further important conclusion was that, in some areas, production of statistics could be facilitated by improved coordination between agencies. The report noted discrepancies in methodology, delays in communicating necessary information (for instance, the balance of payments relies on various inputs from the CSO, such as trade data, while in turn the national accounts require timely balance of payments data), and the potential confusion caused by the various reporting "years" used across the different sectors.

Source: Bank of Botswana *Research Bulletin*.

[7] ROSC refers to the Report on the Observance of Standards and Codes.

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Metadata at Statistics Canada: implementation opportunities and challenges

Michel Cloutier[1] and Alice Born[2]

Introduction

The Integrated Meta Data Base (IMDB) is a corporate repository of information on each of Statistics Canada's nearly 400 active surveys. The IMDB was first developed to support the interpretation of data disseminated by the agency and to present the metadata in a consistent manner. The IMDB is one of the principal mechanisms used by Statistics Canada to fulfil the requirements of the policy on informing users of data quality and methodology. In fact, the metadata contained in the IMDB are a critical component of the agency's communication strategy.

For those outside Statistics Canada (data users), access to metadata is needed primarily to understand the data and surveys produced by the agency. The IMDB is the primary source for the information they need to interpret the statistical products published by Statistics Canada. This information includes a description of data sources and methodology, definitions of concepts and variables and indicators of data quality. For internal users, the IMDB serves as a source of information to support knowledge management, the development of survey content, the management of surveys, classifications, coding and a variety of other statistical functions in addition to dissemination.

The role of the IMDB has continued to evolve as more and more uses are made of this central infrastructure system. These new uses leverage our investment in the IMDB and provide added value to the organisation, while eliminating the need to develop new software systems to document all the aspects of the national statistical system. This paper will outline how this evolution has occurred and some of the challenges and opportunities that national statistical offices (NSOs) face with regard to documenting information about their data and their statistical programmes.

Metadata at Statistics Canada

Metadata have always existed in Statistics Canada, but our approach was at first very much less structured than it is today. Before the age of the computer, a limited amount of documentation regarding surveys was most often published, with the data, in notes at the end of paper publications. As electronic data became more popular, documentation was sometimes lacking and was certainly not kept systematically in a central repository. The meta information was often not easily available to most users. With the advent of the internet, it soon became evident that users needed convenient online access to metadata to help them interpret published data.

The IMDB is the descendant of previous initiatives used to document our survey activities. It started in 1998, partly in response to observations made in a report by the Auditor General of

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Canada. In this report, it was underscored that Statistics Canada should put greater emphasis on providing quality documentation of survey processes and programmes. Before 1998, Statistics Canada had a number of databases and systems for storing metadata. The first step in the creation of the IMBD was therefore the consolidation of existing data stores into one central store.

The following systems were retired and their metadata consolidated into the IMDB:

- Statistical Data Documentation System (SDDS), consisting of primary textual descriptions of the statistical business processes
- Meta Inventory of Data Assets Systems (MIDAS), consisting of metadata describing the confidential master data files
- Thematic Search Tool and Paradox Meta System for Social Statistics
- Questionnaire Inventory.

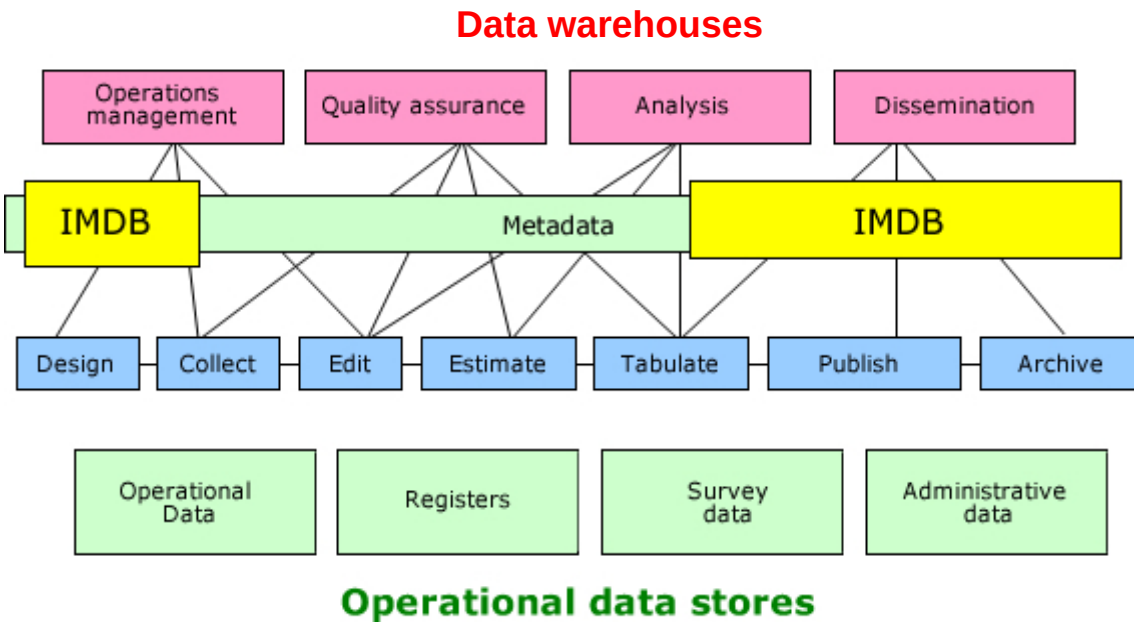
Today, the IMDB information is made available to outside users on the Statistics Canada website. Every data release on the site (in the Daily) includes hyperlinks to metadata from the IMDB. In addition, the Statistics Canada online database (CANSIM), containing millions of statistical time series and data tables, is also linked to the IMDB. The IMDB information can also be accessed directly through the “Definitions, data sources and methods” module on the website. The database is kept up to date through an input system deployed over the departmental intranet and also using the STC Wiki application. Updates are quality-assured and registered before being made available to the external website. The potential also exists for metadata stored in the IMDB to be exported to other meta information systems in any output format that suits these other systems (ie SDMX, DDI, HTML, Wiki).

The short history above illustrates the practical approach that Statistics Canada has used by seizing opportunities and responding to challenges in order to gradually develop its metadata systems and content. Figure 1 illustrates how metadata in the IMDB currently support the statistical system. While the metadata layer extends across all phases of the statistical business process, metadata in the IMDB currently support the design, publishing and archiving phases, and some of the collection and tabulating phases. Metadata for the other phases of the survey life cycle (such as data production) occur in other meta information systems in the agency. The consolidation of these other systems represents an opportunity for further expansion of the IMDB.

The opportunity for increasing the centralisation of metadata management in the agency has occurred through pressure from external stakeholders, the need for survey documentation both internally and externally, and the urgency of updating existing systems that had come to the end of their life cycle. Further examples of this approach are documented in the following section.

Figure 1

The role of the IMDB in the survey life cycle



Opportunities

The scope and use of the IMDB has grown extensively over the years. Although this growth has been planned and managed to meet the needs of the agency, it has also occurred in part owing to events that were not foreseen when the system was originally conceived. Examples will be presented to illustrate the advantages of remaining vigilant and flexible when faced with these opportunities. Statistics Canada has been well served by not limiting the content and functionality of the IMDB to the original requirements and specifications of the system.

Dissemination

As stated previously, the first driver for the IMDB was the need to provide information to data users as part of our dissemination activities. In the dissemination phase, the IMDB is the source of summary texts describing surveys and statistical programmes, their methodology, the quality of the data produced and the definition of the variables they measure, as well as of the images of the questionnaires used in the survey. The content of the IMDB is reused wherever possible to document methodology and data quality in electronic and paper publications. This information is essential to users when they are analysing data from surveys so that they can determine whether the data are fit for their use. This includes analysis of aggregate data as well as public use micro data files (PUMFs) utilised by more sophisticated users, such as university researchers. Documentation for Statistics Canada's Data Liberation Initiative (including PUMFs) uses IMDB metadata reformatted under the Data Documentation Initiative (DDI) standard.

Collection

During the collection phase of the survey, there is often a demand by respondents to confirm the authenticity of the survey they are being asked to complete. By using the IMDB through

the website, we have been able to fill this need. The “Information for survey participants” module on the Statistics Canada website uses the IMDB to provide respondents with basic information about the survey. The module links to the IMDB to display the images of questionnaires as well some of the descriptive text about the survey.

Adopting standards and reducing diversity

The IMDB is becoming a great tool to help us reduce diversity in the statistical system. It is helping us to first document and then control the number of variants we have in terms of common variables, procedures, classifications and systems. When all documentation is stored in a central database, the diversity of various elements of the statistical system becomes evident very quickly in the metadata.

One of the clear benefits of a centralised metadata store is the opportunity to improve data quality (coherence, interpretability, accessibility). The IMDB has allowed us to get a more complete picture of what is being released in our many surveys. For example, we have now documented the large number of variants of the industrial classifications used in the time series published by Statistics Canada. We are now working on reducing the number of variants. Thus the IMDB is enabling us to promote greater standardisation of the classifications used in our surveys. This will allow us to improve coherence and interpretability in the medium to long term.

Another good example of this is our content harmonisation project for household surveys. This project has been an important strategic opportunity to help us expand the use of the IMDB and further metadata implementation in Statistics Canada. Currently, the IMDB intervenes mostly at the analysis, dissemination and post-survey evaluation phases of the statistical cycle. However, with this project we have started using the IMDB for the survey planning and design phase. During this phase, the IMDB can be consulted and used by survey managers to identify existing variables for reuse and to support the development of new questionnaires.

The objective of this project is to define standard concepts and variables to be measured by new or redesigned surveys, as well as to create standard questions and question blocks to collect the data necessary to measure these concepts. The naming of the variables is being done jointly by the IMDB and household surveys staff according to the IMDB naming convention. The Statistics Canada Wiki (a collaborative authoring tool) allows survey managers an easy way to document new variables during questionnaire design and to store these variables and the related questions. Other systems can then use this information as inputs to avoid duplication of metadata in subsequent steps of the statistical process such as collection or dissemination. This metadata will also allow us to better support multimode questionnaires and questionnaire automation, since all collection systems will access the same source for survey questions. This integrated approach to metadata (eg concepts, variables, classifications, questions, question blocks and response choices) will allow the entire statistical system to become much more efficient and effective.

Other information systems

The metadata associated with various phases of the statistical process are managed by multiple systems distributed throughout the agency. The IMDB serves as the source for variables and classifications associated with many of these systems and functions. This is particularly the case for data warehouses, which support the aggregation and analysis phases of the survey life cycle. Data warehouses are being developed across Statistics Canada including in the system of national accounts (SNA), education and health fields. The design and architecture for these projects include links with the IMDB as the authoritative source for metadata. This saves costs, avoids duplication and ensures coherence within the statistical system.

One of the challenges faced by the warehouse architects was how to provide warehouse users with access to metadata in a way that allows them to navigate quickly through the rich metadata environment and submit updates to Standards Division related to metadata that are incomplete or inaccurate. The Data Warehouse Centre resolved this issue by leveraging the Statistics Canada Wiki application to act as a link between the IMDB and the Data Warehouse Framework.

The Government of Canada has implemented, in consultation with departments and agencies, a common look and feel (CLF 2.0) for all federal internet/intranet sites and electronic networks. As part of this policy, there are accessibility rules that no longer allow the use of PDF files on government websites. In particular, at Statistics Canada, survey questionnaires have historically been presented to users in PDF format. To meet the new requirements of CLF 2.0 the IMDB will be used as the source for new XHTML versions of survey questionnaires. These questionnaires will therefore be completely accessible.

Information management

As part of Statistics Canada's information management plan, we have recently decided to use the IMDB as the source for metadata when archiving statistical data. To ensure that archived data is usable by future generations, we need to include not only the data themselves but also information such as the survey objectives, definitions of variables, record layouts, questionnaires, quality indicators, classifications and methodology. The IMDB is the ideal source for this information. By using the IMDB for this purpose, we are again avoiding recreating another system and another database for this particular phase of the survey cycle.

Document management (paper and electronic documents) at Statistics Canada brings together all documents relating to a particular survey from its conceptual development phase to its dissemination phase. The Document Management Centre uses classification numbers from the IMDB to organise all of their files, thus ensuring consistency with other sources for this metadata repository. The documents stored include the following: questionnaires (including test questionnaires), methodology documentation (scientific, technical, operational), correspondence and internal memoranda related to statistical activities (scientific, technical, operational), statistical analytical papers (analysis and quality measurement), promotion and marketing material, reports on survey costs, etc.

Planning and management

We continue to look for strategic opportunities such as the redesign of systems to further promote the use of the IMDB. Every year Statistics Canada goes through a long-term planning (LTP) exercise where new projects and programmes are proposed to meet new user needs or to address problems with existing programmes (ie improving quality and relevance, upgrading existing systems, etc). Many of these proposals are designed to produce efficiencies over the long term (savings that can be reinvested in the statistical system). In many cases, the IMDB is allowing us to avoid developing new systems to meet the metadata needs of these LTP proposals. The following are examples of the development projects that have used the IMDB.

As previously stated, the IMDB was originally designed to be a repository of the metadata describing our surveys and survey outputs. However, since metadata by definition can be collected on any group of objects, Statistics Canada has begun to expand the scope of the IMDB to be a repository of objects other than our data outputs. In particular, we have begun to view structured information describing our management information, IT systems and enterprise architecture as metadata.

It is possible to expand the scope of the information housed in the IMDB because the IMDB conforms to a strongly defined metadata standard, ISO/IEC[3] 11179 metadata registries. Although this standard was designed specifically to support metadata on data, the standard can easily be applied to any group of objects for which metadata are being collected. One such application of the IMDB has been to replace an ageing system known as the Statistics Canada Software Register (SR). The SR was a database containing a list of all software used and developed in Statistics Canada along with support levels and dependencies for survey programmes. This information will now be stored in the IMDB, eliminating the need to redevelop and maintain a separate system.

Another example of this type of implementation within the IMDB is the documentation required for the Government of Canada's Management Accountability Framework (MAF). With the MAF reports and indicators entered and stored in the IMDB, our corporate planning and evaluation programme can take advantage of the functionality in the IMDB such as time travel, metadata classification and registration. This application helps the agency accumulate information to report to central agencies under the MAF while linking the management framework to metadata on survey and statistical programmes.

In addition, we are planning to use the IMDB to store management assessment information related to the ongoing Quality Assurance Reviews of surveys and statistical programmes.

Classification management and coding

Recently, after reviewing our requirements and completing a business case, the agency decided that it needed to centralise and rationalise the management of classifications and computer-assisted coding. It was decided that, as part of this new system, we would leverage the IMDB infrastructure to house the required information. The initiative will reduce the number of individual coding systems across the Bureau as well as provide a computer-based coding tool for divisions where manual coding (using paper versions of classifications) still occurs. The new interactive coding tool will use the redesigned Automated Coding by Text Recognition (ACTR) system as the search engine, and support a centralised set of reference files for several classification domains, thus improving the quality of coding activities and coherence of data throughout Statistics Canada. The generalised interactive coding tool will be offered as a web service, which will make it accessible to any computing platform. This should reduce systems costs for surveys requiring access to an interactive coding tool, and reduce training costs as the agency moves towards increased centralisation of coding in its new collection model.

A generalised coding tool with a standard, centralised set of reference files will enhance the coherence of the agency's statistical outputs since programme areas will be able to interface with the Classification Coding System, and its reference files, through a web service. This will allow access to the most up-to-date version of reference files that have been coded, approved and registered by Standards Division and user groups. Standardising reference files should improve the rate and quality of both automated and interactive coding data. The redevelopment of these systems has been a perfect opportunity to further expand the scope and usefulness of the IMDB.

[3] International Organization for Standardization (ISO) and International Electrotechnical Commission (IEC).

Challenges and implementation issues

Development and maintenance of metadata

One of the greatest challenges related to the implementation of metadata systems in statistical organisations is ensuring that survey managers prioritise the development and maintenance of metadata (content) for their surveys. With the time and resource pressures faced by many programmes, taking time to understand how to update the IMBD and complete documentation is often a much lower priority than releasing survey results and dealing with quality issues.

Therefore, ensuring that metadata are up to date, of good quality and useful to users must be made a priority by senior management. It also helps if the metadata are used as an integral part of the data release, as they are with the Daily releases by Statistics Canada. When Statistics Canada first implemented the IMDB, the Chief Statistician made it a priority for all programmes to provide accurate and up-to-date metadata. The agency quickly followed up with areas that were deficient in this regard. The result was a marked improvement in the quality and quantity of metadata in the IMDB.

Survey managers now see the usefulness of accurately maintaining metadata since they are immediately available to their clients when they view new survey results. It is also critical that we create a user-friendly environment that allows easy updates. The key is showing survey managers that metadata have value to their users and are a critical component of communicating with them. Successful implementation depends on increasing the importance of metadata as an integral part of the statistical process. Metadata need to be shown to have a practical value for analysts. They must help them to convert statistics and numbers into meaningful information. As described above, once the metadata are stored in the IMDB, they can be reused for many purposes in the statistical system. Internal and external analysts (re)use metadata in questionnaire design, data tables, publications, data warehouses, micro data files and data archives.

Standardisation and centralisation

When the IMDB was first implemented, significant effort had to be put into improving the quality of the metadata. This was fully supported by senior management and has resulted in good “buy-in” from survey managers. Now that we have developed the content of the IMDB, the challenge is to enhance and maintain the quality of the metadata themselves. Getting programmes to use common definitions and tools is one way to make it easier to improve the quality of our metadata. We are now encouraging the use of generic concepts instead of survey-specific ones and up-to-date revised classifications instead of continuing to use historical versions of these classifications. Nevertheless, there is still widespread use of variants of our industry classification and multiple definitions of common variables and concepts. The issue of maintaining historical continuity makes it difficult for survey managers to make the change in many cases. The use of concordances and historical revisions helps to facilitate transitions, but it still requires a great deal of time and resources to move to more current standards.

Getting survey programmes to understand and use metadata systems, content and tools requires training and communication throughout the organisation. Using new technologies such as the IMDB’s MetaWeb and Statistics Canada Wiki helps to reduce the learning curve and makes updating content much easier for survey managers. More and more, the IMDB team is permitting survey managers to enter their own metadata updates directly into the IMDB using the MetaWeb interface, thereby allowing staff in the IMDB team to focus on the quality of the metadata. Once entered, survey managers can immediately see their metadata in the IMDB portal on the Statistics Canada Wiki. The advantage of the wiki technology is

that internal users can see all of the metadata stored in the IMDB and then develop a customised metadata presentation depending on their requirements.

Metadata management and governance

Standards Division in Statistics Canada is the principal area in charge of supporting and developing statistical metadata for the agency. This work is also guided by the Methods and Standards Committee. Survey programmes are responsible for keeping the content on the IMDB up to date. Despite this organisation of responsibilities, individual survey areas often find it challenging to adopt and converge on revised standards and classifications. The use of multiple variants of variables, concepts and classifications makes coherence and interpretability difficult among various survey outputs. It is also very difficult for Standards Division to monitor all of this activity with a very limited budget. The challenge is to find the right balance among all of the stakeholders in achieving the best quality possible for the agencies' metadata.

Standards Division is currently developing a proposal that will outline roles and responsibilities for the central functional areas (such as Standards Division and the IMDB) versus those of the subject-matter areas. The IMDB is helping the agency to distinguish between the functional responsibilities of each division as opposed to its corporate roles as they relate to metadata and their contribution to the statistical system. To improve the coherence of metadata, including classifications and variable definitions, across the statistical system, we are looking at creating a Standards Governance Board with a mandate to examine and monitor the implementation of standards across survey and statistical programmes. Membership will be drawn from survey programmes, registers (eg business register and tax data) and statistical programmes such as the System of National Accounts. The objectives will be to increase awareness of the challenges of incoherence in the system and to develop a planned approach for implementing coherent metadata.

As part of the harmonised content for household surveys project, we have already seen the benefits of a corporate approach to developing and approving standardised definitions for variables and classifications, and their related standardised question and response choices. For example, we will have only one definition for household income and one set of questions that will be used on questionnaires to measure household income. This should lead to greater efficiencies by reducing design and processing costs, and to better coherence since the concept will be the same across most household surveys.

Conclusion

Metadata management and governance in statistical institutions are important issues that can have a significant impact on the entire statistical system. Statistics Canada has taken a pragmatic approach to metadata implementation by looking for strategic opportunities – redesign of collection systems, survey systems and information management, as opposed to a complete redevelopment of our statistical system. This approach has allowed the agency to cost-effectively gain many benefits, including some that were unexpected, from a centralised metadata store. The integrated approach of the IMDB has been very effective in promoting and creating better metadata for all of Statistics Canada's programmes (surveys and management information). We have also been successful in developing an environment that promotes efficiencies through the reuse of content, improved data quality and better information management.

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SDMX as the logical foundation of the data and metadata model at the ECB

Gérard Salou[1] and Xavier Sosnovsky[2]

Introduction

The Directorate General Statistics of the European Central Bank (ECB) is responsible for efficient management of the statistics that are needed for the ECB's monetary policy and the other functions of the ECB, the Eurosystem and the European System of Central Banks (ESCB). In addition, it is responsible for providing statistics to the interested public and market participants. For those tasks, the ECB has developed a statistical infrastructure based entirely on SDMX[3] standards. This paper starts with a description of the SDMX statistical standards, covering the development of the standards, the underlying data model and implied data organisation. Later, the paper describes how SDMX standards are used as the common logical foundation for data collection, data dissemination and data models within the ESCB. Tools and applications of common interest to the SDMX community are also described, in particular the ECB SDMX loader suite, which is used by the ECB for converting seamlessly between data formats (EDI, XML, CSV), the ECB data visualisation tools and the related ECB SDMX framework.

In a second section, the paper describes the SDMX service-oriented architecture developed by the ECB. The web services allow the retrieval of data in the SDMX-ML formats based on filters such as dimensions, attributes, time, datasets, data flows and categories. They allow users to retrieve the latest version of the data, specific snapshots, as well as updates and revisions. They also allow the retrieval of structural metadata such as category schemes, dataflow definitions, data structure definitions, concepts, code lists, as well as "maintenance agencies", data providers and organisation schemes. Two complementary technical implementations of the web services are also presented. The system is also supplemented with a subscription and notification mechanism.

The paper concludes by describing the benefits in terms of efficiency and effectiveness of using SDMX standards for statistical data and metadata infrastructures. The experience of navigating SDMX-ML data in the same way as HTML pages is presented as a vision for data browsing in the future.

The development of SDMX standards

Since their creation, the ECB and the ESCB have used a standard format for their data interchanges. At the time (1998), the format had been based on the Electronic Data Interchange (EDI) technology, using the EDIFACT syntax. The precise implementation

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[3] A glossary of acronyms is available in the annex.

chosen by the ESCB, the GESMES/TS message, was derived from a more generic EDIFACT standard called GESMES (Generic Statistical Message) created in the early 1990s by a group of institutions under the leadership and support of Eurostat.

At the beginning of the 2000s, a group of institutions, including the Bank for International Settlements (BIS), the ECB, EUROSTAT, the International Monetary Fund (IMF), the Organisation for Economic Co-operation and Development (OECD), the United Nations and the World Bank, joined together to work on business practices in the field of statistical information with a view to developing more efficient processes for exchange and sharing of data and metadata for their statistical activities. The goal of the consortium was to take advantage of developing technologies and ongoing standardisation activities that could allow them to gain efficiency and avoid duplication of effort in the field of transfer of statistical information.

In that context, the GESMES/TS EDIFACT message, intensively used by the ESCB, the BIS and Eurostat, was very soon thereafter adopted as the first SDMX data format standard under its present name of SDMX-EDI. Based on the same data model, the consortium also developed a data format using XML and web technologies. The data model underlying the original GESMES/TS message was further elaborated upon and eventually a new set of standards was adopted. The present version of the standards is now version 2.0 and has become an ISO technical specification (ISO/TS 17369:2005).

The SDMX standards cover[4]:

- The SDMX information model underlying all other elements of the standards;
- SDMX-EDI: the EDIFACT format for exchange of SDMX-structured data and metadata;
- SDMX-ML: the XML format for exchange of SDMX-structured data and metadata. This is accompanied by a set of XML schemas (for example, the schemas for the generic, compact, utility and cross-section data formats);
- The SDMX Registry Specification: this specification defines the basic services offered by the SDMX Registry: registration of data and metadata, querying for data and metadata, and subscription/notification regarding updates to the registry;
- The SDMX Guide – a guide to facilitate the use of the SDMX specifications. It includes reference material for the use of the SDMX information model and provides some best practices for assigning identifiers and designing data structure definitions;
- Web Services Guidelines: a guide for the implementation of SDMX using web services technologies. It places emphasis on web services technologies which will work regardless of the development environment or platform used to create the web services.

The SDMX information model

SDMX standards are based on a powerful information model which is an elaboration on a star schema in which datasets are represented as multidimensional cubes, as commonly done in the information technology (IT) industry for data warehousing. The data structures are described by the so-called structural metadata. These include definitions about the dimensions and the related attributes that are relevant and used in the context of a dataset.

[4] For further details, see www.sdmx.org.

Structural metadata comprise the statistical concepts, code lists and data structure definitions (DSDs) which provide the basis for the data representation of each dataset. Each DSD provides definitions and additional details for the dimensions and attributes used in representing data in a particular subject-matter domain. Statistical concepts such as frequency, reference area and institutional sector can play the role of dimensions. Concepts such as units of measurement or methodological comment can be attributes. While concrete dimension values are used to identify and point to a concrete data point (or set of data points), concrete attribute values provide qualitative information about observations (or sets of observations). In particular datasets, dimensions take their values from predefined code lists. Attributes, on the other hand, can take their values from code lists (coded attributes, eg unit of measurement) or can be free text (non-coded attributes, eg observation status). In practice, some attributes must always have a value (they are defined as mandatory in a DSD) while others only have a value for each of the object(s) they are associated with under certain conditions (conditional attributes).

In general, structural metadata are created, administered, maintained and disseminated by the institution managing the data. In the case of the ESCB data, the Statistical Information Services Division of the ECB's Directorate General Statistics coordinates and performs these activities. This enforces discipline in data management, in particular for datasets used across the ESCB. Furthermore, the standardisation work on the data representation also facilitates standardisation in the higher level layers (eg code lists), which yields benefits for the statistical community at large that become increasingly evident. There are cases where institutions use structural metadata defined by other institutions for their own datasets (eg the more global harmonisation is achieved in a particular statistical subject matter, the more likely it is that the structural metadata used in this domain are managed via a collective agreement or by the organisation coordinating the particular harmonisation effort). SDMX facilitates development in that direction. The following section elaborates on the role of DSDs in data management.

The importance of the DSDs in the information model

The set of data managed by an institution can be partitioned into a number of datasets in such a way that each dataset can be represented by no more than one DSD. A DSD can be used for several datasets. In reality, there are several ways to partition datasets and several ways to define alternative DSDs for a given dataset. It is generally desirable to avoid having too many datasets and too many DSDs because it increases maintenance costs. It is also important to partition data in such a way that DSDs share concepts so that datasets can be more easily related using common dimensions. Research has been done in that domain, in particular by Sundgren (2006) with the so called "αβγτ" model. A particular application to SDMX is developed by Androvitsaneas et al (2006). For example, a large macroeconomic database could be partitioned into national and financial accounts, prices and short-term statistics, external sector statistics, government finance statistics and monetary and banking statistics. A DSD could be specified for each one of these blocks, and if there is a need, for example, for more efficient data management, each block could be partitioned into subsets using the same DSD.

Moreover, a more detailed breakdown could be envisaged at a higher level if there is a need for more flexibility and room for manoeuvre in the specification of DSDs, thus foreseeing a different DSD for each of the more detailed categories/partitions (eg splitting monetary and banking statistics into monetary statistics and banking statistics and specifying a corresponding DSD for each one). Actually, the more aggregated the data are, the smaller is the need for partitions and DSDs (as in the case of dissemination from central supranational institutions). The more detailed the data that are managed are (as in the case of data

collected by a national statistical institute), the higher is the number of partitions and DSDs required.

The ECB has defined and constantly maintains more than 40 DSDs and a much higher number of partitions or data flows (several data flows may use the same DSD). Most of these DSDs are also used in the data sharing process within the ESCB and with Eurostat, thus contributing to harmonisation not only at the technical level but also in the statistical modelling layers, up to the content. The ECB also uses several DSDs defined and managed by other institutions disseminating data in SDMX formats, mainly the BIS and Eurostat, which are applicable when ECB end-users access data from those other institutions. Similarly, the ECB internally creates “artificial” DSDs for accommodating, within its internal statistical data warehouse data model, data from other sources, such as the OECD or the IMF, that do not yet disseminate DSDs for all their datasets. It is interesting that in some areas (eg balance of payments) the lead role in defining DSDs is played by one institution (IMF), while other institutions (ECB, Eurostat, OECD) may also use them, directly or indirectly, in their data management work. The maintenance of DSDs is also of very high importance, since they form the basis of data content and also constitute the link to other data structures which may exist for related data. For example, special care is taken with the structural metadata used in the domain of balance of payments statistics (BOP), for which the ongoing world-wide use of SDMX-EDI requires a high level of coordination among the institutions involved in administering BOP data exchanges (ECB, Eurostat, IMF, OECD). In conclusion, the use of structural metadata is of crucial importance for promoting harmonisation and maximising efficiency in statistical activities, since it makes data structures more accessible and visible to non-IT specialists.

SDMX along the statistical process

The ESCB having adopted the SDMX standards for all its data exchanges, it was very natural for the ECB to also consider the SDMX data model for adoption and use all along its statistical processes, from data collection to data dissemination. The data model was implemented in the internal database system used for statistical compilation and subsequently in the ECB Statistical Data Warehouse. Later, the use of the SDMX model and format was expanded to the data dissemination website.

To assist the statistical processes, a number of SDMX-based tools have been developed by the ECB. These include the ECB loader suite, which provides data loaders and writers as well as a data checker that verifies the compliance of incoming files with the standard format. That tool also provides some format translators, to convert from one representation to another, covering SDMX variants and standard IT formats such as CSV.

On the dissemination side, a number of implementations can be seen on the ECB and NCB websites. In addition to the fact that SDMX-ML files are made available throughout the statistics section of the ECB website, the most technically interesting case is the Eurosystem Joint Dissemination, where euro area data and their respective national contributions are updated on the ECB website and replicated automatically on the websites of national central banks (NCBs), using the national language(s) and the look and feel of the respective NCB website. This is made possible through the use of web technologies (XML and XSLT) in combination with SDMX standards.

The usage of the SDMX data model for the ECB Statistical Data Warehouse (SDW) was also a natural choice, given the fact that the underlying data model is close to a star schema which itself is commonly used for data warehousing in the IT industry. Using those technologies and sound DSD management makes it possible to relate data from different datasets and to combine them into virtual datasets using their common dimensions. It then

becomes possible to present data not from the producers' point of view, as is the case with the original DSD, but rather from the users' point of view, using virtual datasets.

Finally, in order to improve the visual display and the accessibility of data, and to make data analysis more efficient, productive and successful, the ECB has created various visualisation tools on the ECB website. SDMX is at the core of these rich internet applications. Not only do they consume data expressed in SDMX-ML, but they are also modelled according to the SDMX information model. The applications have become very popular and they have definitely improved the understanding of the statistics published.

Implementation of SDMX web services

In order to allow interested parties to use data available in the SDW in their own applications or keep their databases automatically up to date, the ECB implemented a set of web services which follow the SDMX specifications. The web service makes it possible for all potential clients to interface their applications with the SDW and thus have online access to data with comprehensive euro area, national and international data coverage. It also facilitates the reproduction of ECB statistics on other media by interested parties such as information distributors. Furthermore, the web service makes it easier for international organisations, such as the OECD and the IMF, to feed their own data systems with ECB statistics. The following paragraphs describe the SDMX web services.

As defined by the World Wide Web Consortium (W3C), a web service is a software system designed to support interoperable machine-to-machine interaction over a network. A web service involves APIs (application programming interface) that can be accessed over a network, such as the internet, and executed on a remote system hosting the requested services. Web services exchange data in XML format. Using SDMX, the web service inherits from:

- The SDMX information model, for describing statistical data and metadata;
- A proposed API for web services;
- The SDMX-ML query format, a standard for requesting data. The query message supports the retrieval of both statistical data and metadata, using various filters;
- Various formats in SDMX-ML for supplying data (eg SDMX-ML generic data, SDMX-ML compact data and SDMX-ML structure formats).

Additionally, these SDMX standards build on general IT standards such as HTTP, XML, SOAP and WSDL, or REST. The combination of these IT standards with the SDMX statistical standards makes it possible for the data user to abstract from the IT hardware, network, database and language layers used on the data side.

The SDW web service is designed to:

- Offer access to the statistical data stored in the SDW, including the possibility of obtaining updates and revisions only, or snapshots at specific points in time. The data can be filtered by data flows, datasets, dimensions, attributes, date ranges, etc. The matching data can be returned in the SDMX-ML generic data or SDMX-ML compact data formats;
- Offer access to metadata information such as data structure definitions (DSDs), concepts, code lists, dimensions and economic concepts, so that the statistical data mentioned above can be easily understood, used in calculations, automatically processed and interpreted. The matching metadata will be returned in the SDMX-ML structure format;

- Offer a subscription/notification mechanism whereby users of the web services receive a notification when data of interest have been updated.

This approach follows current best practices, as the “publish once and pull” scenario underlying the implementation of SDMX web services makes it possible to take full advantage of the data sharing model in facilitating low cost, high quality statistical data and metadata exchange. If properly deployed, an SDMX-based architecture coupled with an SDMX web service allow for a very high degree of automation for data collection, dissemination and processing for the benefit of the wider statistical community and beyond (institutional policymakers, researchers, and others).

Conclusions

This paper has described how the early adoption of the SDMX statistical standards by the ECB, and its constant efforts to keep its systems compliant with the standard, has made it possible for the ECB to maintain its statistical systems at the leading edge of technology, from data collection to data dissemination. For statistical institutions the main benefits provided by the implementation of the SDMX standards all along the statistical process are as follows:

- Full harmonisation of data representation for ESCB data sets;
- Fully automatic data exchanges within the ESCB;
- Unique statistical data warehouse for aggregated data within the ECB;
- Reusability of components and methods for IT tools along the process;
- More efficient development of tools due to improved interoperability and increasing abstraction of IT layers;
- Synergies with technological developments.

In addition, because SDMX includes a well-developed and tested data model together with a collection of techniques and tools, the development of a modern statistical system based on SDMX is simpler, cheaper and more efficient.

As shown by the implementation at the ECB and on its website, it is possible to develop applications that recognise the various statistical objects contained in SDMX-ML files. This means that it is possible to create applications that can read and understand statistical data independently of their location, origin and IT implementation, in the same way as a web browser can interpret and use HTML pages or a music player interprets MP3 files. With this analogy it is possible to imagine how the generalised use of the SDMX standards by producers of official statistics could change the way that decision-makers and citizens could access and use statistics in the future. They will no longer need to use data interfaces specific to the data source, for example, the ECB SDW interface for ECB data, but can use the interface of their choice for all SDMX-enabled sources. Users will easily be able to use data from different sources at the same time and bookmark, refresh and see data as tables, graphs or maps.

Annex:
Glossary of terms

API	Application programming interface: a set of routines, data structures, object classes or protocols provided by libraries in order to support the building of applications
DSD	Data structure definition (also known as “key family”)
EDI	Electronic data interchange
EDIFACT	Electronic Data Interchange for Administration, Commerce and Trade, the international electronic data interchange standard developed under the United Nations
ESCB	European System of Central Banks (27 European Union central banks plus the ECB)
GESMES	Generic statistical message, implemented using the EDIFACT syntax
ISO	International Organization for Standardization
NCB	National central bank
REST	Simple interface which transmits domain-specific data over HTTP without an additional messaging layer such as SOAP
SDMX	Statistical data and metadata exchange
SDW	ECB Statistical Data Warehouse
SOAP	Based on XML, SOAP defines an envelope format and various rules for describing its contents.
URL	Uniform resource locator
W3C	The World Wide Web Consortium is the main international standards organization for the internet (www.w3.org).
WSDL	Web service description language
XML	Extensible mark-up language
XSLT	Extensible stylesheet language transformations (XSLT) is an XML-based language used for the transformation of XML documents.

References

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Integrative analysis of cancer genomic data

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In the past decade, we have witnessed an unparalleled development in high throughput technologies. One of the most exciting developments is in microarray technology. Microarrays have been extensively used in biomedical, particularly cancer, studies. Microarrays make it possible to measure the expressions of thousands of genes simultaneously and detect genomic markers that are associated with cancer development and progression. In this article, we will focus mainly on cancer microarray studies, although many issues and techniques discussed are also applicable to other high throughput (eg epigenetic, proteomic) measurements, and to other diseases or phenotypes (eg diabetes, cardiovascular diseases).

Cancer microarray study

Cancer is a heterogeneous class of diseases caused by the abnormal proliferation of cells in the body. On a cellular level, cancer development and progression can result from genetic mutations and defects. For cancer research, the development of microarray technologies opens the possibility for transcriptional fingerprinting, as the collection of transcriptional activated genes and the levels of mRNA can be a more accurate definition of the state of the cell than the simple genetics or histology. Massive applications of microarrays in cancer research started in the late 1990s. Significant successes have been achieved since then (Knudsen (2006)). As an example, gene signatures obtained from microarray studies have already had a direct impact on breast cancer and lymphoma clinical practice.

Based on their specific scientific goals, cancer microarray studies can be categorised as follows: (1) studies designed to understand cancer biology. For example, multiple studies have been conducted to investigate whether patients with homogeneous histologies can be further categorised into different subtypes with different genomic patterns; (2) studies designed to identify diagnosis markers. Studies have been conducted comparing expressions of tumour versus normal tissues, with the goal of identifying genes whose expressions are linked with an increased risk of developing cancer; (3) studies designed to identify prognosis markers. Studies have been conducted to identify genes whose expressions are linked with shortened disease-free or overall survival in cancer patients; and (4) studies designed to identify predictive markers, where the goal is to identify genes whose expressions are linked with a positive response to treatment. We note that the above categorisation is based on our own experiences and is subjective. In addition, there may exist studies that belong to multiple categories.

In the following sections of the paper, we will focus on the studies in categories (2)–(4). A common characteristic of such studies is that a cancer clinical outcome (or phenotype) is measured along with the gene expressions. The cancer clinical outcome can be the categorical

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cancer status or response to treatment, censored cancer survival, or a continuous marker. Supervised statistical methodologies are needed to identify the genes associated with the outcomes. In contrast, statistical analyses of studies in category (1) are often unsupervised. Although studies in category (1) can be of great importance, they often demand statistical techniques that are significantly different from those for studies in other categories, and hence will not be discussed here.

Although significant success has been achieved, cancer gene signatures identified from microarray studies often suffer from low reproducibility. For example, the breast cancer prognosis signatures identified in van't Veer et al (2002) and Wang et al (2005) contain 70 and 76 genes, respectively, with *only 3 genes in common*. Although more reproducible gene signatures exist, in general, the reproducibility of cancer microarray gene signatures is of concern.

Several factors may have contributed to the low reproducibility. First, different studies may contain patients with different demographic characteristics (age, gender, race), clinical risk factors (tumour type and stage) and treatment regimes. Such differences naturally raise concerns regarding the comparability of different studies. The low reproducibility caused by such differences can be improved by properly adjusting for relevant risk factors in the regression analysis. Second, seemingly different sets of identified genes may correspond to the same or similar gene pathways. Pathway-based analysis can be conducted following gene-based analysis to improve reproducibility. The third, and perhaps most important, reason is that most cancer microarray studies have relatively small sample sizes ($10^{1\sim3}$ samples compared to $10^{3\sim4}$ genes). Such studies can be severely underpowered, which may lead to significant variations of identified gene signatures. An ideal solution to improve reproducibility is to conduct well designed, large-scale, prospective studies. However, such studies can be extremely time-consuming and expensive. A cost-effective solution is to *conduct an integrative analysis of multiple existing studies with comparable designs to increase the statistical power and, hence, the reproducibility*.

Data integration

Table 1
Public databases that host cancer microarray datasets

Name	Organization	URL
ArrayExpress	European Bioinformatics Institute	www.ebi.ac.uk/arrayexpress/
CIBEX	Center for Information Biology	cibex.nig.ac.jp
GEO	National Institutes of Health	www.ncbi.nih.gov/geo
CleanEx	Swiss Institute of Bioinformatics	www.cleanex.isb-sib.ch
RAD	University of Pennsylvania	www.cbil.upenn.edu/EPConDB/
GermOnline	International Consortium	www.germonline.org
HPMR	Stanford University	receptome.stanford.edu
PEPR	Children's National Medical Center	microarray.cnmresearch.org

Note: The list is far from complete.

Public data warehouses. With regard to cancer microarray studies, there has been a global coordinated effort to make experiment protocols and raw data publicly available. Multiple public data warehouses have been constructed to host cancer microarray datasets. Although the original goal of such data warehouses was to facilitate the reproduction and validation of microarray studies, they have enabled the integrative analysis of multiple existing studies to be conducted. We provide a partial list of public databases in Table 1. Beyond those large databases, many cancer microarray datasets are hosted at researchers' personal or institutional websites.

A case study of pancreatic cancer. We provide descriptions of four pancreatic cancer microarray studies in Table 2. Although this is a small example, we can already appreciate some of the difficulties associated with integrating datasets from different cancer microarray studies. Careful examination of the datasets described in Table 2 and others suggests that different studies may differ in platforms (eg nylon versus glass), technologies (eg oligo versus spotted), array annotations, sample annotations, and ways of annotating and recording the above information.

Table 2
List of pancreatic cancer microarray studies

Dataset	P1	P2	P3	P4
Reference	Logsdon	Friess	Iacobuzio-Donahue	Crnogorac-Jurcevic
PDAC	10	8	9	8
Normal	5	3	8	5
Array	Affy HuGeneFL	Affy HuGeneFL	cDNA Stanford	cDNA Sanger
UG	5521	5521	29621	5794

MIAME guideline. To facilitate the adoption of standards for experiment annotation and data representation, and to introduce standards for experimental controls and data normalisation methods, the MIAME (Minimum Information About A Microarray Experiment) guideline has been developed. MIAME was originally created by MGED, a consortium of industry and academic representatives in the field. It is now required by most major journals including *Nature*, *Cell*, and *JAMA*. Such journals require two things for MIAME compliance: MIAME checklist information in a Word document, and depositing the dataset in a public microarray database. Under the current MIAME guideline, a relatively complete description of a cancer microarray study should contain information on the following aspects, which are also summarised in Figure1.

1. Experiment design, which includes a brief description of the experiment's goals, the type of experiment (time course, treated vs untreated, gene knockout), the experiment factors (the conditions being tested, eg time, dose, response to treatment), the total number of hybridisations, the types of replicates (biological or technical) and links to citations.

2. Array design – each array used and each element (spot) on the array, and array design-related information (e.g. platform type: in situ synthesised or spotted, array provider, surface type: glass, membrane, other).

3. Sample information, extract preparation and labelling, which includes the origin of the samples (name, provider and characteristics – gender, age, developmental stage), the manipulations to the samples (growth conditions, treatment, separation techniques), the RNA extraction protocols, sample labelling protocols and spiked-in controls.

4. Hybridisation procedures and parameters: the solution (eg concentration of solutes), blocking agent, wash procedure, quantity of labelled target used, time, concentration, volume, temperature and description of the hybridisation instruments.

5. Measurements, including scanning information, scan parameters (laser power, spatial resolution, pixel space, PMT voltage), the laboratory protocol for scanning (scanning hardware and software used) and image analysis information.

6. Normalisation strategy (spiking, housekeeping genes, total array, other), normalisation algorithm and control array elements.

In Figure 2, we provide an example of a GEO submission that follows the MIAME guideline. Figure 2 includes two parts (separated by "sample table begin"): the MIAME information is at the top and the data table is at the bottom.

Computation of similarity. A critical step in integrative analysis is the selection of studies with *comparable designs*, which amounts to computing the dissimilarity measurements between studies. For studies that follow the MIAME guideline, we can use the experiment annotations to compute dissimilarities, and select those with zero or small dissimilarities for downstream integrative analysis.

One possibility is the component-wise experiment dissimilarity measurement. For two cancer microarray studies, we have two sets of annotation terms (denoted as A and B, respectively). The component-wise dissimilarity between these two studies can be defined as $1-|A\cap B|/|A\cup B|$ (Jaccard) or $1 - 1/2(|A \cap B|/|A| + |A \cap B|/|B|)$ (Kulczynski). Choosing one measurement versus the other depends on how the researchers want to weigh the containments.

As with simple numerical measurements, once the distance (dissimilarity) is properly defined, cancer microarray studies can be classified into clusters, where studies in the same cluster share similar schemes and can be integrated for further analysis.

After clusters of studies have been defined, we can evaluate the comparability of selected studies using (for example) the approach in Butte and Kohane (2006), which is based on mapping concepts found in sample annotations to the UMLS (Unified Medical Language System) meta-thesaurus. Specifically, for study i, the silhouettes can be computed as follows: (1) compute $a(i)$, the average dissimilarity between study i and all other studies in the same cluster as study i; (2) compute $d(i, C)$, the average dissimilarity between study i and cluster C that study i does not belong to; (3) compute $b(i) = min_C d(i, C)$, the dissimilarity between study i and its neighbour cluster; (4) compute $s(i) = \frac{b(i)-a(i)}{max(a(i),b(i))}$. If study i is in a singleton cluster, then $s(i) = 0$. Larger $s(i)$s suggest studies are better clustered, whereas small $s(i)$s suggest that studies lie between clusters, and negative $s(i)$s suggest possible wrong clustering.

Integrative analysis

Knudsen (2006) and references therein show that, for cancers of the breast, ovary, lung, colon, prostate and lymphatics, there are multiple independent studies. Using the approach

Figure 1

Protocols and materials required for the annotation of a microarray experiment
LEX: Labelled Extract, Evaluated or Reference

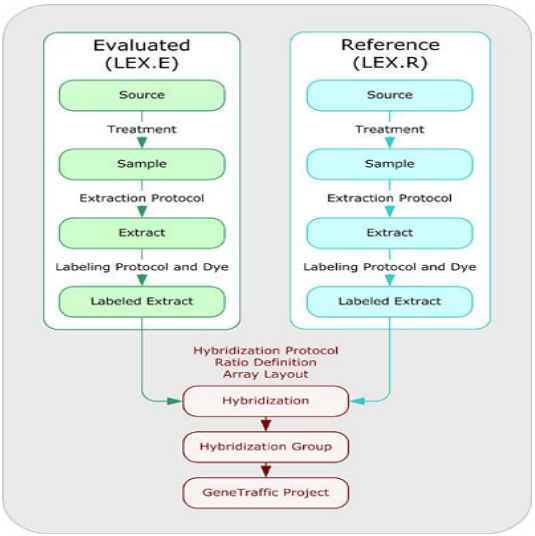

Figure 2

Example of a GEO submission under the MIAME guideline

```
^SAMPLE=body wall rep1
!Sample_title = body wall replicate 1
!Sample_source_name = body wall
!Sample_organism = Drosophila melanogaster
!Sample_characteristics = Wild type, third instar larvae, body wall
!Sample_molecule = total RNA
!Sample_extract_protocol = Approximately 200 wild-type (Berlin strain) wo
!Sample_label = biotin
!Sample_label_protocol = Approximately 8 µg of total RNA was processed to
!Sample_hyb_protocol = standard Affymetrix procedures
!Sample_scan_protocol = standard Affymetrix procedures
!Sample_description = Wild type third instar larvae imaginal wing discs
!Sample_data_processing = Affymetrix Microarray Suite version 5.0
!Sample_platform_id = GPL72
#ID_REF =
#VALUE = MAS5-calculated Signal intensity
#ABS_CALL = the call in an absolute analysis that indicates if the transc
#DETECTION P-VALUE = 'detection p-value', p-value that indicates the sign
!Sample_table_begin
ID_REF  VALUE   ABS_CALL        DETECTION P-VALUE
1412D0_at       36.6    A       0.818657
1412D1_at       41.5    A       0.703191
1412D2_at       607.3   P       0.000944
1412D3_at       1509.1  P       0.000762
1412D4_at       837.3   P       0.000613
1412D5_at       363.2   P       0.003815
1412D6_at       1193.6  P       0.000491
1412D7_at       346.6   P       0.001165
1412D8_at       257.8   P       0.006575
1412D9_at       337.1   P       0.002607
```

described above, for a specific type of cancer, we will be able to select multiple studies with comparable designs. Available statistical methodologies that can analyse multiple cancer microarray datasets can be categorised as meta analysis and integrative analysis methods.

Meta analysis. Meta analysis methods analyse each dataset *separately*, and then combine *summary statistics* from the analysis of multiple datasets.

Available meta analysis methods can be further categorised as follows: (1) category 1 focuses on the comparative analysis of published results, such as lists of significant genes, without actually accessing the raw data. Representative examples include the Lists of Lists Annotated (LOLA, www.lola.gwu.edu) and L2L (depts.washington.edu/l2l) methods. Those methods only involve searching publication databases (for example PubMed or NCBI) and utilising text mining techniques; and (2) Category 2 uses raw data to compute unified statistics across multiple studies, and then combines those statistics. Available methods include: (a) the effect size approach, whereby the effect size is measured for each gene in each study as the *Z* score, and

then combined under a random or fixed effects model; (b) the p-value approach, which applies significance testing separately to each study and then combines the resulting p-values utilising methods such as Fisher's inverse Chi-square; and (c) the vote-counting approach, which ranks genes according to the number of studies that show statistical significance for the genes in question.

Integrative analysis. Integrative analysis, in the narrow sense, differs from meta analysis *by pooling and analysing raw data from multiple studies (as opposed to summary statistics)*.

A family of integrative analysis approaches, which have been referred to as "intensity approaches" in the literature, compare intensity measurements of a gene matched across multiple studies, and search for transformations that make those measurements comparable (Shabalin et al (2008) and references therein). After transformation, multiple datasets can be directly combined and treated as if they were from a single study. Single-dataset methods can then be used for analysis. It is important to note that the comparability of gene expressions obtained from different platforms (even after transformations) is still debatable.

MTGDR: a new integrative analysis approach

In this section, we describe a newly proposed integrative analysis method called *MTGDR* (Ma and Huang (2009)), and demonstrate the basic principles of statistical methods for integrative analysis.

Data and model. For simplicity of notation, we assume that the same set of d genes are measured in M studies with $M > 1$. For study $m = 1 \ldots M$, let Y^m denote the cancer clinical outcome and Z^m denote the gene expressions. In addition, we assume a regression model $Y^m \sim \phi(Z^{m\prime}\beta^m)$, where β^m is the regression coefficient, $Z^{m\prime}$ denotes the transpose of Z^m, and ϕ is the known link function. We assume the same link function ϕ across different experiments. However, we allow for different regression coefficients β^m and, hence, different models under different studies. The rationale is that a one-unit gene expression change in experiment 1 (for example, a cDNA study) may not be equivalent to a one-unit change in experiment 2 (for example, an Affymetrix study). The regression coefficients, which measure the strength of associations, should be allowed to differ.

Consider binary cancer outcomes. For study m, $Y^m = 1$ and $Y^m = 0$ may denote the presence and absence of cancer or two different cancer stages, respectively. We assume the commonly used logistic regression model, which postulates that the logit of the conditional probability $logit(P(Y^m = 1|Z^m)) = \alpha^m + Z^{m\prime}\beta^m$, where α^m is the unknown intercept. Suppose that there are n_m iid observations in experiment m. The log-likelihood is: $R^m(\beta^m) = \sum_{j=1}^{n_m} Y_j^m(\alpha^m + Z_j^{m\prime}\beta^m) - \log(1 + \exp(\alpha^m + Z_j^{m\prime}\beta^m))$.

MTGDR method. The MTGDR is a gene selection method, which can analyse multiple heterogeneous datasets. With the MTGDR, gene selection amounts to identifying non-zero components of the regression coefficients β^m. In integrative analysis, it is reasonable to assume that the sets of genes with non-zero coefficients (i.e., the identified cancer-associated genes) are the same across different experiments. However, even though similar logistic regression models are used to link genes with cancer outcomes in all experiments, the non-zero components of the regression coefficients β^m may be not equal across experiments. This is mainly due to the concern of different experimental setups, especially platforms.

Let $\beta = (\beta^1, \ldots, \beta^M)$. Let $R(\beta) = R^1(\beta^1) + \ldots + R^M(\beta^M)$, the overall objective function. Let $\Delta\nu$ be a small positive increment. In the implementation, we choose $\Delta\nu = 10^{-3}$. Let $\beta^m(\nu)$ denote the parameter estimate of β^m corresponding to ν. Let $0 \leq \tau \leq 1$ be a fixed threshold value. The MTGDR algorithm proceeds as follows.

1. Initialise $\beta = 0$ (component-wise) and $\nu = 0$.
2. With current estimate β, compute the $d \times M$ negative gradient matrix $g(\nu) = -\partial R(\beta)/\partial\beta$, where the $(j, m)^{th}$ element of g is $g_{j,m}(\nu) = -\partial R^m(\beta^m)/\partial\beta_j^m$.
3. Compute the length d vector of meta gradient G, where the j^{th} component of G is $G_j(\nu) = \sum_{m=1}^{M} g_{j,m}(\nu)$.
4. Compute the meta threshold vector $F(\nu)$ of length d, where the j^{th} component of $F(\nu)$: $F_j(\nu) = I(|G_j(\nu)| \geq \tau \times max_l|G_l(\nu)|)$ and I is the indicator function.
5. Update the $(j, m)^{th}$ element of β: $\beta_{j,m}(\nu + \Delta\nu) = \beta_{j,m}(\nu) - \Delta\nu g_{j,m}(\nu)F(\nu)$ and update ν by $\nu + \Delta\nu$.
6. Steps 2–5 are iterated k times, where k is determined by cross validation.

The tuning parameters τ and k jointly determine the property of β and hence the property of gene selection. When $\tau \approx 0$, β is dense even for small values of k (i.e, many genes are selected). When $\tau \approx 1$, β is sparse for small k and remains so for a relatively large number of iterations. But it will become dense eventually. At the extreme, when $\tau = 1$, the MTGDR usually updates estimates for a single gene at each iteration, which is similar to the stage-wise approaches. When τ is in the middle range, the characteristics of β are between those for $\tau = 0$ and $\tau = 1$. For $\tau \neq 0$, gene selection can be achieved with cross-validated finite k by having certain components of β exactly equal to zero.

Pancreatic cancer study. Pancreatic ductal adenocarcinoma (PDAC) is a major cause of malignancy-related deaths. Apart from surgery, there is still no effective therapy, and even resected patients usually die within one year post-operatively. As shown in Table 2, we collected data from four independent studies, and conducted an integrative analysis. We compute the dissimilarity measurements using the MIAME descriptions and found reasonable similarity among the four studies. In addition, we manually examined the experiment protocols and experimental setup and determined that the designs of the four studies are comparable. Among the four studies, two use cDNA arrays and two use oligonucleotide arrays. Cluster ID and gene names are assigned to all the cDNA clones and Affymetrix probes based on UniGene Build 161. The two sample groups considered in our analysis are PDAC and normal pancreatic tissues. We identity a consensus set of 2,984 UniGene IDs. We remove genes with more than 30% missingness in any of the four datasets. There are 1,204 genes remaining for downstream analysis.

In the MTGDR analysis, tuning parameters are chosen via the threefold cross validation. 15 genes are identified as being associated with the risk of developing pancreatic cancer (results available upon request). We find that, if a gene has a non-zero coefficient in one dataset, then it has non-zero coefficients in all the datasets (which indicates that this gene is identified as cancer-associated in all studies). However, the estimated coefficients for one gene can be different across studies. This is the extra flexibility allowed by the MTGDR, which naturally accommodates differences among experimental setups in different studies. We evaluate the biological implications of selected genes by looking at www.ncbi.nlm.nih.gov/

and other public databases. Among the 15 genes, several (including Fibrinogen-like 1, Carnitine acetyltransferase, CRAT, PABPC4, RPS9 ribosomal protein S9, fibronectin 1, BCAT1, MKNK1, PTPN12, GATM, NBL1) have been confirmed to be associated with the risk of developing pancreatic cancer in independent studies.

We have conducted extensive evaluations and comparisons. The results have been summarised in Ma and Huang (2009). Specifically, we have found that: (a) the MTGDR gene signature can be significantly different from alternatives; and (b) compared with gene signatures identified using alternative approaches including the pooled analysis, meta analysis, and single-dataset analysis, the gene signature identified by the MTGDR is more reproducible and has better predictive power.

Remarks. Although the MTGDR is a very specific algorithm, it does provide insights into the essential features common to most integrative analysis methods. Specifically, in integrative analysis, the effect of a single gene (on a cancer outcome) needs to be considered in multiple studies simultaneously. Such an effect needs to be described using the *vector* of regression coefficients, with one coefficient for each study. In addition, it is crucial to allow for the existence of heterogeneity among different studies. Following the development of MTGDR, we can extend other single-dataset gene selection methods to the integrative analysis of multiple datasets. In a recent endeavour, we have considered the group penalisation methods for integrative analysis, which have roots in the single-dataset penalisation methods.

Conclusions

Cancer microarray study is a representative example of the “large p, small n” data, which has attracted extensive attention. The analysis of individual datasets can be underpowered, which may lead to low reproducibility of findings. The integrative analysis of multiple datasets can increase statistical power without additional cost. Successful integrative analysis demands proper execution of the following steps: (1) the establishment of public databases for data storage and access; (2) the detailed descriptions of each individual study; (3) the computation of dissimilarities between studies, and the selection of comparable studies; and (4) the effective statistical methods for integrative analysis.

Many public databases have been established. Although most of them have already been very successful, communications among databases are less satisfactory. The effective integration of databases is of critical need. Software that can conduct automated database searching and dataset integration is needed. The MIAME guideline has been proposed and commonly adopted for descriptions of cancer microarray data. Of note, other guidelines have also been developed and (maybe less extensively) adopted. The integration and unification of guidelines may be necessary for the better integration of studies (described using different guidelines). There have been a few published studies investigating the different definitions of dissimilarity. However, a small number of experiment annotations cannot provide complete descriptions of all studies. The examination of each individual study by experts and the selection of studies based on experiences still play an important role. Efficient statistical methodologies for integrative analysis still have a long way to go. Although considerable success has been achieved, most available approaches have not been extensively tested and there is no consensus on the relative performance of the different approaches.

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Documenting the research life cycle: one data model, many products

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Introduction

Technical documentation for social science data is produced by a range of technologies in a variety of environments. While statistical agencies generally standardise the content and the look and feel of the documentation they produce, each agency approaches the task differently. Documentation produced by individual researchers shows even more variety. This heterogeneity in documentation comes at a cost – for data archivists who have had to adjust to new documentation styles with each data deposit in order to curate the collection, and for secondary data analysts attempting to understand datasets with which they were not familiar.

The idea of standardising documentation has gained traction in the past few years. There is much to be gained from such standardisation, particularly with respect to automation of related processes, because standardised content provides a consistent structure to build upon and to programme against. If data archives receive standardised input with each data submission, they can tune their ingest processes according to the structure of the documentation. Structured, machine-actionable documentation can also be used to drive systems, including search and browse, data analysis and subsetting, and data visualisation. Converging on a set of standard elements also facilitates data exchange.

The Data Documentation Initiative (DDI) is an effort to establish an international standard in XML for the content and exchange of metadata describing social science data. Version 3.0 of the specification covers the research data life cycle, from inception of a project, through questionnaire design and data collection, to deposit of the data in an archive and beyond. To leverage the potential of this standard, two organisations at the University of Michigan have undertaken a project designed to produce a shared DDI-compliant data model leading to several different data products. This paper reports on the project, which suggests an approach that statistical agencies may want to consider to increase flexibility and to facilitate data and metadata sharing and reuse.

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Brief history of the data documentation initiative

The Data Documentation Initiative (DDI) began in 1995 when the Inter-university Consortium for Political and Social Research (ICPSR) convened an international group to begin work on a specification. The standard began as SGML, and was then converted to Web-friendly XML. The project is now directed by the DDI Alliance (http://www.ddialliance.org), a self-sustaining membership organisation whose members have a voice in the development of the DDI specification. A small steering committee provides governance. The governance structure of the Alliance is based on the World Wide Web Consortium (W3C).

In 2000, DDI version 1.0 was published as an XML DTD. This version of the specification was mainly document- and codebook-centric, following closely the traditional codebook models with which social scientists were familiar. In 2003, the scope of the DDI specification was extended to incorporate aggregate data coverage and geography into version 2.0.

Version 3.0 (http://www.ddialliance.org/ddi3/index.html) of the standard was published in the spring of 2008 after vetting and review by the Alliance members and the general public. This version is a full implementation of XML schemas and emphasises the reuse of metadata through modularity and the use of persistent schemes that can stand alone and be referenced. DDI 3.0 also provides for grouping and comparison of datasets as well as multilingual support. The standard supports other metadata standards, including MARC, Dublin Core, SDMX (statistical data and metadata exchange), ISO 11179 (metadata registries), FGDC (digital geospatial metadata), and ISO 19115 (geographic information metadata). Support for PREMIS (preservation metadata) and METS (metadata packaging) is also being built in. Arguably the most interesting thing about DDI 3.0, though, is its coverage of the research data life cycle, from inception of a project to archiving and secondary analysis.

More generally, creating documentation in DDI and XML provides several advantages. Documentation tagged in XML carries “intelligence” about the content of the data. Since it is ASCII at its core, it will remain usable into the future, unlike proprietary word processing software. In addition, it can be repurposed. A DDI codebook contains all of the information necessary to produce several different types of output, including, for example, a traditional social science codebook, a bibliographic record, or SAS/SPSS/Stata data definition statements. Changes made to the core DDI document will be passed along to any output generated. DDI also lends itself to fielded searching on the Web.

Project stakeholders

The two organisations conducting the demonstration project to show the advantages of using DDI 3.0 are both units of the Institute for Social Research, University of Michigan:

- ICPSR, a large social science data archive
- Survey Research Operations (SRO), a data collection centre

The two organisations had worked together previously on the National Survey of Family Growth (NSFG), sponsored by the National Center for Health Statistics, to create an interactive codebook. They partnered again on the Collaborative Psychiatric Epidemiology Surveys (CPES) (www.icpsr.umich.edu/CPES), sponsored by the National Institute for Mental Health. This involved a harmonisation of three datasets and interactive documentation featuring question comparison and five languages, as shown in Figure 1.

Figure 1

Multilingual variable display in CPES

Together, SRO and ICPSR cover the life cycle of research data and they are natural partners. They both need a rich, high-quality metadata structure and both have the desire to comply with metadata standards – in particular, DDI, since it is the relevant standard in this space. Additionally, passing data easily from SRO to ICPSR without information loss is important to both organisations.

Life cycle metadata tools

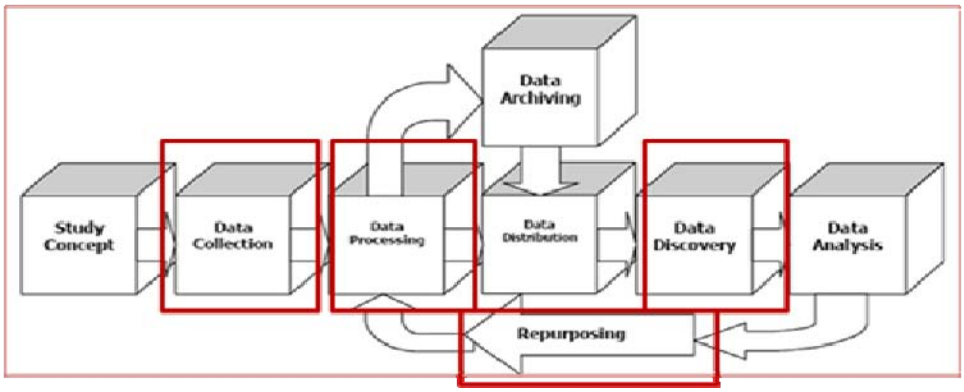
The needs of the partners span several phases of the research data life cycle. From SRO's perspective, what they wanted to derive from the project were tools to complement the MQDS (Michigan Questionnaire Documentation System), which produces XML documentation from Blaise instruments used during data collection. They also needed a tool to permit external users to add metadata for the National Survey of Family Growth during the time when data are being processed in order to produce a public use file.

On ICPSR's side, there was a need to create a robust variable-level search across ICPSR collection for resource discovery, comparison of variables, and ultimately the creation of new datasets and questionnaires. In addition, ICPSR needed a tool to perform internal searches across variables to aid in data harmonisation, which is a type of data repurposing.

Figure 2 shows the life cycle phases covered by the four metadata tools developed from the core relational database.

Figure 2

Data life cycle phases covered by SRO-ICPSR project

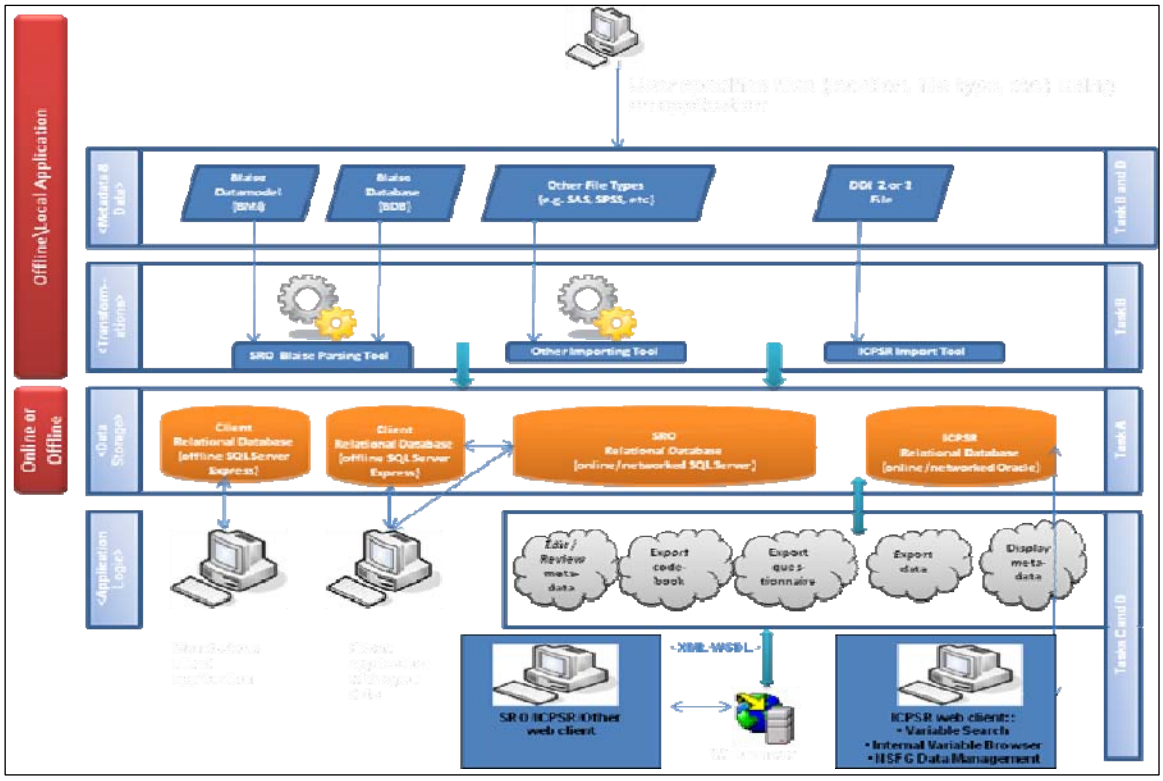


Project design

Teams from the two collaborators met for several months during 2007 and 2008 in order to finalise the data model. Because SRO and ICPSR work in different technical environments, the database had to be implemented on two separate platforms. Figure 3 shows a diagram created early on in the project to guide activities. A flexible model was necessary and thus the partners agreed that while the two implementations would share a common core of metadata elements, each group could create local extensions. This is possible in DDI and does not “break” the standard.

Figure 3

High-level diagram of project functionality



Data collection phase – (MQDS)

SRO uses Blaise for computer-aided telephone interviewing (CATI)/computer-aided personal interviewing (CAPI) surveys, and in recent years they developed a system called MQDS to facilitate automated documentation and harmonisation of Blaise survey instruments and datasets and to extract survey question metadata in a standardised format. The survey metadata MQDS provides include question universe, variable name and label, question text, question variable text (fills), data type, code values and code text, and skip instructions.

MQDS version 1 extracted metadata from the Blaise data model as XML tagged data and provided a user interface for selection of Blaise files, instrument questions and sections, types of metadata to extract, languages to display, and a style sheet for generation of instrument documentation or codebook. However, the first version of MQDS had limitations in that the XML was not DDI-compliant because DDI version 2 did not have XML tags for all metadata provided by Blaise and did not provide easy means of adding XML tags without becoming non-compliant. Another problem was that XML files for complex surveys can be very large; entire files had to be processed in computer memory and there was limited ability to fully automate documentation.

With DDI 3.0 it became possible to document the instrument and it was decided to move from processing XML metadata in memory to streaming metadata to a relational database. The resulting database solution includes DDI-compliant standardised tables and flexibility for SRO and ICPSR to add extensions that meet their specific organisational needs. It also allows automated documentation of any Blaise survey instrument, importing and documenting data produced by other software, and results in lower costs for development of other tools that facilitate editing and disseminating data.

In documenting both the instrument and the data, MQDS offers unique functionality to complement Blaise and other CAI systems.

Data processing phase – editing tool

The relational database also enables the development of new tools to deal with the practical problems involved in transforming data and documentation derived from Blaise instruments into public use products. One such product is an editing tool to load MQDS output into database tables with a Web interface to permit quick viewing. This is an application that permits both internal and external clients to access and edit variable-level information and also provides the ability to include disposition codes to designate which variables to include in public use files. It permits the maintenance of a permanent record of decisions made throughout the editing process.

Data discovery phase – social science variables database (SSVD)

The SSVD enables ICPSR users to search variables across datasets. Furthermore, it assists in data discovery, comparison, harvesting, and analysis and is useful in question mining for designing new research.

The concept was first tested in a pilot project funded by the National Science Foundation and completed in 2005. This product had good functionality and demonstrated the benefits of using DDI markup with easy import, complex, granular searches, and a user-friendly display. However, it included a limited number of datasets (69 ICPSR studies included) at the time.

ICPSR was able to automate the production of DDI-compliant metadata from SPSS source files, making input to SSVD much more efficient. This software produces the full suite of archival distribution products, including data files in SPSS, SAS, and Stata formats, as well as raw ASCII text plus setup files and a variables description in DDI.

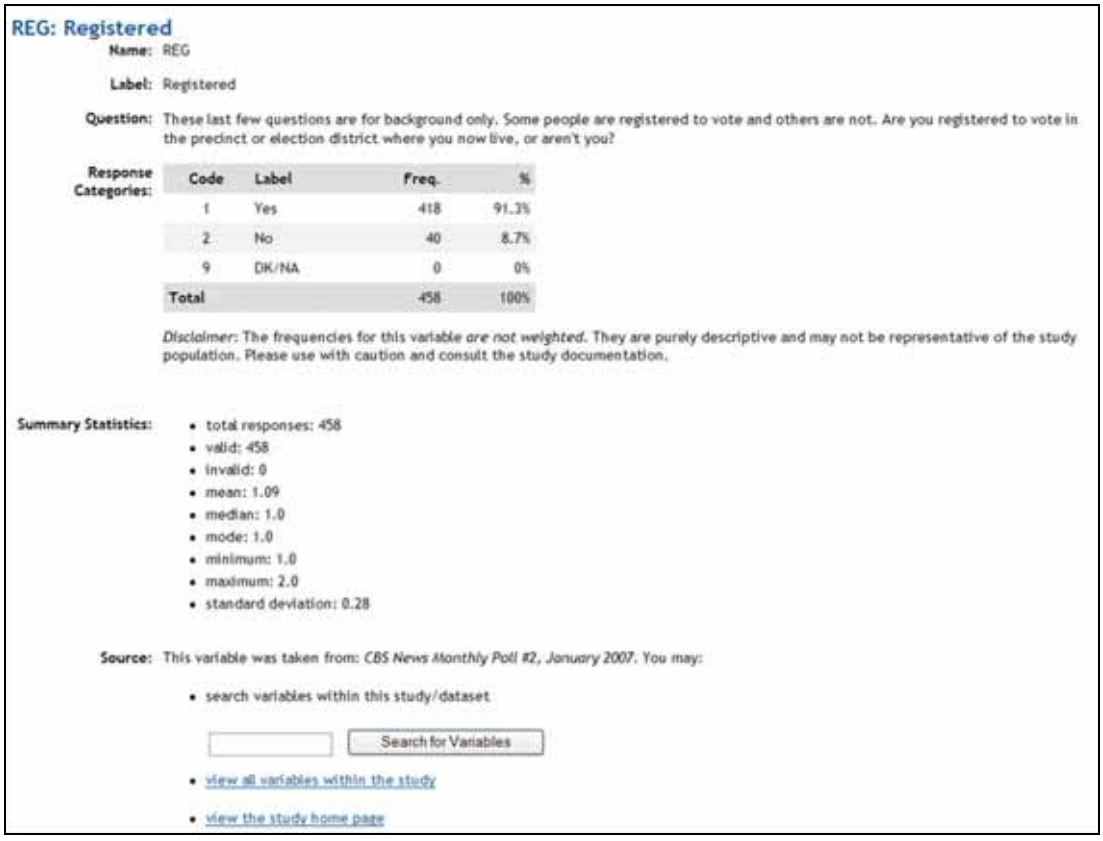
To maximise the effectiveness of the public search, it was necessary to perform additional work to enhance the quality of the machine-generated DDI documentation. ICPSR needed to add question text, whenever available, and needed to increase the readability of variable/value labels, especially if question text was not present.

The new SSVD, which was finalised in autumn 2008, was built to match the DDI 3.0 data model and to be both DDI 2.x and DDI 3.0 compliant. It was designed to accept both DDI 2.x and 3.0 as input and to produce output in both versions. ICPSR version currently uploads DDI 2.1 and generates DDI 3.0 individual variable descriptions.

The variable-level description files in SSVD number more than 5,100 files representing about 2,000 studies and 40 percent of the ICPSR holdings with setup files. Over 1.5 million variables can now be searched, and ICPSR continues to add content. The database can be searched here – http://www.icpsr.umich.edu/ICPSR/ssvd/index.html – and Figure 4 shows a sample variable.

Figure 4

Sample variable from SSVD



REG: Registered

Name: REG

Label: Registered

Question: These last few questions are for background only. Some people are registered to vote and others are not. Are you registered to vote in the precinct or election district where you now live, or aren't you?

Response Categories:

Code	Label	Freq.	%
1	Yes	418	91.3%
2	No	40	8.7%
9	DK/NA	0	0%
Total		458	100%

Disclaimer: The frequencies for this variable *are not weighted*. They are purely descriptive and may not be representative of the study population. Please use with caution and consult the study documentation.

Summary Statistics:

- total responses: 458
- valid: 458
- invalid: 0
- mean: 1.09
- median: 1.0
- mode: 1.0
- minimum: 1.0
- maximum: 2.0
- standard deviation: 0.28

Source: This variable was taken from: *CBS News Monthly Poll #2, January 2007*. You may:

- search variables within this study/dataset

Search for Variables

- view all variables within the study
- view the study home page

Repurposing phase – internal search for data harmonisation

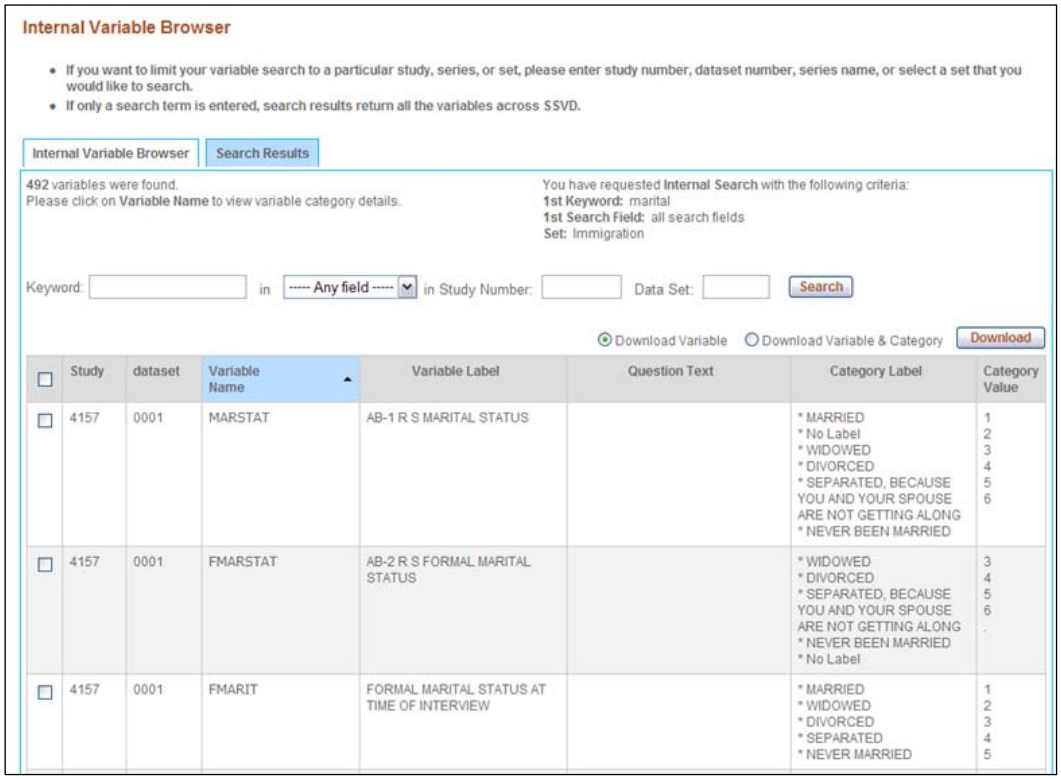
The fourth tool based on the shared data model was designed to aid in post hoc data harmonisation. ICPSR received a five-year grant from the National Institute of Child Health

and Human Development to harmonise data from 10 large surveys of marriage, fertility, and child-bearing in the United States. These surveys, running from 1955 through 2002, comprised the data series Growth of American Families, National Fertility Surveys, and National Surveys of Family Growth.In order to make decisions about harmonisation across all files, ICPSR needed access to question text for all variables along with value labels and categories. Staff needed to be able to find and export metadata from all 10 files at the variable level and to have the capability to document and recode each variable, as well as variable choice. Also important was the ability to do nested searches that were documented, search all fields individually and in sequence, and download results and document what search terms were used.

To that end, all 10 datasets were loaded into ICPSR's version of the shared database, which was designed to capture all of the relevant fields that were marked up in DDI. Figure 5 shows the variable marital status and the different categories to be harmonised.

Figure 5

Internal variable browser results



Downloaded search fields serve to identify variables to be harmonised and provide metadata for translation tables which are used to harmonise files.

Conclusion

The relational database project has shown the benefits of cooperation across research data life cycle stages and the possibility of creating multiple metadata products from a core database designed to be compliant with DDI 3. In addition to providing a means for producing structured documentation for archiving and distribution, the project also shows the

potential for going beyond the traditional codebook in terms of providing instrument documentation, including universe statements and a better view of what interviewers saw when administering surveys. There are also advantages in terms of repurposing data items, as the internal variable search for the harmonisation effort shows.

Statistical agencies that use Blaise will soon have the capability to produce DDI-compliant documentation from Blaise when the MQDS module becomes part of the Blaise package. At this point, export to DDI 3, either directly as XML or potentially into a database, will be possible. Agencies may want to consider storing, presenting, and distributing documentation in this format. As the CPES example (Figure 1) shows, XML can be rendered in any number of ways on the Web and is also easily convertible to PDF for dissemination copies. It lends itself to fielded searching, which is a boon for users. And compliance with the DDI standard ensures that the content can be preserved and will remain usable and reusable over time.

Invited Paper Meeting 68

Risks in finance – the state of the art in statistical methods

Chair:	Richard Walton, European Central Bank
Papers:	Creating a statistical framework for the measurement of credit risk transfer – the ECB experience Violetta Damia, Jean-Marc Israël and Paolo Poloni, European Central Bank
	Macroprudential analysis of the financial system: the case of South Africa Francis Selialia, Thabo Mbeleki and Kgomotso Matlapeng, South African Reserve Bank
	Prudential supervision of banks in the South African context – the supervisory review and evaluation process Nico De Lange and Madoda Petros
	The advanced measurement approach for banks Jan Lubbe and Flippie Snyman, Firstrand Banking Group
Discussants:	Filipa Lima, Bank of Portugal
	Satoru Hagino, Bank of Japan

Chairman summary of session IPM 68: Risks in finance – the state of the art in statistical methods

Richard Walton[1]

This topic covered two approaches: (i) a data collection approach, and (ii) a research approach to risks in finance and to the management of those risks. Discussion of the data collection approach focused on data assessment needs and "gaps" and the links with frameworks of risk. Discussion of the research approach focused on ways in which prudential supervisors and the banking industry deal with risk. For the data collection approach, the Invited Paper Meeting covered macroprudential analysis and the measurement of credit risk transfer. For the research approach, a paper from the banking industry looked at the advanced measurement approach to operational risk. A second paper presented by a prudential supervisor covered the supervisory review process.

Concluding remarks

Going forward, further work on these themes would be desirable in order to: (i) strengthen the analytical and conceptual framework for financial stability analysis, which would in turn clarify data priorities; (ii) strengthen work on international data harmonisation and particularly on the comparability of exposures (large exposures, trading books) between institutions and on cross-sectoral and cross-border financial linkages, in order to identify the build-up of risk; (iii) increase coordination of microprudential data collection from banks (exposures, capital and liquidity, credit risks) and its frequency (end-period and period averages and high-lows). Data collection should be shared between supervisory authorities and economic statisticians, not least to reduce the burden on business; and (iv) meet statistical demands for stress tests and the implementation of the advanced measurement approach for banks (Basel II).

[1] European Central Bank.

Creating a statistical framework for the measurement of credit risk transfer – the ECB experience[1]

Violetta Damia,[2] Jean-Marc Israël[3] and Paolo Poloni[4]

The financial crisis has highlighted certain gaps in the existing economic and financial statistics available to policymakers. In devising its strategy for filling in these gaps, the European Central Bank (ECB) has developed new or enhanced euro area statistics, which are to the extent possible coherent with the existing ones and in conformity with international standards. At the same time, the ECB has been responsive to the high priority given by users to more detailed datasets, including at the micro level, and to the need to achieve even better timeliness.

A major gap in the statistics available to policymakers has been the measurement of credit risk transfer (CRT) across macroeconomic sectors and geographical regions.[5] The aim of this paper is to describe the ECB approach to improving the measurement of CRT, which has been developed jointly with other relevant institutions. This approach should be seen as part of a broader, integrated statistical framework.

1. Broad overview of credit risk transfer statistics

In general, new or enhanced CRT statistics for the euro area are developed and implemented under a variety of different arrangements, using legal instruments where appropriate, and working with national central banks and other international agencies and supervisory authorities. Within Europe, CRT and other monetary and financial statistics are a prime competence of the ECB, according to the Memorandum of Understanding signed by the European Commission (DG-Eurostat) and the ECB's Directorate General Statistics. In the last decade, this memorandum has promoted an efficient production and dissemination of statistics at the European level.

The need to measure the sectoral and geographical transfer of credit risk stems from the opaque characteristics of the instruments, which bundle diverse credit risks and allow a CRT to take place between market participants, and from the reduced amount of information

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[1] The views expressed herein are those of the authors and do not necessarily reflect the views of the ECB. The authors would like to thank Steven Keuning, Patrick Sandars and Richard Walton for their very useful comments. Any remaining mistakes or inaccuracies are the fault of the authors.

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[5] The ECB has also addressed other statistical implications of the financial turmoil, eg better measures of market liquidity, better asset price statistics, and statistical accounting consequences for governments in the context of the excessive deficit procedure. An overview of such initiatives is provided by Stephen Keuning, *Statistical needs emanating from the financial crisis and the ECB's initiatives for more comprehensive financial statistics*, International Statistical Institute, Special Topic Contributed Paper Meetings, no 52, 2001[?].

available to end-investors as the ultimate holders of this risk. In addition to the cross-sector and cross-border transfer of risk, users have emphasised the need for a harmonised classification of CRT instruments, an appropriate valuation of instruments that may be traded in illiquid markets, and a sufficient level of data disaggregation (eg to identify the accumulation of credit risk exposures within large banks and other investors) and granularity.

For CRT statistics, the emphasis has been placed, to the extent possible, on the reuse of already available data from either official or commercial sources[6]. However, where existing sources are not adequate, consideration is given to finding an optimal trade-off between the costs of reporting and the data quality necessary to meet user requirements.

In credit risk transfer, two rather distinct developments and related sets of instruments can be identified. First, credit risk is transferred by making the underlying loan negotiable in the form of securities, often issued by securitisation vehicles. Second, credit risk itself may be transferred using credit derivatives. Mixed solutions have also been used, eg securitisation vehicles issuing securities collateralised by credit derivatives.

CRT instruments may also have an impact on the monetary policy transmission mechanism as these instruments allow credit risk and the related tying-up of financial capital to be spread among a much larger pool of economic entities, thus facilitating the expansion of credit. From a financial stability perspective, the usefulness of the data related to CRT can be assessed by their ability to identify and measure the risks and the channels that could pose adverse systemic consequences for the financial system. In this respect, the CRT markets may be a source of risks themselves, such as market-originated risks (liquidity risk, legal risk, etc) or exposure-originated risks (correlation risk, country risk, etc). As the current crisis has shown, the CRT markets may facilitate the propagation of a shock, ie the spillover to other institutions and/or to other markets via several channels, such as the balance sheet channel, the rating channel and the primary credit channel, for example, via capital requirements. Finally, for the oversight of payment and securities settlement systems, the clearing and settlement of derivatives (in particular credit default swaps (CDS), given the size of the market) is an important segment to monitor.

The rest of this paper contains four sections. The next two sections deal with the two categories of CRT instruments, namely securities and credit derivatives. The fourth section discusses the possible reuse of supervisory information for statistical purposes. The last section of the paper briefly concludes.

2. Harmonised statistics on securitisation

The measurement of CRT undertaken via the issuance of securities has been developed through harmonised statistics on banks' securitisation and loan sales, integrated with balance sheet statistics on securitisation vehicles (so-called "financial vehicle corporations" or FVCs). The related statistical requirements have been laid down in two recent ECB regulations;[7]

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[6] In general, statistics cannot be compiled if private information is missing altogether. In that sense, better market transparency is a precondition (and not a consequence) of better statistics.

[7] Regulation (EC) no 24/2009 of the European Central Bank of 19 December 2008 concerning statistics on the assets and liabilities of financial vehicle corporations engaged in securitisation transactions (ECB/2008/30) (see http://eurlex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:015:0001:0013:EN:PDF); Regulation (EC) no 25/2009 of the European Central Bank of 19 December 2008 concerning the balance sheet of the monetary financial institutions sector (recast) (ECB/2008/32) (see http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:015:0014:0062:EN:PDF).

here the focus is on macroeconomic and monetary analysis and the residency criterion is based on the host country of the individual entities surveyed.

Banks, which form the main part of the monetary financial institutions (MFI) sector, will report net flows and, if acting as servicers, also stock data, on traditional loan securitisations through an FVC and on loan sales, with a breakdown by maturity, purpose, residency/sector of debtors, and residency of the FVCs. Moreover, MFIs will report data on holdings of securities issued by FVCs as well as some further details to ensure consistency of the reporting of securitisation in an environment of (still) differing accounting standards. This information will provide users with a measure of the share of euro area bank loans for which credit risk has been transferred, ie net of the FVC securities that have been purchased by the originators of the loans.

In parallel, complete information on the balance sheets and transactions of euro area FVCs will become available in 2010, covering the portfolio of securitised loans broken down by residency/sector of the originator, residency/sector of debtors, as well as a breakdown of their holdings of securities by maturity and sector/residency of issuers. Within the instrument breakdown, gross positions/flows in financial derivatives will be identified, as well as debt securities issued, broken down by maturity, and deposits. Moreover, FVCs involved in true sale and synthetic securitisations will be separately identified.

The two sets of statistics (MFI securitisation data and FVC balance sheet statistics) are integrated. A particular effort has been made to ensure that the same information is not reported twice, ie by the originating bank and by the FVC which securitises the loans. Moreover, a significant degree of flexibility has been given to national central banks (NCBs) regarding the data sources needed to compile FVC balance sheet statistics, such as possibly using available (supervisory or public) data sources, where predefined data quality standards are met.

Some limited information on securitisation originated within the euro area by entities other than banks will also be available. On the holding side, the forthcoming collection of new harmonised statistics on assets and liabilities of investment funds (including hedge funds)[8] will be based on security-by-security reporting, so that it will be possible to assess their holdings of structured securities issued by banks and FVCs. A complete picture of CRT in the euro area would also require similar data covering eg the insurance corporations and pension funds sector.

Moreover, specific work has also been undertaken to identify the sector and residency of holders of securities arising from securitisation deals. Industry initiatives have been taken, coordinated by the European Securitisation Forum, to provide more detailed information on outstanding amounts and to estimate holdings of structured securities. Given some quality issues with these data, and in order to capture a broader set of user requirements, the ECB's Statistics Committee has established an Advisory Group on Security Holdings Statistics. The Group's aim is to develop strategic guidelines for the collection and compilation of securities holding statistics, for both monetary and financial stability purposes. This may lead to a concrete follow-up from 2010 onwards.

[8] Regulation (EC) no 958/2007 of the European Central Bank of 27 July 2007 concerning statistics on the assets and liabilities of investment funds
(see ECB/2007/8) (see http://eur-lex.europa.eu/JOHtml.do?uri=OJ:L:211:SOM:EN:HTML).

3. Statistics on credit derivatives

As mentioned before, the new MFI securitisation data and FVC balance sheet statistics will provide incomplete coverage of CRT instruments, in particular regarding the provision of information on credit derivative positions.

The collection of enhanced statistics on CDS and other derivatives is considered to be of primary importance from a financial stability perspective and relevant also for financial and structural analysis and the oversight of payment and securities settlement systems. Statistics currently available from the Bank for International Settlements (BIS) are the starting point for statistics on credit derivatives.[9] The ECB is chairing the Working Group on CRT statistics (WG CRT), an initiative launched by the Committee on the Global Financial System, to: (i) identify potential gaps in and assess the need to improve the current BIS statistics on CRT globally, (ii) propose possible enhancements, and (iii) consider a broader scope for CRT statistics.

Regarding the expansion of the current CDS data, the WG CRT has proposed to expand the current CDS statistics with a limited geographical breakdown and an extended breakdown of counterpart sectors and reference entities (underlying assets or debtors). The proposal also consists in improving the timeliness of the OTC derivatives data[10] (reducing the reporting lags from five months to approximately three months).

The WG CRT has benefited from the US Depository Trust and Clearing Corporation disclosure of weekly data from November 2008, and has ensured a sufficient degree of consistency between these very frequent and timely market data and the biannual BIS statistics that would serve as the benchmark survey. Overall, these two sources would increase the capacity of central banks to monitor market developments, to identify potential market disruptions and, hence, improve monetary policy and financial stability analysis. At the same time, the further breakdowns of the biannual BIS statistics are expected to impose only a limited cost on the 55 reporting dealers.

The new features of the CDS statistics will be aligned with those in the BIS Triennial Survey, and to the extent possible with BIS consolidated banking statistics, in order to enhance their value for analysis. Following these enhancements and a more complete and detailed coverage of ratings and multi-name instruments, a clarification of valuation methods is contemplated. This would make the data comparable across reporting countries and would make it possible to provide an assessment that is closely related to the eventual risk transfer.

4. Reuse of supervisory information

Supervisory information collected at the national level is a key source of information for financial stability monitoring and assessment. The ECB's semi-annual *Financial Stability Review* and other publications include information collected by the ECB, in cooperation with the Banking Supervision Committee,[11] on the solvency and profitability of the banking sector,

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[9] See http://www.bis.org/publ/rpfxf07t.htm.

[10] It is worth noting that the BIS statistics on OTC derivatives are collected on a consolidated basis, hence include foreign offices and non-bank subsidiaries. This is the preferred basis for financial stability and oversight analysis, as it more accurately reflects the on- and off-balance sheet exposures of systemically important entities in often highly concentrated markets.

[11] The IMF is promoting the compilation of financial soundness indicators (FSIs) on a worldwide scale. For a comparison between the ECB and IMF approaches, see Agresti et al (2008).

as well as ad hoc information on specific exposures of the banking sector. Yet, *"there is room for enhancing the access to supervisory information for the ECB's financial stability assessment. A wider access – in terms of the timeliness and frequency of information on banks' exposures and risk concentrations – would improve the identification of potential risks to the stability of the euro area financial system and the assessment of the potential impact on the system of the possible materialisation of the identified risks."*[12]

To assess the possible reuse of supervisory information on CRT for statistical purposes, the ECB has been monitoring the possible impact of potentially enhanced Basel II disclosure requirements on statistics, and the harmonisation and reconciliation of reporting formats. Under the Basel II Framework,, banks are required to disclose confidential information to supervisors (Pillars 1 and 2), as well as information for the public (Pillar 3). While Pillar 2 remains a matter of national discretion, Pillar 1 requirements have been harmonised by the EU Committee of European Banking Supervisors (CEBS), which has developed harmonised templates and reporting guidelines for reporting financial information and solvency data. Most EU national supervisory authorities have adopted (or intend to adopt) the financial reporting and solvency data templates for regulatory purposes, but the level of detail (data layers) of the information collected is likely to vary widely across countries. Moreover, the solvency data reporting guidelines allow for unharmonised data definitions. For this reason, for the time being, ECB users consider that exclusive reliance on solvency data information is not sufficient for an EU-wide picture of banks' exposures to CRT markets.

The frequency of Pillar 3 data is only annual. The relevant quantitative information concerning CRT instruments requested under Pillar 3 can be divided into two main sets: securitisation and (other) credit risk mitigation disclosures. Pillar 3 requirements concerning credit risk mitigation include data on the gross protection bought and sold via credit derivatives in notional value, broken down by type of instrument, and the gross fair value of credit derivatives. Regarding securitisations, the data requirements lag behind the information to be reported under the new ECB statistical framework for securitisation.

Efforts are being made to allow a meaningful reuse of supervisory information on CRT for macroprudential purposes. In the current financial crisis, key supervisory information concerns banks' direct exposures to the US subprime sector and to structured financial products, as well as the effects of write-downs on banks' capital position. However, the nature of the next financial stress is likely to differ from the previous ones; this calls for sufficient flexibility and responsiveness of the statistical systems in place. To this end, ad hoc surveys may be considered. Moreover, these systems may be geared towards collecting more granular data, eg security-by-security and loan-by-loan information, the latter possibly based on central credit registers.

In a medium-term perspective, the ECB and CEBS have started joint work on reconciling supervisory (financial reporting, solvency data) and statistical reporting requirements addressed to credit institutions. This work aims at bridging and, where possible, reconciling elements of the two frameworks (eg definitions, concepts, valuation rules, reporting templates) and may therefore help compilers at the national level to develop more integrated information systems. For instance, it may help to collect information on securitisation only once, with the information then serving both statistical and supervisory purposes.

[12] See Bini-Smaghi (2008).

5. Conclusion

ECB statistical initiatives to measure CRT began in response to a changing environment of financial innovation, globalisation, deregulation and technological changes, which have been going on for a long time (see Annex). The serious lack of transparency in a number of financial innovations, which was acknowledged because of the 2007 financial crisis, motivated the ECB to intensify its endeavours in this area of statistics.

Although the scope of the CRT statistics developed by the ECB needs to be widened, they largely respond to the increasing calls from academics[13] for greater transparency in the (exposures to the) CRT market and for enhanced cooperation among central banks and supervisory authorities. As a next step, additional coordinated efforts should be made among supervisory authorities, policymakers and statisticians to further define the data requirements and expand the scope of the CRT statistical exercise to the global scale in a cost-effective manner.[14]

[13] See G Franke and J P Krahnen (2008), among others.

[14] For instance, the following calls for international cooperation could be leveraged:

- The Financial Stability Forum (FSF) (2008) submitted to G7 finance ministers and central bank governors a comprehensive set of recommendations for addressing the weaknesses that have produced the present crisis and for strengthening the financial system going forward. The FSF report called for concrete actions in five areas, including enhancing transparency about risk exposures, valuations, off-balance sheet entities and related policies.
- More recently, the Issing Committee (2009), an expert committee advising the German Government on issues relating to financial crisis prevention, has advocated the establishment of a reliable data foundation for systemic risk assessment.
- In addition, the High-Level Group on Financial Supervision in the EU, chaired by Mr de Larosière, has set out a number of key principles and recommendations as a means to strengthen European supervisory arrangements covering all financial sectors, with the objective of establishing a more efficient, integrated and sustainable European system of supervision. In particular, the recommendations address issues such as (i) how to organise the supervision of financial institutions and markets in the EU, (ii) how to strengthen European cooperation on financial stability oversight, early warning and crisis mechanisms, and (iii) how EU supervisors can cooperate on a global basis. The Group has also analysed and brought forward recommendations on regulation of financial markets.

Annex

Table 1

Non-exhaustive list of the ECB's new CRT statistics and related initiatives

Enforced via regulations

- New balance sheet statistics on FVCs and IFs (including legal definition of hedge funds)
- New statistics on MFI securitisation, integrated to MFI balance sheet statistics

Developed via international cooperation and voluntary data transmissions

- Improving data on credit derivatives, in cooperation with the BIS and international clearing houses
- Collection of securities holdings statistics
- Alignment of supervisory and statistical concepts and data, in cooperation with the CEBS (and the banking industry); also, possible reuse of Pillar 3 data, or ad hoc surveys

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Macroprudential analysis of the financial system: the case of South Africa

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1. Introduction

Financial stability is crucial for sustained economic growth. Economic growth cannot be achieved without strong financial systems. Even with sound macroeconomic fundamentals, weak financial systems can destabilise economies, making them more vulnerable to external shocks. The interaction of financial markets and the real economy needs close monitoring since the instability of the financial system can be very costly. A smoothly operating, stable and efficient financial system is a major pillar for growth, output and employment.

Central banks have adopted macroprudential analysis as a widely used method of detecting vulnerabilities in the financial system. This involves, among other things, the identification of financial soundness indicators (FSIs) and the methods used to analyse them. Observing potential signs of heightened risks in the financial system is important for central banks, as they rely on such insights to be able to take both preventive measures and appropriate action in crisis management.

The rest of the paper is organised as follows. Section 2 defines macroprudential analysis and the FSIs. Section 3 provides methods of identifying FSIs. The main analytical tools are described in section 4. Section 5 discusses the methodology for modelling credit risk. Section 6 presents the bivariate regression results and a brief discussion of scenarios. Section 7 discusses the risk-bearing capacity of the banking sector and the model's forecasting accuracy. The last section concludes.

2. Macroprudential analysis

Macroprudential analysis is a method of economic analysis that evaluates the health, soundness and vulnerabilities of a financial system. The analysis involves the assessment and monitoring of the strengths and vulnerabilities of financial systems using quantitative information, largely in terms of FSIs, and other economic indicators that provide a broader picture of economic and financial circumstances. The assessment takes into account both

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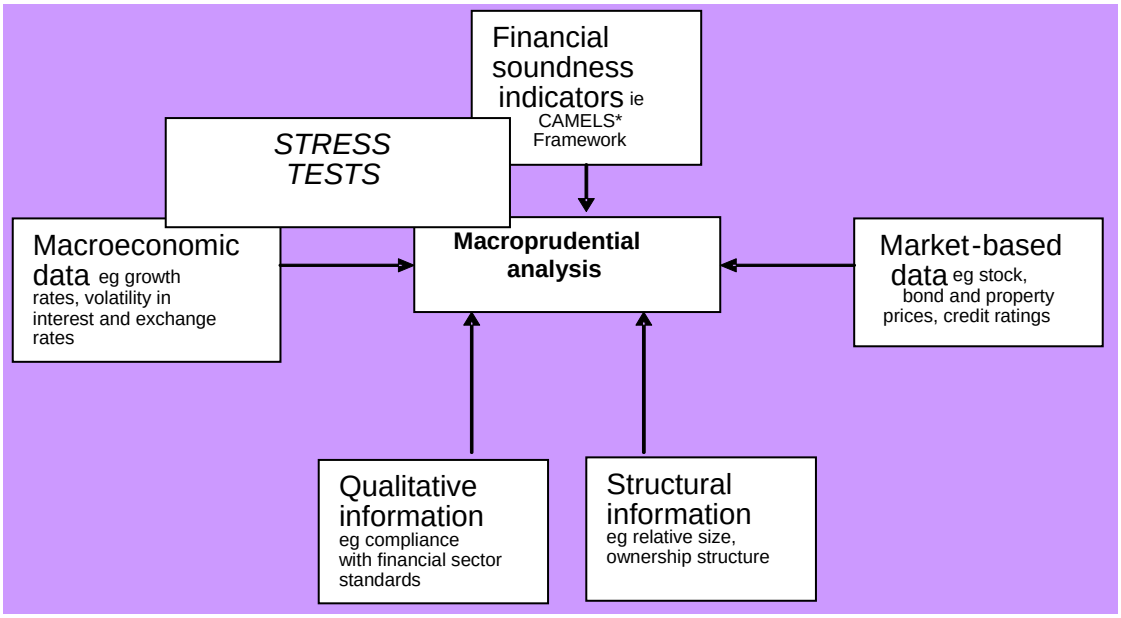
the risks facing the financial system and the system's capacity to withstand shocks. It also involves establishing or investigating the linkages between the financial system and the real sector of the economy. Scenario analysis and stress tests are major components of this analysis and they help in determining the system's sensitivity to economic shocks and its resilience to such shocks.

In its broad definition, macroprudential analysis encompasses an analysis of qualitative information relating to the structure of the financial system and its institutional and regulatory framework in order to get an additional sense of the strength of the financial system architecture. Qualitative assessment is done, among other things, through the assessment of compliance with international financial sector standards and codes and the Financial Sector Assessment Programme (FSAP). Figure 1 provides a diagrammatic summary of macroprudential analysis and Annex 2 shows macroprudential indicators recommended by the IMF.

Figure 1

Components of macroprudential analysis



* CAMELS stands for capital adequacy, asset quality, management soundness, earnings, liquidity and sensitivity to market risk.

Source: Evans et al (2000).

3. Identification of macroprudential indicators

Three main approaches are followed when identifying FSIs. The first approach followed is international best practice, which is suggested by international institutions such as the IMF, BIS and others, and by central banks. Examples of FSIs derived from this approach are summarised in Annex 2. The second approach is based on the underlying economic theories of financial instability as espoused by Davis (1999). He emphasises that data requirements for macroprudential analysis are dictated by the theories underpinning the concept of financial instability. Examples of the theories include the monetary approach and theories based on the concept of uncertainty and those based on asymmetrical information and agency costs. Annex 3 provides a summary of implied or recommended macroprudential indicators derived from these theories. The third approach is based on the linkages or

interaction between the financial sector and other sectors of the economy. It is summarised with the aid of the circular flow of income and expenditure[4] (Annex 4).

In all the approaches discussed above, the indicators should be analytically and empirically relevant, that is, there should be a sensible basis for expecting a relationship between the indicator and financial instability, and indicators should have predictive power or be classified as leading indicators in the sense that changes in one variable precede changes in another.

4. Assessment methods

Central banks in different countries use different techniques to assess and monitor the exposure of financial systems to different types of risks and shocks. As mentioned earlier, in most cases, stress tests and scenario analysis are the main methods used to determine the system's sensitivity to economic shocks. Stress testing is a generic term describing various techniques used by financial firms to gauge potential vulnerability to exceptional but possible events.[4] These methods are preferred because they perform a quantitative analysis of financial fragility.

Another method of conducting macroprudential analysis (the most basic and the most common) is to monitor indicators from a variety of sources and seek to identify broad patterns in the indicators that might suggest growing imbalances and the potential for financial instability. When the indicator breaches what is perceived to be a benchmark, it is interpreted as giving a warning signal of potential vulnerability. Annex 5 gives a snapshot of the main sectors monitored when conducting macroprudential analysis and the benchmarks/thresholds used.

Credit risk remains one of the most important sources of vulnerability in the South African banking sector. Annex 6 shows the increasing trend of impaired advances in the South African banking sector. However, the increase in impaired advances is not seen as a major systemic threat as banks remain well capitalised and profitable. The increase in credit impairments came after a prolonged period of extensive credit growth in recent years during a period of very low lending rates. Annex 6 gives an example of a credit risk financial soundness indicator (impaired advances) which is monitored on an ongoing basis. In an attempt to guard against credit risk, banks and other authorised credit providers introduced stringent lending standards (Annex 7).[5]

5. Effects of macroeconomic developments on credit risk

In estimating the effects of macroeconomic developments on credit risk, bivariate regressions are estimated.

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[4] The circular flow of income and expenditure is an analytical tool used in basic macroeconomic textbooks to demonstrate the linkages among the various sectors of the economy.

[5] See CGFS (2000).

[6] It should be noted, however, that there are other factors which may also have contributed to the stringent lending standards by authorised credit providers, such as the implementation of the National Credit Act (NCA), no 34 of 2005, in June 2006 and recent developments in global financial markets.

5.1 Model specification

The estimated model is a distributed lagged model specified as:

$BANRUP_t = \beta_0 + \beta_1 BANRUP_{t-1} + \beta_2 X_{i,t-p} + \varepsilon$ …….. (1)

where

BANRUP is the dependent variable (bankruptcies) used as a proxy for non-performing loans;

$BANRUP_{t-1}$ is lagged bankruptcies;

X_i represents macroeconomic variables;

β represents regression coefficients that capture the sensitivity of bankruptcies (and hence, loan quality) to specific macroeconomic variables;

p is the number of lags, and

ε is the error term.

5.2 Data

The data used in the analysis ranged from the first quarter of 1980 to the fourth quarter of 2007, and bankruptcies were used as a proxy for non-performing loans.[6] All variables were logarithmically transformed and differenced. There is a strong correlation between gross overdues and the number of bankruptcies (Annex 8). All time series variables included in the study were first tested for stationarity using the augmented Dickey-Fuller unit root test and the correlogram. Non-stationary variables were transformed to stationarity by differencing. They were, therefore, used at their differenced levels in the regression equations.

The explanatory variables used in the regression equations were divided into the following six categories: cyclical indicators, price stability indicators, household sector indicators, corporate sector indicators, market indicators and external sector variables.[7] The expected sign(s) of each indicator is/are provided in Table 1.

[7] Non-performing loans and gross overdues are used interchangeably. Data on bankruptcies were obtained by adding insolvencies and liquidations. Insolvencies refer to individuals or partnerships that are unable to pay their debts and are placed under final sequestration. Liquidations capture companies or close corporations for which the affairs have been wound up when liabilities exceed assets.

[8] The categorisation contains some ambiguity and was chosen purely for convenience and ease of presentation. For example, private sector credit extension can also be included among indicators of the household sector.

6. Empirical analysis

Table 1

Bivariate regression results

$BANRUP_t = \beta_0 + \beta_1 BANRUP_{t-1} + \beta_2 X_{i,\, t-p}$					
	Expected sign	Coefficient	T-stats	R^2	DW[a]
Cyclical indicators					
GDP	–	–2.165	–2.205[b]	0.612	1.937
Volume of production	–	–1.371	–2.233[b]	0.612	1.961
Price stability indicators					
Inflation	+/–	–0.090	–1.507	0.619	1.921
Money supply	+/–	0.088	1.350	0.609	2.027
Household sector indicators					
Disposable income	–	0.675	1.483	0.607	2.015
Household wealth	–	–0.747	–1.428	0.601	2.000.
Household financial assets	–	–1.410	–3.422[b]	0.635	1.849
Gross savings	–	0.258	2.325[c]	0.619	2.004
Remuneration per worker	–	–0.291	–0.400	0.594	1.964
Mortgage advances	+	0.034	0.151	0.598	1.987
Corporate sector indicators					
Corporate profits	–	–0.088	–0.985	0.597	1.978
Total gross fixed capital formation	+/–	–0.361	–0.757	0.596	1.947
Gross fixed capital formation – residential construction +/–		–0.747	–2.353[b]	0.614	1.960
Gross fixed capital formation – machinery and equipment	+/–	–0.547	–1.893	0.607	1.897
Business confidence	–	–0.194	–3.478[b]	0.636	2.240
Private sector credit extension	+	1.463	2.575[b]	0.618	2.083
Market indicators					
Prime lending rate	+	0.316	1.972[b]	0.608	2.135
All-share index	–	–0.319	–2.405[b]	0.615	2.033
External sector indicators					
Merchandise exports	–	–0.392	–3.431[b]	0.644	2.104
Rand/US dollar	+/–	0.500	2.687[b]	0.620	2.015
Rand/pound sterling	+/–	0.349	1.835	0.606	1.956
Rand/euro	+/–	0.556	2.776[b]	0.622	1.944
Oil price	+	0.139	1.388	0.608	2.013

[a] The Durbin-Watson *d*-statistic detects the presence of serial correlation in the regression residuals. As a rule of thumb, if *d* is found to be in the vicinity of 2 in an application, it is assumed that there is no first order autocorrelation, either positive or negative. It should be noted, however, that the Durbin-Watson statistic cannot be relied upon for distributed-lagged models. [b] Denotes statistical significance at 5 per cent level. [c] Denotes statistical significance at 5 per cent level but has a wrong sign.

Source: Authors' computation.

6.1 Scenario analysis

Scenario analysis was done in order to measure the impact of various adverse macroeconomic events (shocks) on the dependent variable (bankruptcies). The historical approach for selecting scenarios was adopted.

Adverse changes (scenarios) in the shock variables and the period in which they occurred are presented in Annex 9, while Annex 10 provides a graphical illustration of the scenarios.

7. Stress testing results

Table 2 gives stress testing results given historical moves in individual macroeconomic variables.

Table 2

Stress testing results

Significant macro factors	Worst case scenarios (in per cent)	Per cent change in bankruptcies (non-performing loans)
GDP	–0.1	0.2
Volume of production	–6.9	9.5
Household financial assets	–5.2	7.3
Gross fixed capital formation – residential construction	–9.8	7.3
Business confidence	–49.6	9.6
Private sector credit extension	8.1	11.9
Prime lending rate	21.9	6.9
Exports	–19.4	7.6
Rand/US dollar	21.3	10.7
Rand/euro	24.8	13.8
All-share index	–26.1	8.3

Source: Authors' calculations.

7.1 Impact on banks' core capital and capital adequacy ratio

In conducting the stress test and risk-bearing capacity of the banking sector, data as at the end of January 2007 are used for illustration purposes. During that period, gross overdues for the banking sector stood at ZAR 19.7 billion, core capital at ZAR 121.7 billion, and the capital adequacy ratio was 11.9 per cent. For example, the impact of a 21.9 per cent increase in the prime lending rate would result in an increase of about 6.9 per cent in loan losses for banks, which in monetary terms would amount to about ZAR 1.4 billion. This would, in turn, be approximately 1.1 per cent of core capital as at end-January 2007. With the restricting assumptions that loan loss provisions have been depleted and that there are no profits (such that increases in loan losses are deducted from capital), core capital would be reduced by 1.1 per cent. With the reduced level of core capital, the net impact would be a reduction in the capital adequacy ratio of 0.1 percentage points. The results for other shock variables or scenarios are given in Table 3.

Table 3

Impact on banks' share capital and capital adequacy ratio (January 2007)

Shock variables	Change in loan losses			
	(In per cent)	(Rand billions)	(As a percentage of core capital)	(As a percentage of CAR)
GDP	0.22	0.04	0.04	0.00
Volume of production	9.46	1.86	1.53	0.18
Household financial assets	7.33	1.44	1.19	0.14
Gross fixed capital formation – residential construction	7.32	1.44	1.19	0.14
Business confidence	9.62	1.90	1.56	0.19
Private sector credit extension	11.85	2.33	1.92	0.23
Prime lending rate	6.92	1.36	1.12	0.13
Exports	7.60	1.50	1.23	0.15
Rand/US dollar	10.65	2.10	1.72	0.21
Rand/euro	13.79	2.72	2.23	0.27
All-share index	8.33	1.64	1.35	0.16
			Sum of net effects	**1.79**

Source: Authors' computation.

7.2 Resilience testing

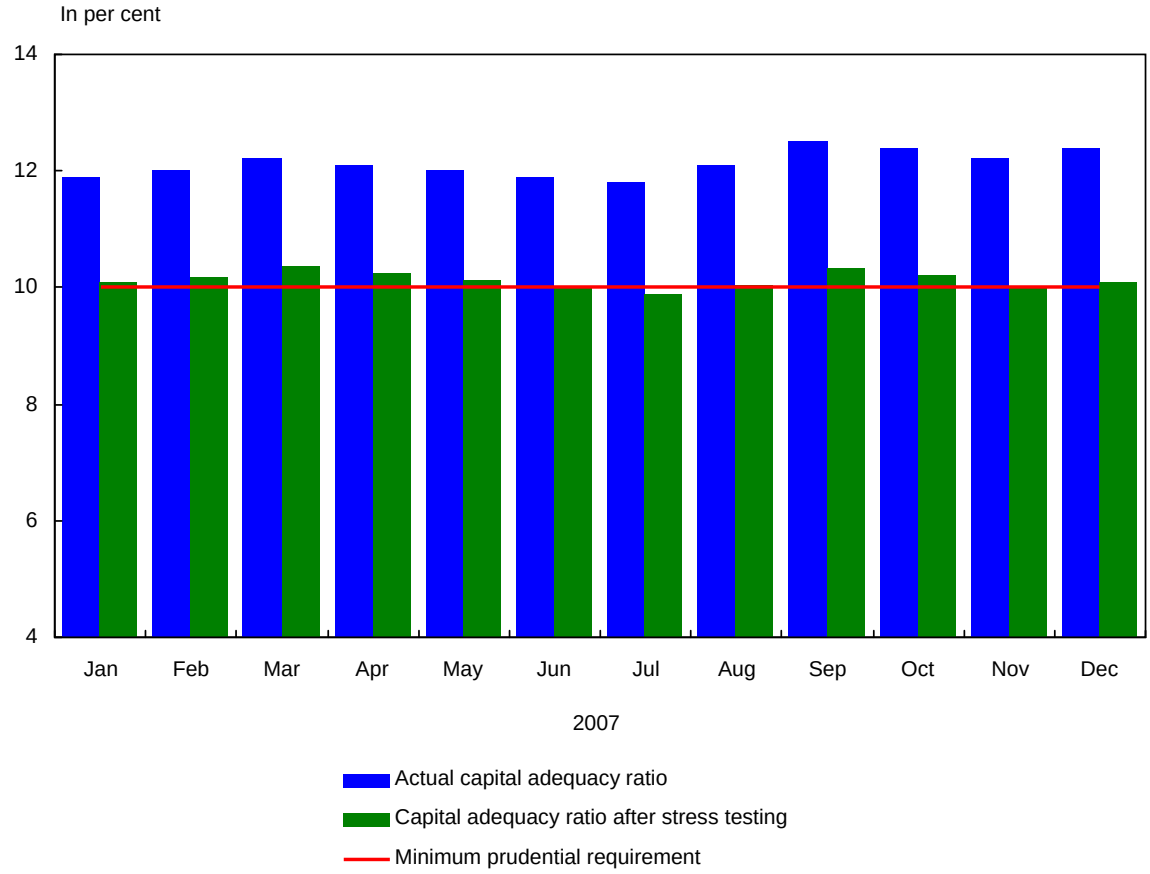
The sum of the effects of all the shock variables is estimated at a reduction of 1.8 percentage points in the capital adequacy ratio (Table 3). Thus, the new capital adequacy ratio after the multifactor stress test is estimated at 10.1 per cent, suggesting that the banking sector would still be resilient to the shocks as the capital adequacy ratio after stress testing is still above the minimum prudential requirement of 10 per cent.[8]

Stress test results from January 2007 to December 2007 are given in Figure 2 and show that the South African banking sector was generally resilient to plausible macroeconomic shocks for the whole of 2007. The capital adequacy ratio after the stress tests remained above the minimum prudential requirement for 11 of the 12 months, with the exception of July, when it fell short by about 0.1 percentage points.

[9] The internationally accepted benchmark for the capital adequacy ratio during this period (before the implementation of the Basel II Framework) was 8 per cent of risk-weighted assets. The South African benchmark was more stringent and set at 10 per cent of risk-weighted assets.

Figure 2

Risk-bearing capacity



Source: Authors' construction.

7.3 Forecasting accuracy

To assess how well different indicators predict future bankruptcies, the bankruptcy equations were estimated over a shorter period of time (from the first quarter of 1980 to the second quarter of 2006), omitting the six quarters from the third quarter of 2006 to the fourth quarter of 2007. The estimated coefficients were then used to produce forecasts of movements in bankruptcies for the out-of-sample period.

To evaluate the robustness of the model (out-of-sample forecasting), the mean forecasting error, calculated as the root mean squared error (RMSE), and the mean absolute percentage error (MAPE) were used (Annex 11). The RMSE measures the dispersion of the forecasted variable around the true value of the observations (bankruptcies). The smaller the forecasting error, the better the variable is in predicting movements in bankruptcies and hence loan losses. It implicitly weights large forecasting errors more heavily than small errors and is appropriate to situations in which the cost of an error increases with the square of that error. The MAPE is the average of the absolute values of the percentage errors. The RMSE and the MAPE are often used to evaluate the forecasting accuracy of a model. The two measures gave very similar results. They both gave the prime lending rate, private sector credit extension, business confidence and the ALSI as the first four macroeconomic variables with high forecasting power (Table 4). Annex 12 presents out-of-sample forecasts graphically.

Table 4

RMSE and MAPE between actual and estimated dependent variable[9]

	PRIM	PSCE	BUSCONF	ALSI	R/USD	VOP	R/EURO	GFCFRES	MEXP	GDP	HHDFA
Rank	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
06-q3	26	13	32	50	56	75	90	18954	39494	881954	3761589
06-q4	16	24	23	43	70	68	108	19004	44653	938802	4139116
07-q1	1	48	9	37	101	65	149	19072	53801	1184911	4456826
07-q2	30	14	36	63	57	83	101	18958	48507	1028419	4721013
07-q3	44	-13	48	67	15	81	47	18863	33168	734867	4797237
07-q4	0	38	6	30	68	49	112	18815	44593	947018	4679532
MAPE	**19**	**21**	**26**	**48**	**61**	**70**	**101**	**18944**	**44036**	**952662**	**4425886**
	PSCE	PRIM	BUSCONF	ALSI	R/USD	VOP	R/EURO	GFCFRES	MEXP	GDP	HHDFA
Rank	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
RMSE	**115**	**126**	**146**	**232**	**264**	**319**	**432**	**18575**	**188693**	**4081442**	**4440960**

Source: Authors' calculations.

8. Concluding remarks

This paper discusses macroprudential analysis in general and within the context of the South African financial system. It also assesses the resilience of the South African banking sector to macroeconomic shocks that can lead to an increase in credit risk. The main methods of identifying macroprudential indicators within the South African context are outlined as ensuring compliance with international best practice, making use of economic theories and taking into account the interlinkages between various sectors of the economy. The main analytical methods are identified as monitoring trends of macroprudential indicators and developing models to assist in the analysis. Stress testing is discussed as the most popular modelling technique used by most institutions.

The results of bivariate regressions confirmed the causal relationship between macroeconomic developments and credit risk (proxied by bankruptcies). The following macroeconomic variables were found to explain changes in bankruptcies and to have high predictive power in terms of bankruptcies: the prime lending rate, private sector credit extension, business confidence level and ALSI. Using a capital adequacy ratio of 10 per cent as a benchmark, the banking sector was found to be resilient to plausible macroeconomic shocks throughout 2007.

It has to be noted, however, that the analysis only provides an idea of what could happen if history were to repeat itself. The results should therefore be interpreted with care. The analysis also has some limitations. Firstly, the use of a bivariate framework may be unrealistic because in reality shocks may not take place in isolation. Bivariate regressions

[9] See Annex 1 for a description of the acronyms and abbreviations used in the table.

may suffer from some flaws such as misspecification errors. Secondly, the use of a linear model to measure the impact of large shocks is restrictive because in reality shocks may have a non-linear impact. Thirdly, bankruptcies are a proxy for credit risk and thus an error-in-variables problem may be present. The analysis does, however, provide a foundation and backup for qualitative discussions that are always necessary when assessing the performance of the financial system.

Future research should focus on building rigorous models that can include both macroeconomic variables and FSIs as opposed to the bivariate approach used in this paper. This will allow for the simultaneous utilisation of all available information. Nevertheless, it is believed that the framework used does shed some light and is considered a reasonable starting point in attempting to assess the soundness of the South African financial system and its vulnerability to macroeconomic shocks.

Annex 1:
Acronyms and abbreviations

ALSI	All-share index
BANRUP	Bankruptcies
BER	Bureau for Economic Research
BIS	Bank for International Settlements
BUSCONF	Business confidence index
CAMELS	Capital adequacy, asset quality, management soundness, earnings, liquidity and sensitivity to market risk
CAR	Capital adequacy requirements
FSIs	Financial soundness indicators
FSAP	Financial sector assessment programme
FSSA	Financial system stability assessment
GDP	Gross domestic product
GFCFRES	Gross fixed capital formation – residential construction
HHDFA	Household financial assets
HHDW	Household wealth
IMF	International Monetary Fund
JSE	Johannesburg Securities Exchange, SA
LLP	Loan loss provision
MAPE	Mean absolute percentage error
MEXP	Merchandise exports
MORTADV	Mortgage advances
MPIs	Macroprudential indicators
NPLs	Non-performing loans
OLS	Ordinary least squares
OENB	Oesterreichische Nationalbank
PRIM	Prime
PSCEGDP	Private sector credit extension as a percentage of GDP
R/EURO	Rand/euro exchange rate
RMSE	Root mean square error
R/POUND	Rand/pound sterling exchange rate
R/USD	Rand/US dollar exchange rate
SARB	South African Reserve Bank
STATSSA	Statistics South Africa
VOP	Volume of production
ZAR	South African rand

Annex 2:
Summary of financial soundness indicators

Aggregated financial soundness indicators	Macroeconomic indicators
Capital adequacy	Economic growth
Aggregate capital ratios	Aggregate growth rates
Frequency distribution of capital ratios	Sectoral slumps
Asset quality	Balance of payments
Lending institutions	Current account deficit
Sectoral credit concentration	Foreign exchange reserve adequacy
Foreign currency denominated lending	External debt (including maturity structure)
Non-performing loans and provisions	Terms of trade
Loans to loss-making public sector entities	Composition and maturity of capital flows
Risk profile of assets	
Connected lending	
Leverage ratios	
Borrowing entity	Inflation
Debt-equity ratios	Volatility in inflation
Corporate profitability	
Other indicators of corporate conditions	
Household indebtedness	
Management soundness	Interest and exchange rates
Expense ratios	Volatility in interest and exchange rates
Earnings per employee	Level of domestic real interest rates
Growth in the number of financial institutions	Exchange rate sustainability
	Exchange rate guarantees
Earnings and profitability	Lending and asset price booms
Return on assets	Lending booms
Return on equity	Asset price booms
Income and expense ratios	
Structural profitability indicators	
Liquidity	Contagion effects
Central bank credit to financial institutions	Trade spillovers
Segmentation of interbank rates	Financial market correlation
Deposits in relation to monetary aggregates	
Loans-to-deposits ratios	
Maturity structure of assets and liabilities (liquid asset ratios)	
Measures of secondary market liquidity	
Sensitivity to market risk	Other factors
Foreign exchange risk	Directed lending and investment
Interest rate risk	Government recourse to the banking system
Equity price risk	Arrears in the economy
Commodity price risk	
Market-based indicators	
Market prices of financial instruments, including equity	
Indicators of excess yields	
Credit ratings	
Sovereign yield spreads	

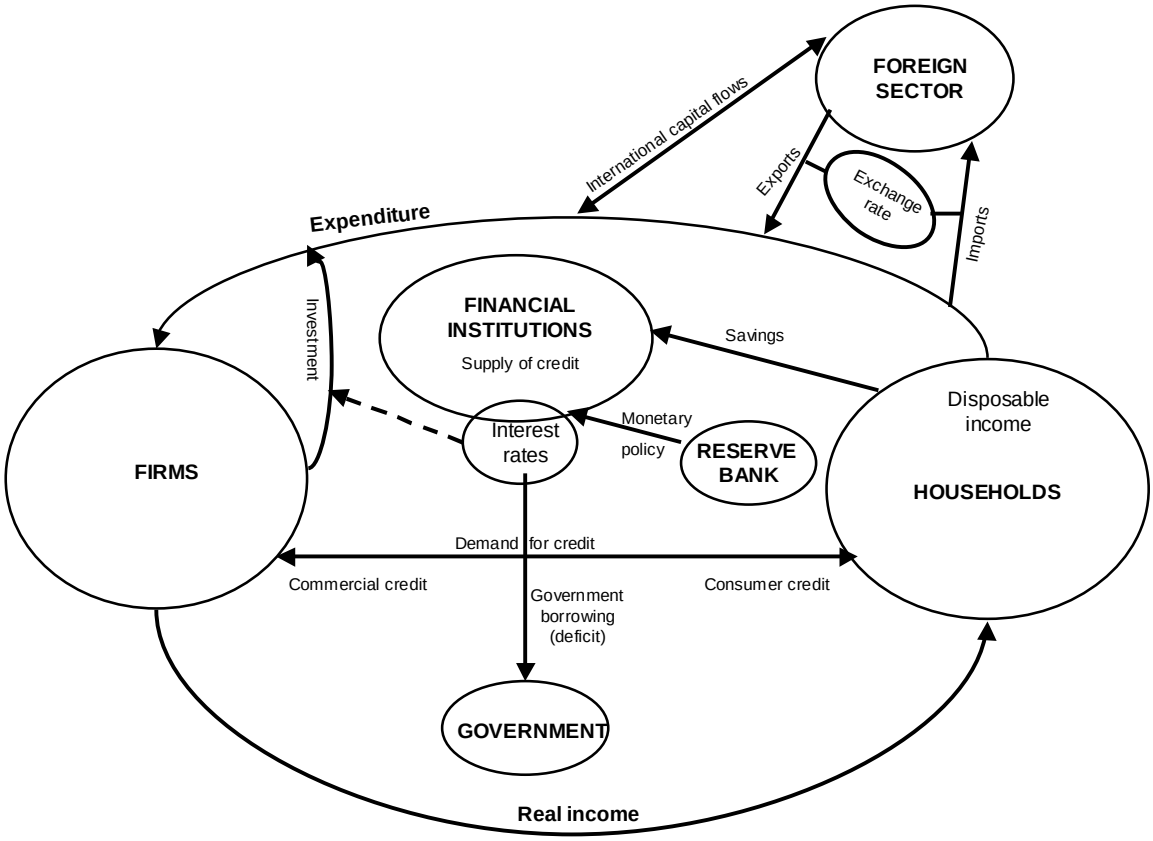
Source: IMF (2006).

Annex 3:
Selected FSIs implied by economic theories of financial stability

Theories (models)	Main emphasis	Recommended indicators
Debt and financial fragility	Debt accumulation Rising corporate and household debt accumulation relative to assets	Macroeconomic variables, real estate sector, economic growth, asset prices, income gearing, corporate and household debt, sectoral balance sheet, credit markets and investment trends
Monetarist approach	Growth of monetary aggregates Monetary policy in general	Monetary aggregates, inflation, interest rates and exchange rates
Risks of bank runs	Use of micro data on the banks' balance sheets and profit and loss statements	Capital adequacy, overall interest rate margins, returns on assets or equity and banks' assets, bank share prices, interbank claims and liabilities
Uncertainty, credit rationing and asymmetrical information	"Disaster myopia" Emphasise and summarise other theories. Deviations from long-term averages are emphasised.	Loan spreads, rapid growth of markets, sectoral distribution of credit, bank capital ratios, net worth of customers
International aspects	Vulnerability to external shocks Role of international capital flows	Foreign reserves, balance of payments transactions, foreign currency borrowing, capital inflows and contagion and commodity prices

Source: Authors' construction based on Davis (1999 and 2001).

Annex 4:
The circular flow of income and expenditure



Source: Fourie (1996).

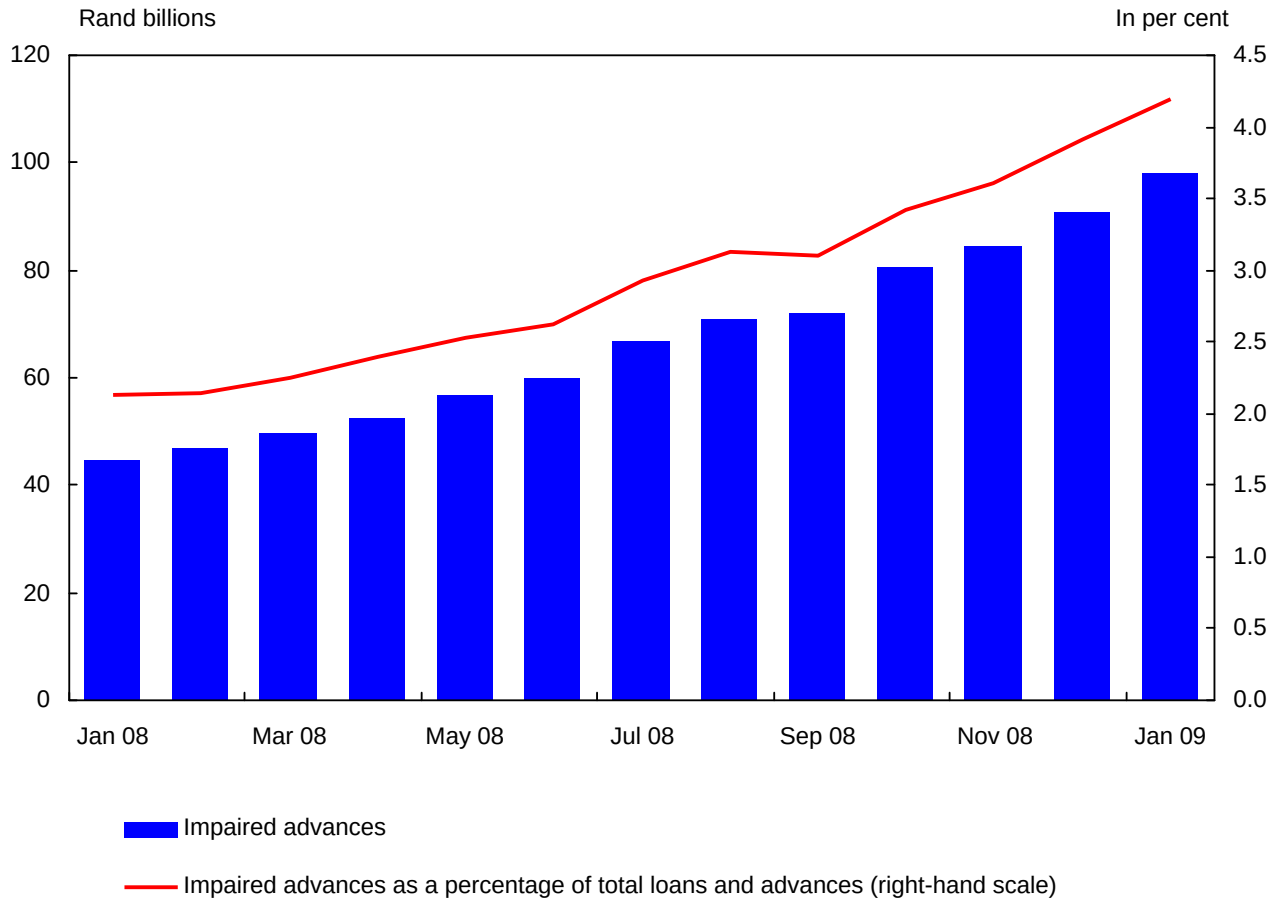
Annex 5:
Snapshot of macroprudential indicators

Financial services index				
	Mean[a]	**Threshold[b]**	**Actual (Q1 2009)**	**Signal issued**
Retail banking confidence index	88	67	32	Yes
Investment banking and specialized finance confidence index	91	74	42	Yes
Investment managers confidence index	88	71	43	Yes
Life insurance confidence index	84	66	46	Yes
Financial services index	88	70	41	Yes
Banking sector				
	Mean	**Threshold**	**Actual (Feb 2009)**	**Signal issued**
Market share – top four banks, in per cent	83.9	84.3	84.4	No
Concentration – H-index	0.186	0.188	0.190	No
– Gini index	83.4	83.8	84.0	No
Capital adequacy ratio	12.6	12.2	13.0	No
Impaired advances (ZAR billions)	71.6	89.8	106.1	Yes
Impaired advances as a percentage of total advances	3.1	3.9	4.6	Yes
Total loans and advances (ZAR billions)	2266	2340	2316	No
Banking share prices (y-o-y), per cent change	–24.0	–30.9	–23.9 (Mar 2009)	No
Insurance sector				
5.1	**Mean**	**Threshold**	**Actual (Q4 2008)**	**Signal issued**
Surrenders, in per cent	21	27	13	No
Individual lapses, in per cent	36	47	59	Yes
Number of policies (y-o-y), per cent change	5	–4	6	No
Insurance share prices (y-o-y), per cent change	2.3	–20.5	–38.2 (March 2009)	Yes
Corporate sector				
	Mean	**Threshold**	**Actual (Mar 2009)**	**Signal issued**
Liquidations (y-o-y), per cent change	5.8	37.9	16.8	No
Business confidence index	49	26	27 (Q1 2009)	No
Household sector				
	Mean	**Threshold**	**Actual (Q1 2009)**	**Signal issued**
Insolvencies (y-o-y), per cent change	4.6	39.4	20.8 (Feb 2009)	No
Consumer confidence index	3.8	–6.2	1.0	No
Credit card lending (y-o-y), per cent change	10.2	16.6	2.18 (Feb 2009)	No
Real estate sector				
	Mean	**Threshold**	**Actual (Apr 2009)**	**Signal issued**
ABSA house price index (y-o-y), per cent change	12.7	2.6	–2.7	Yes
ABSA house price index (m-o-m), per cent change	0.92	0.09	–0.38	Yes
ABSA building cost index (y-o-y), per cent change	12.0	19.3	5.6 (Q1 2009)	No
Total mortgage advances (y-o-y), per cent change	18.6	22.5	12.9 (Feb 2009)	No
Real sector (annual growth rates)				
	Mean	**Threshold**	**Actual (Mar 2009)**	**Signal issued**
Building plans passed	11.4	–13.4	–36.2	Yes
Buildings completed	14.9	–8.3	–4.5	No
Retail sales	6.1	1.5	–5.1	Yes
Wholesale trade sales	5.7	–0.2	–10.4	Yes
Electric current generated	2.6	–1.6	–7.7	Yes
New vehicle sales	5.2	–16.0	40.2 (Apr 2009)	Yes

[a] Data ranges for computing the mean are not the same for all indicators. [b] The benchmark (threshold) is calculated as the mean value of the indicator adjusted by the less favourable standard deviation. The actual value of the indicator is compared to the threshold value and is interpreted as giving a warning signal to vulnerability in the financial system if it crosses the threshold.

Source: Authors' computation.

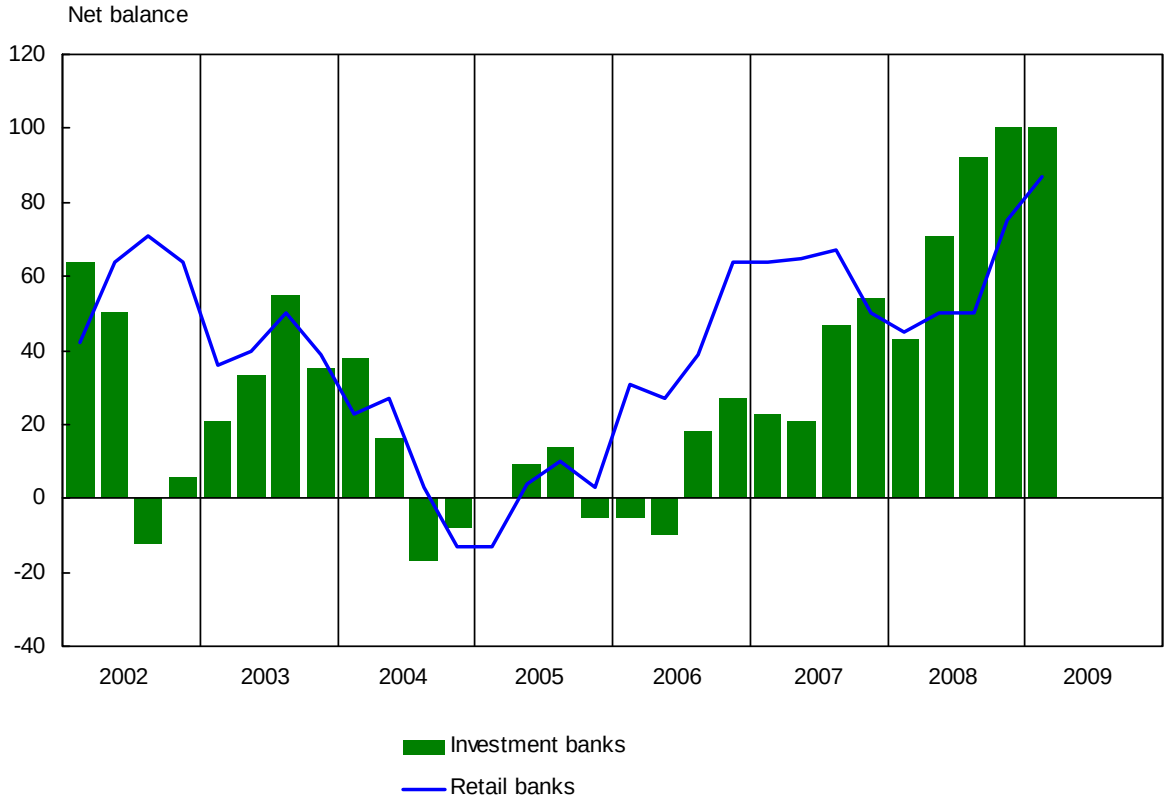
Annex 6:
Impaired advances (South African banking sector)



Data collection forms were changed with the implementation of Basel II in January 2008 and the term “non-performing loans” was replaced with the term “impaired advances”, which has a more stringent definition and results in a technical increase from non-performing loans to impaired advances. Impaired advances are advances in respect of which a bank has raised specific credit impairment.

Source: South African Reserve Bank (2009), *Financial Stability Review*, March..

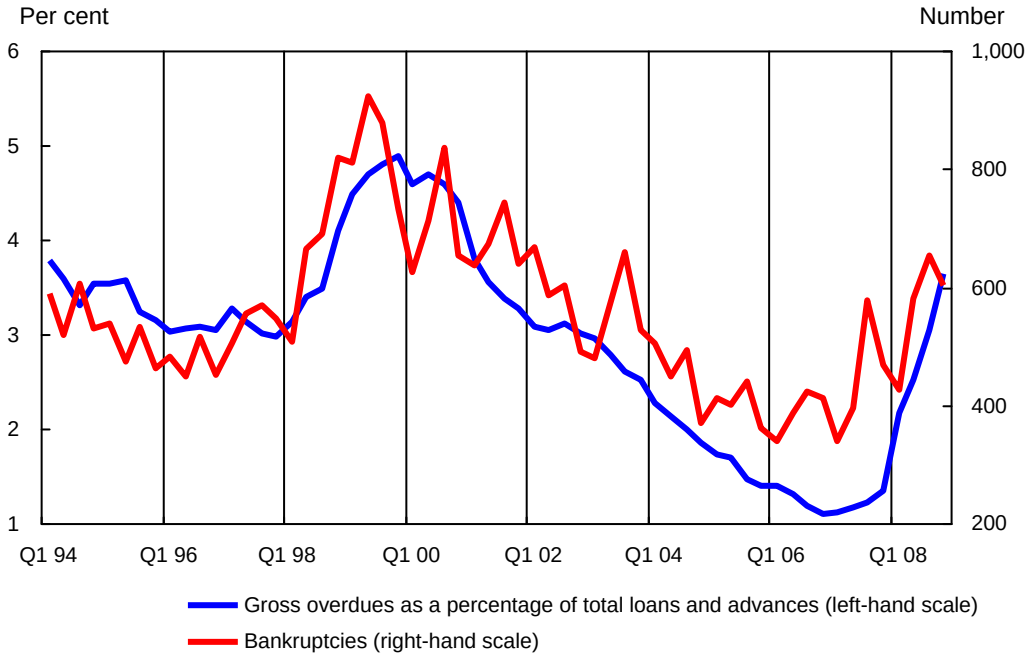
Annex 7:
Credit standards in South African banks



The net balance statistic is used to interpret the survey results. The net balance is the percentage of bank survey respondents who tightened credit standards compared to the same quarter a year earlier minus those who eased credit standards.

Sources: Ernst & Young and Bureau for Economic Research..

Annex 8:
Number of bankruptcies and gross overdues



Sources: South African Reserve Bank; Statistics South Africa.

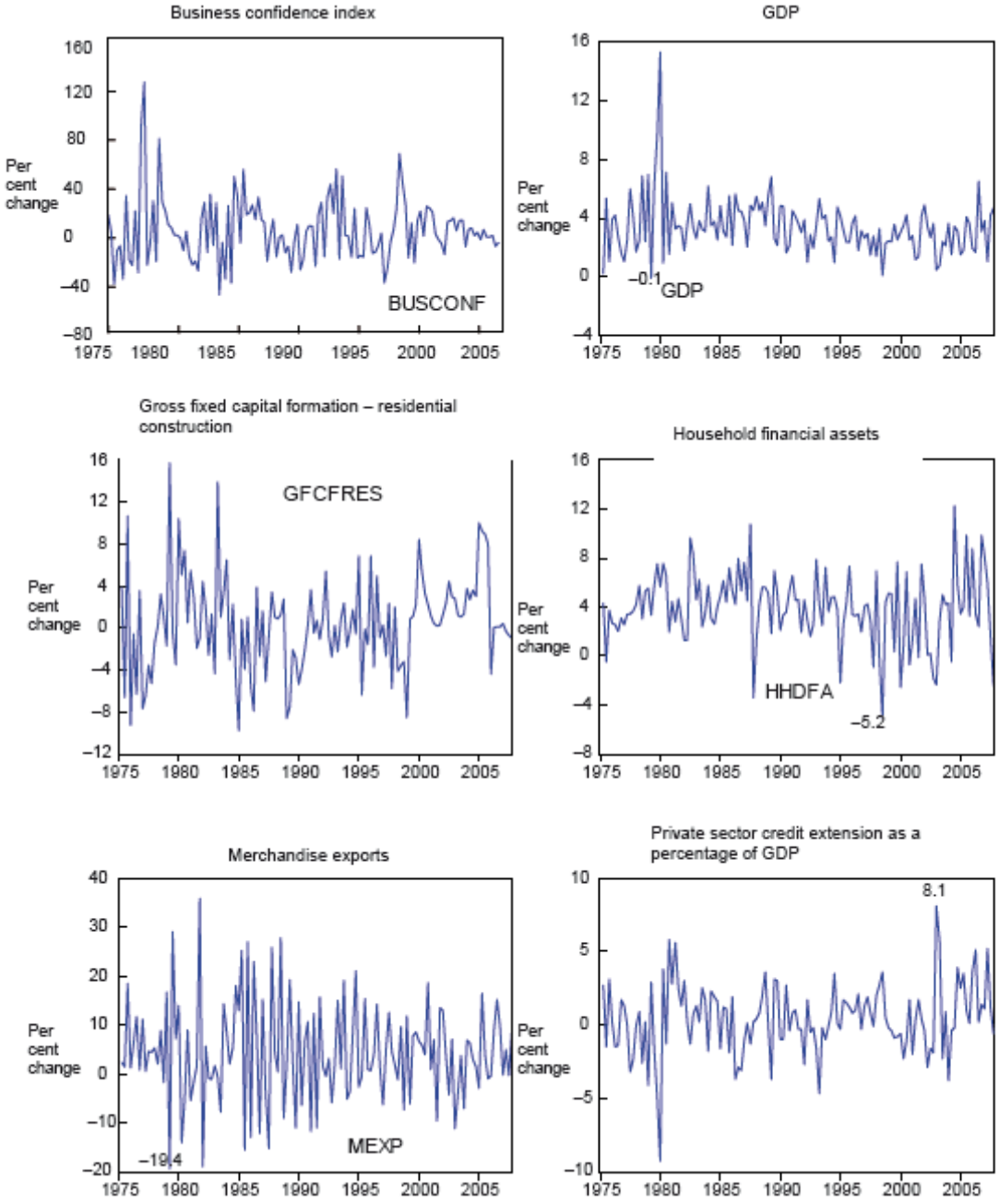
Annex 9:
Scenarios

Shock variables	Historical moves (shocks)		
	Period	Range	Per cent change
Rand/euro*	1985 – quarter 3	ZAR 1.49–ZAR 1.86	24.8
Rand/US dollar	1985 – quarter 3	ZAR 1.95–ZAR 2.35	20.3
Prime lending rate	1998 – quarter 2	18.25%–22.25%	21.9
Private sector credit extension	2003 – quarter 1	56.51%–61.07% of GDP	8.1
Volume of production	1989 – quarter 1	95.49–88.93 (index)	–6.9
Business confidence index	1984 – quarter 3	46.00–23.00	–49.6
All-share index	1987 – quarter 4	36.64–27.08	–26.1
		(Rand millions)	
GDP	1979 – quarter 2	44,592–44,552	–0.1
Merchandise exports	1979 – quarter 2	8,987–7,243	–19.4
Household financial assets	1998 – quarter 3	1,002,254–950,646	–5.2
Gross fixed capital formation – residential construction	1985 – quarter 1	21,610–19,544	–9.8

* The figures for the rand/euro exchange rate were calculated retrospectively by the South African Reserve Bank as the euro was only introduced in 2000.

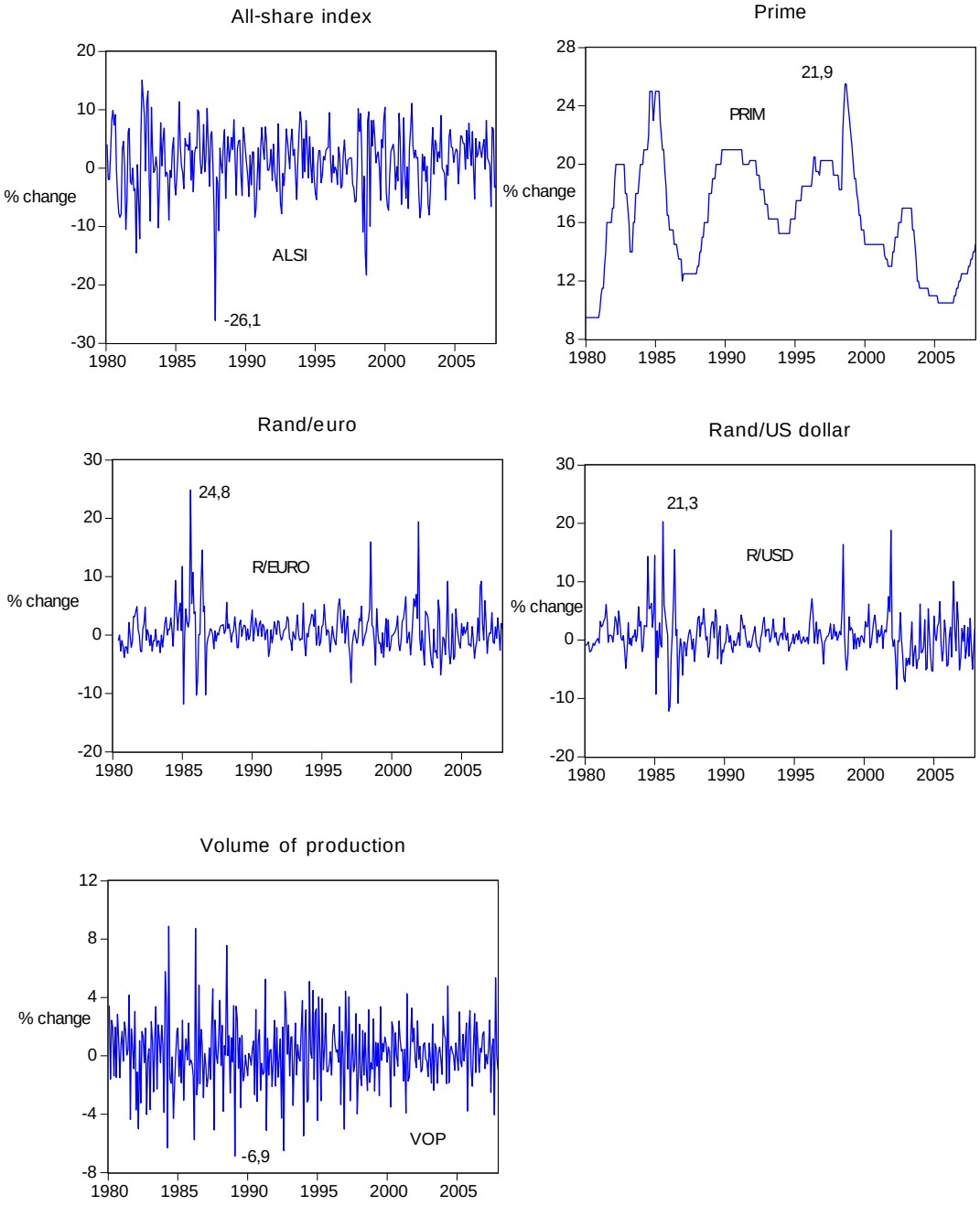
Source: Authors' computation.

Annex 10:
Graphical illustration of scenarios



Source: South African Reserve Bank.

Annex 10:
Graphical illustration of scenarios (cont)



Source: South African Reserve Bank.

Annex 11:
The root mean squared error (RMSE) and the mean absolute percentage error (MAPE)

$$\text{RMSE} = \sqrt{\frac{1}{n}\sum_{i=1}^{n}(Y_i - \hat{Y}_i)^2} \quad \ldots\ldots\ldots\ldots\ldots\ldots (2)$$

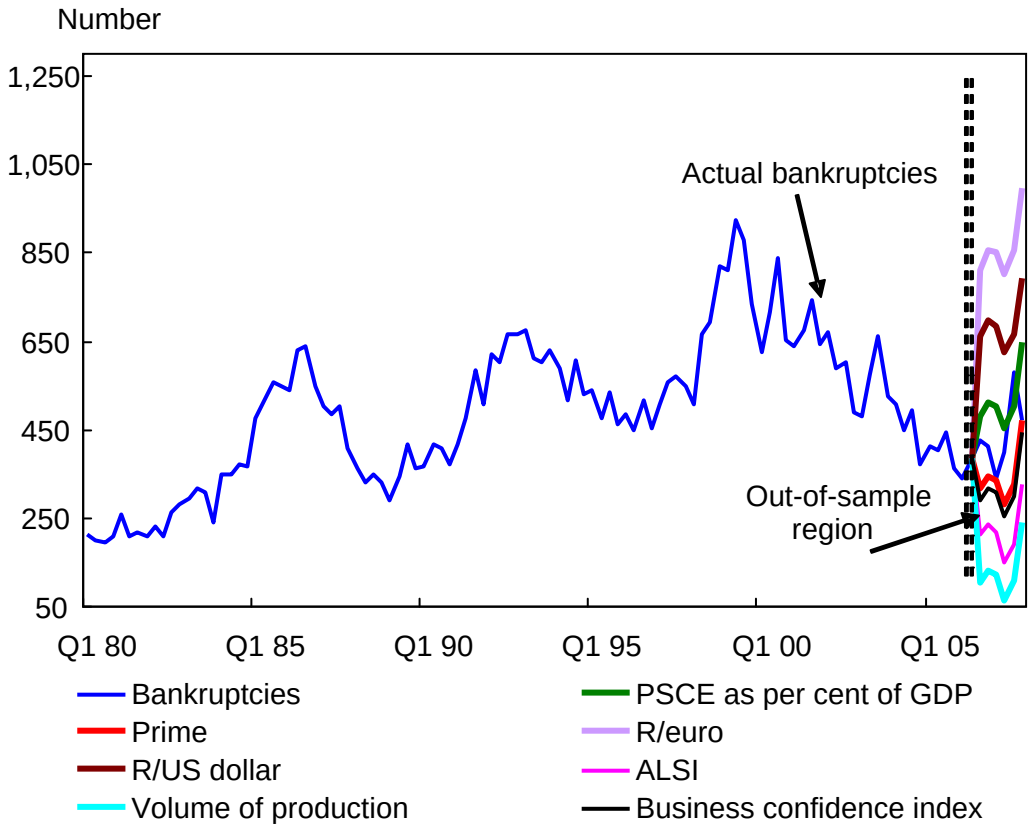
$$\text{MAPE} = 100 \left(\frac{Y_i - \hat{Y}_i}{Y_i} \right) \quad \ldots\ldots\ldots\ldots\ldots\ldots (3)$$

Where n is the sample size,

Y_i is the actual observation, and

$\hat{Y}_i$ is the estimated value of Y_i.

Annex 12
Out-of-sample forecasting



Source: Statistics South Africa; authors' calculations.

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Prudential supervision of banks in the South African context – the supervisory review and evaluation process

Nico De Lange and Madoda Petros

Executive summary

The purpose of prudential supervision of banks in South Africa is to ensure the safety and soundness of the South African banking system and to contribute to the stability of the financial sector.

The Bank Supervision Department (BSD) of the South African Reserve Bank is the body responsible for prudential supervision of banks. The Banks Act, 1990 (Act no 94 of 1990 – "the Act") provides these powers to the BSD.

Section 4(4) of the Act states that the Registrar shall implement a supervisory review process.

With the advent of the Basel II Framework, the BSD updated its supervisory review process, now formally known as the Supervisory Review and Evaluation Process (SREP).

The SREP serves as the conduit for streamlining prudential supervision of banks in South Africa and the cycle consists of six stages.

Risk-based supervisory practices are embedded in each stage of the SREP.

We believe that the SREP will ensure appropriate corrective actions, given that it considers individual bank and systemic conditions, resulting in a safe and sound banking system.

1. Background

1.1 Responsibility for prudential supervision in South Africa

The purpose of prudential supervision of banks in South Africa is to ensure the safety and soundness of the South African banking system and to contribute to the stability of the financial sector.

The Bank Supervision Department (BSD) of the South African Reserve Bank is the body responsible for prudential supervision of banks. The Banks Act, 1990 (Act no 94 of 1990 – "the Act") provides these powers to the BSD.

Section 4(4) of the Act states that the Registrar shall implement a supervisory review process.

1.2 Mission of the Bank Supervision Department of the South African Reserve Bank

The mission of the BSD is to promote the soundness of the banking system through the effective and efficient application of international regulatory and supervisory standards.

The body that sets global banking regulatory and supervisory standards is the Basel Committee on Banking Supervision (BCBS). The BCBS Secretariat is located at the Bank for International Settlements (BIS) in Basel.

1.3 Brief history of Basel I and development of Basel II

The Basel Capital Accord (Basel I), published in 1988, was formulated by the BCBS. At the core of this international regulatory regime was a requirement that banks maintain a minimum capital adequacy ratio of 8 per cent based on their risk-weighted assets. This standardised approach was deemed appropriate then. Since 1988 the global landscape has changed. Events and innovations that have occurred include the following:

- Deregulation of financial markets
- Globalisation (global markets)
- Competitive pressures (margins)
- Improved technology (new products and delivery systems)
- Consolidation (mergers and acquisitions)
- Changing role of disintermediation (risk transfer)
- Risk management revolution

The above resulted in the Basel I framework becoming outdated.[1] In the late 1990s, the BCBS commenced the work that led to the formulation of the Basel II Framework. Basel II was published in June 2004.

Basel II consists of three Pillars.

- Pillar 1 sets out the minimum capital requirements that banks must meet in respect of credit, market and operational risk. The requirements with regard to Pillar 1 are largely rules-based.
- Pillar 2 prescribes the requirements for "supervisory review". Banks must assess their capital adequacy relative to their overall risks. In addition, requirements are imposed on supervisors of those banks to review and take appropriate action in response to those assessments. The requirements with regard to Pillar 2 are largely principles-based.
- Pillar 3 describes the requirements for "market discipline". Banks must publish certain details of their risks, capital and risk management. The aim of this requirement is to strengthen market discipline through transparency and disclosure.

The end result is a more flexible and risk-sensitive framework that imposes more onerous requirements on both banks and supervisors.

The cornerstones of the new framework encapsulated under Pillar 2 are the specific requirements that banks should develop their own internal capital adequacy assessment process (ICAAP) and that supervisory authorities should review these assessments. The aim is to enhance the links between an institution's risk profile, risk management and capital.

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[1] The weakness of Basel I was that it was standardised and blunt. The framework was not sufficiently risk-sensitive and represented a "one size fits all" approach. Important risk areas such as operational risk, liquidity risk, interest rate risk in the banking book and concentration risk were ignored.

In the light of the mission of the BSD (see 1.2 above), the answer to the question whether or not South Africa should adopt Basel II was self-evident. Implementation occurred on 1 January 2008.

In terms of the Banks Act, 1990 (Act no 94 of 1990) banks are obliged to maintain at all times overall financial resources which are adequate as to both amount and quality, in order to ensure that the risk of not meeting their liabilities as they fall due is insignificant.

The adequacy of a bank's capital needs to be assessed by both the bank and the BSD. Individual capital adequacy standards in terms of Basel II comprise:

- an ICAAP, which a bank is obliged to carry out; and
- a supervisory review and evaluation process (SREP), which is conducted by the BSD.

The remainder of this paper will focus on the SREP.

2. The SREP

As part of the Basel II implementation process, the BSD revisited its supervisory framework, and modifications were made to it, resulting in an updated supervisory framework known as the SREP.

2.1 Modification to the SREP

As a starting point, it was recognised that Basel II is more risk-sensitive than Basel I.

It was also recognised that risk management practices in banks have evolved considerably over the recent past.

Furthermore, it was incumbent upon the Department to adopt the four principles contained in Pillar 2 of Basel II in the SREP. The four principles under Pillar 2 can be categorised as follows:

Bank's responsibilities

- A bank should have in place a process for assessing its overall capital adequacy in relation to its risk profile and a strategy for maintaining its capital levels (Principle 1).
- A bank should operate above the minimum regulatory capital ratios (Principle 3).

The above is generally known as the ICAAP (Internal Capital Adequacy Assessment Process).

Supervisor's responsibilities

- A supervisor should review and evaluate a bank's ICAAP (Principle 2).
- A supervisor should take appropriate action if it is not satisfied with the results of this process (Principle 2).
- A supervisor should review and evaluate a bank's compliance with the regulatory capital ratios (Principle 2).
- A supervisor should have the ability to require banks to hold capital in excess of the minimum (Principle 3).

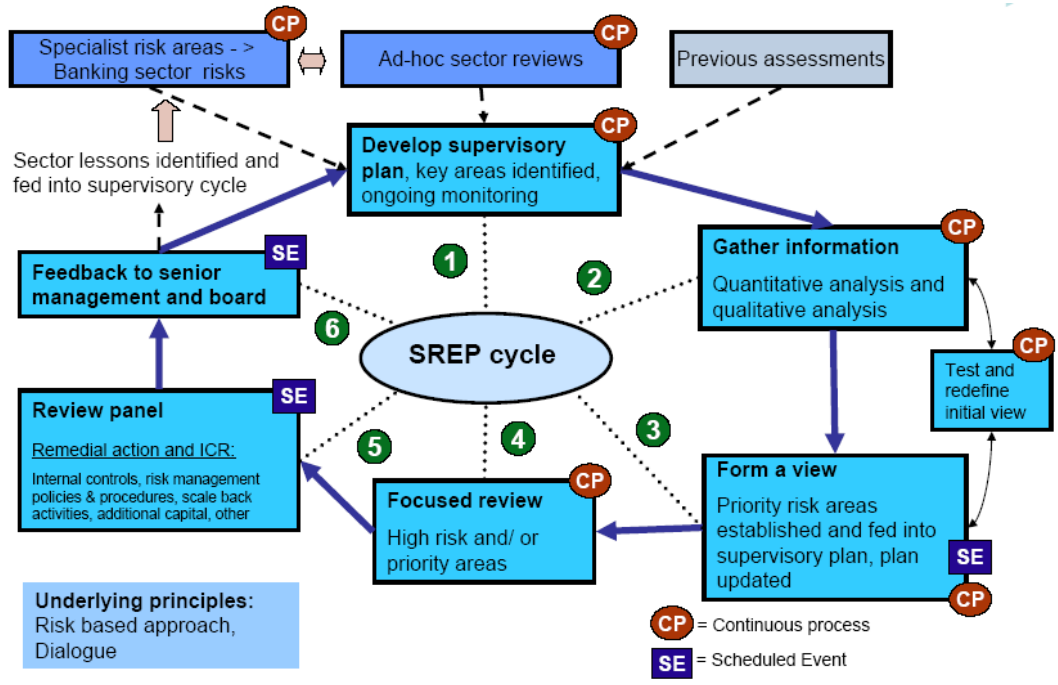
- A supervisor should seek to intervene at an early stage to prevent capital from falling below the minimum prescribed levels (Principle 4).
- A supervisor should require rapid remedial action if capital is not maintained or restored (Principle 4).

2.2 The modified SREP process

The modified SREP process, implemented at the beginning of 2008 and incorporating the above elements, is shown in Figure 1 below.

Figure 1

Modified SREP process



The SREP cycle (the complete process that makes up the SREP) consists of various stages (stages 1 to 6) that take place as a continuous and ongoing process, and of scheduled events.

Stage 1

The process begins with formulation by the analyst of a supervisory plan for the bank that is set out in writing. A sound, robust and well-considered supervisory plan is a necessary prerequisite to an effective SREP.

In line with the BSD's approach to risk-based supervision, the supervisory plan takes into account the key risk areas that have been identified in relation to the particular bank and their systemic relevance. In the determination of the systemic relevance and identification of the key risk areas, reliance is placed on previous years' assessments.

The supervisory plan is communicated to the bank at the start of the SREP cycle.

The main purpose of the supervisory plan is to ensure a disciplined, comprehensive and professional planning process that forms the foundation for supervisory actions, interactions and interventions.

Stage 1 is a continuous and ongoing process (ie the supervisory plan will be updated as and when new information becomes available and a change in the supervisory plan becomes warranted).

Stage 2

Throughout the SREP cycle, information is gathered by analysts and risk specialists. Examples of such sources of information are the following:

- The bank's annual report, annual financial statements and interim report
- The duly completed regulatory returns submitted to the BSD by the bank
- Correspondence between the bank and the BSD
- Graphs generated from the information submitted by the bank to the BSD, and reports prepared therefrom
- Graph discussions: discussions between the bank and the BSD in relation to the graphs generated from the information submitted by the bank to the BSD
- Prudential meetings with risk managers: meetings between the bank's risk managers and the BSD
- Prudential meetings with heads of business units: meetings between the bank's business unit heads and the BSD
- The chief executive officer meeting: meeting between the bank's CEO and the BSD
- Board meetings: meeting between the bank's board of directors and the BSD
- Meeting between the bank's board audit committee, the bank's internal audit function, the bank's external auditors and the BSD
- Financial media
- Suppliers of market data (such as McGregor BFA Net, Moneyweb, JSE SENS)
- Ratings agencies and their reports
- Investment analyst reports

Stage 2 is also a continuous and ongoing process.

Stage 3

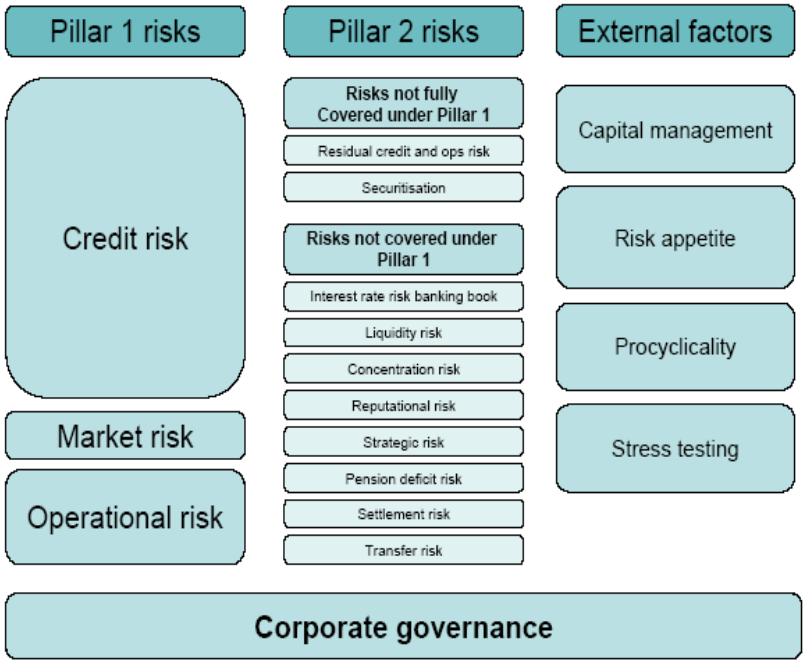
Stage 3 entails the process whereby the information gathered by analysts and risk specialists in stage 2 is assembled and then analysed and synthesised in order to form a view of the bank. The focus is on materiality and risk.

During this stage there are two distinct scheduled events that take place once during each SREP cycle.

- The first scheduled event is the submission by a bank of its ICAAP report (the ICAAP report is submitted in a non-prescriptive format by the bank to the BSD).

- The second scheduled event relates to the development of a supervisory perspective, which entails gathering information, assembling the relevant information in risk score sheets and populating the sheets, and analysing the risk review as prepared by the analyst. The score sheets cover, inter alia, Pillars 1 and 2 risks. Pillar 3 aspects should also be considered. For the purposes of developing the score sheets and analysing the information, an analytical framework has been developed. The analytical framework is depicted below.

Figure 2



It is envisaged that these two processes will enable a bank and the analyst to compare findings and challenge one another's conclusions and recommendations in a constructive manner.

Internally it is envisaged that the BSD analyst could call for a "pre-panel" review to seek guidance on priorities, clarification of issues and further work to be done. (In order to promote and improve consistency in judgements, a review panel has been established, consisting of the members of the BSD executive committee and two other senior members of management; see stage 5.)

Stage 3 consists of both continuous and ongoing processes and scheduled events.

Stage 4

Depending on the outcome of the "forming-of-a-view" stage, the analyst and the risk specialists will identify areas of the bank that may require a detailed or specialist review.

This review may be carried out by the analyst, risk specialists, an on-site review team, internal auditors, external auditors, external risk consultants, or other advisors (eg lawyers or actuaries). The resulting information gathered is incorporated into the SREP, and necessary consequential adjustments are effected.

Stage 4 is a continuous and ongoing process.

Stage 5

Stage 5 consists of the panel review process, which entails an assessment by the review panel of the procedural and substantive correctness of the SREP, the conclusions reached and the recommendations made.

The conclusions reached and recommendations generated during the "forming-of-a-view" stage (stage 3) and the focused review stage (stage 4) by the analyst (in conjunction with the relevant risk specialists, if applicable) form the basis for the panel review.

The review panel's recommendations may include remedial actions to be taken and adjustments to the individual capital requirement (ICR). (It is important to note that the ICR should not be seen as the only tool in a supervisor's armoury. Other recommendations, such as strengthening of internal controls or risk management policies and procedures, may in certain circumstances be more appropriate.)

Stage 6

Stage 6 consists of the process in which the conclusions and recommendations reached in stage 5 are fed back to the bank's board of directors, risk committee, audit committee and senior management.

Industry lessons identified are fed back into the macro-surveillance cycle and report, and may warrant ad hoc sector reviews.

The advanced measurement approach for banks

Jan Lubbe[1] and Flippie Snyman[2]

Introduction

The Basel II Framework gives banks four options that they can use to calculate regulatory capital for operational risk. Each of these options requires an underlying risk measurement and management system, with increasing complexity and more refined capital calculations as one moves from the most basic to the most advanced approaches.

The most sophisticated and complex option under Basel II is the advanced measurement approach (AMA). This approach allows a bank to calculate its regulatory capital charge using internal models, based on internal risk variables and profiles, and not on exposure proxies such as gross income. This is the only risk-sensitive approach for operational risk allowed and described in Basel II.

Rationale for adopting the AMA

FirstRand decided on the AMA not only because of the capital savings that could be obtained, but also to achieve world-class, sophisticated risk management using state-of-the-art technology and techniques. The use of an AMA requires the implementation of various risk management processes, subprojects and measurement components that support good, accurate risk measurement, management and reporting.

Definition of operational risk

Operational risk is the risk of loss resulting from inadequate and failed internal processes, people or systems or from external events. This definition includes legal risk, but excludes strategic and reputational risk.

AMA risk management and measurement tools

Various risk measurement tools and supporting projects had to be put in place in order for FirstRand to follow an AMA. Fundamental AMA tools include internal loss data, external loss data, risk scenarios and business environment and internal control factors, which are addressed through risk and control self-assessments and key risk indicators.

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Loss data (internal and external), key risk indicators (KRIs), risk and control self-assessment (RCSA) and scenarios are used extensively in the risk identification and management process. However, only risk scenarios and internal loss data are used in the capital calculation and allocation process. For capital purposes, all the other measurement tools are used to inform risk scenarios. External data can also be used as direct input into the capital calculation, but only after extensive development has been done (eg on selection, scaling and methodology).

Benefits of the advanced measurement approach

One of the most visible effects of implementing an advanced approach for operational risk management is the positive impact on reputation and perception by stakeholders. More sophisticated and advanced risk management certainly sends a clear message of solid and sound risk management to shareholders, clients, rating agencies and the market. This reassurance is extremely important and gives comfort to stakeholders, especially in times of economic turbulence and uncertainty.

The use of internal models to calculate capital requirements under the AMA may also lead to a reduction in regulatory and economic capital. Capital is based on risk exposures and not on income levels as is the case for the more basic approaches.

The most significant benefit, however, is that implementation of the AMA leads to improved risk management processes and more sophisticated risk measurement mechanisms. In many cases advanced risk measurement techniques (such as risk scenarios and the use of external data) were put in place earlier than originally anticipated to facilitate the successful implementation of an AMA system. Better-quality risk management ultimately protects the bank's value and the interests of stakeholders.

The AMA implementation has also resulted in improved relationships between deployed risk managers and centralised (Group function) risk specialists. Deployed risk managers had to take on extensive responsibility for the implementation of all operational risk measurement and management components in their business units. Guidance, frameworks and policies for these implementations were developed by centralised risk specialists, and therefore close cooperation between Group functions and business risk managers was required.

Lessons learnt

The implementation of an advanced measurement approach for operational risk was a challenging project and various valuable lessons were learnt. These lessons can be related to processes and systems, projects, regulatory aspects and quantification.

Processes and systems

Since internal loss data is a primary AMA component and a direct input into the capital model, the importance of data quality cannot be stressed enough. Internal data are used for risk management and reporting, regulatory returns and various other reports to the regulator, for submission to external data consortia and in the capital model.

It also became evident that the linking and alignment of all risk measurement and management tools are essential for effective risk monitoring and management. Tools cannot be viewed in isolation, but should be integrated to allow risk managers and business management to get a holistic view of their risk profile and exposures.

Operational risk measurement and management tools, for example, scenario analysis and key risk indicators, may be extremely useful in other risk types. The aim is to achieve an optimal balance between operational risk-specific tools and generic risk management tools, whereby tools are used across various risk types, but still address risk-type specific needs.

Risk management applications (support systems) and methodologies should be used in harmony, and evolution should take place in the right chronological order. Information technology (IT) systems should not determine or drive methodologies. Methodologies and manual implementation should reach a certain level of maturity before they are migrated onto a suitable IT platform.

Projects

Since operational risk management (specifically the AMA) is a very new science, it is easy to underestimate the scope of the project and the amount of effort and expertise required. Extensive subject knowledge and resources are required for the successful implementation of such an advanced risk management system.

Therefore, risk managers (in central teams and business units) should have an in-depth understanding of both the business they operate in and risk management. In over 200 business units, we have very diverse quality and skills levels among our human resources, which poses challenges for uniform implementation. To address some of these challenges, it is important to identify potential skills shortages early in order to allow for rectification without delaying implementation.

Strategic planning of a project of this size and complexity is extremely important. In the initial planning process, special attention must be given to estimating workloads, setting priorities, anticipating methodologies, implementing solutions and foreseeing the impact on business units.

Regulatory aspects

Regulatory interaction proved to be very beneficial for all participants. On-site visits and correspondence provided a channel for knowledge sharing between the bank and the regulator. As far as general correspondence is concerned, banks should be proactive in their communication and always give honest feedback and high-quality assessments. Requests from the regulator should be treated with great urgency and priority.

Quantification

The quantification and modelling of operational risk are very specialised subject fields and require people with the appropriate qualifications, skills and experience. External reviewers of models should also have extensive experience and appropriate credentials to validate such complex models and be well recognized in the industry as experts and thought leaders.

Quantification of operational risk

Quantification of operational risk for capital calculation purposes is a complex process, and a series of advanced statistical techniques are used. Since the scope of modelling is extensive, only key steps will be discussed.

Data used and classification

Internal loss data and risk scenarios are the two inputs into the capital calculation model. Loss data are historically suffered losses, while risk scenarios are prospective risk exposure estimates. Each risk scenario is quantified by experts who specify loss amounts at specific probability (or frequency) levels. Loss data and risk scenarios are classified in a matrix, where the vertical axis is typically business lines, while risk classes are depicted on the horizontal axis.

Data and extreme value theory analysis

Internal loss data exploration and analysis are an essential step in the overall modelling process and need to be performed before analytical modelling of available internal loss data can be performed.

Tabular and graphical data analysis provides the modeller with an indication of data completeness, spread, classification, patterns, breaks and possible compatibility with certain analytical model families. Typical tools that are utilised are summary tables, regulatory data matrices, multidimensional histograms and empirical distribution representations.

More formalised statistical tests are used to determine which family of distributions may be a possible fit for the data over various logical segments (specific reference is made here to light-tailed and fat-tailed theoretical distributions). These tests also help to determine the most appropriate truncation points and thresholds for modelling data in a single cell.

Some of the graphical plots that are used to determine the applicability of using extreme value theory (and light-tailed vs heavy-tailed distributions in general) are mean excess plots, Hill estimator plots, HKKP-Hill plots, DEdH plots, tail plots and stability parameter plots.

These plots help to determine whether the data show light-tailed or heavy-tailed behaviour or both (in different segments), whether certain data segments can be modelled using the empirical distribution and what the possible thresholds for modelling might be, and therefore whether one dataset or cell needs to be divided into and modelled across multiple segments.

The basic data and extreme value theory analysis also assists in determining the point at which risk scenarios should be incorporated into the models. This is typically done at a point where observations are very scarce and business areas are exposed to high severity events. It is important to note that scenarios are incorporated at a threshold that corresponds to an identified modelling segment for a specific cell, or from an additional threshold created specifically to facilitate the incorporation of risk scenarios into the capital model.

Once the thresholds have been determined, as well as the type of distributions that may be applicable, analytical modelling of the underlying loss data and scenarios can be performed.

Modelling of internal loss data

In segments where light-tailed behaviour is observed, the beta, chi-square, exponential, gamma, inverse Gaussian, log normal, normal, Weibull and Rayleigh distributions are usually considered for severity modelling. In segments where heavy-tailed behaviour is observed, the Burr, Cauchy, F-, generalised Pareto, generalised extreme value, log gamma, log logistic, Pareto and Student's *t*-distributions are tested for severity modelling.

Any of five methods of distribution fitting can be used, and in many cases more than one method is applied for a specific distribution, since they may yield different results. The methods used include the maximum likelihood estimation, least squares method, probability-weighted least squares method, robust least squares method and the method of moments (for frequency models only).

Once a series of fits have been performed, various non-graphical goodness of fit (GOF) measures are used to evaluate the accuracy and appropriateness of each fit. The most commonly used tests are Kolmogorov-Smirnov, Cramer von Mises, Anderson-Darling, analysis of fit differences, evaluation PP, evaluation QQ, chi-square tests and mean square error estimates.

A number of graphical representations are also used to supplement the GOF measures. These include probability-differences plots, probability-probability (PP) plots and quantile-quantile (QQ) plots. For QQ plots, linear scale QQ plots, logarithmic scale QQ plots, relative error plots (for specific quantiles) and absolute error plots (for specific quantiles) are evaluated.

Based on all the graphical and non-graphical GOF measures, a decision is made on the most suitable severity distribution for the data segment under consideration for a specific cell.

When performing frequency modelling for a segment where a corresponding severity model exists, tests are performed for the geometric, negative binomial and Poisson distributions. The same graphical and non-graphical GOF measures are evaluated for frequency distributions as for severity distributions in order to find the most appropriate and accurate frequency fit for a specific segment in a particular data cell under consideration. However, as a general assumption, the Poisson distribution is used for frequency modelling. While this assumption is well supported by research and literature, the Poisson distribution is also chosen to ensure consistency across all cells and segments, and to enable the integration of internal data and scenario models.

Modelling of risk scenarios

Each individual risk scenario should be quantified (loss estimates) at various probability/frequency levels. In addition, experts also provide an annual loss frequency for each scenario. This information is used to construct an empirical severity cumulative distribution function for each scenario, which consequently can be modelled with an analytical distribution. For frequency modelling, the annual frequency estimate is assigned as the mean parameter of the Poisson distribution. As discussed, each risk scenario is modelled individually.

Scenarios are consequently aggregated per cell in the classification matrix using Monte Carlo simulation with a high number of iterations. The result is an empirical dataset that contains all possible annual permutations and combinations of scenario realisations. For each cell, this empirical distribution is incorporated into the model from a specified threshold.

Since each point in the empirical distribution represents a combination of losses from various scenarios (annualised), a frequency distribution of Poisson (1) is associated with each empirical severity set. This mean parameter may be adjusted for threshold values. In cases where internal data are also present in the specific cell segment where scenarios will be incorporated, the internal data frequency distribution is set equal to the scenario frequency distribution. This is to ensure stability during simulation.

This frequency setting or equalisation determines the value of the threshold from where scenarios are incorporated. The threshold is chosen so that the annual frequency of internal data above the threshold is equal to 1 (or a slightly smaller parameter should adjustment for threshold value be necessary).

Independent simulation and aggregation

Before starting the simulation process, a decision needs to be made on the weights that will be assigned to internal loss data models and scenario models, respectively, during the simulation process for each segment in each cell. These weights determine the percentage

of random values that are drawn from loss data models and risk scenario models. The weights are individually specified for each segment in each cell where both an internal loss data model and a risk scenario model were constructed. The weighting of the two input data type models is subjective and is determined by a predefined list of factors.

Multiple segment severity distributions can be used to introduce scenario analysis into the simulation above specific thresholds. Several thresholds, and hence segments in a specific cell, can be defined in order to specify the weight of internal loss models and scenario models per segment, as described earlier. In many cases it makes sense to assign a higher weight in the simulation to scenarios in higher value segments (tails) where internal data are scarcer or less reliable.

The process followed for simulation with multiple segments containing internal loss models and scenario models is the same as when only internal losses are used, except for the added complexity of mixing internal loss distributions and scenario distributions.

Monte Carlo simulation is performed simultaneously across all segments and distributions within a specific cell. For each simulation iteration the total losses across all segments are added up to arrive at an annual aggregate loss for the specific iteration. A large number of iterations are performed to construct a dense annual aggregate loss distribution for each cell. Value-at-risk (VAR) at the 99.9th percentile is calculated for each cell to arrive at the regulatory capital charge for a specific cell. For the calculation of the Group's (and each business line's) capital charge, all applicable cells' 99.9th percentile values-at-risk are added together. This equates to assuming full dependence between all cells and business lines.

Simulation taking correlation into account

Since the data are classified in a matrix, it is possible that inherent correlations are present between the individual internal loss datasets. These correlations can be taken into account during aggregation (simulation) to derive a diversified economic capital charge under Pillar 2 of the Basel II Framework.

Correlation is estimated based on internal data only. Consequently, the calculated correlation is applied to the whole cell and it is then implicitly assumed that the scenarios also pertaining to these cells have the same correlation characteristics and structures.

The copula calculation and simulation are performed in two steps. First, the aggregate loss distribution for each cell is generated in an independent process with several segments, including internal loss data models and scenario-based models. Second, the empirical distributions resulting from the simulation process are provided with the desired dependencies, tail properties and other distributional properties using copulas.

Copulas are used to model correlation structures. Gaussian and Student's *t* copulas require a correlation matrix for the simulation process and a tail parameter for the Student's *t* copula, in order to define the inter-cell dependencies and other distributional properties. A rank correlation matrix is calculated using event dates of the fitted data; therefore, it is only possible to calculate correlation parameters for the cells populated with empirical data (observed internal loss data).

The process followed to construct copulas and create multivariate distributions with marginal distributions correlated via copulas can be summarised in a few steps. The Gaussian copula is used as an example.

1. Generate/construct an empirical aggregate loss distribution for each cell utilising an independent Monte Carlo simulation procedure.

2. Generate independent normal random numbers (X), which are correlated through the rank correlation matrix, obtaining X^*.

3. Calculate the normal cumulative probabilities $\varphi(X^*)$ in order to recover the arguments of $C_\rho^{Ga}(u)$; and

4. Finally, determine the x_i (ie the loss of division/loss event type i) by inverting the marginal distributions F_i: $x_i = F_i^{-1}(u_i)$.

By iterating this process and summing up the x_i losses each time, we trace the whole integrated distribution for each cell and for the Group. Sampling is performed simultaneously across all cells, taking correlation structures into account. The Group's annual aggregate loss distribution will therefore inherently contain all underlying dependencies and correlation structures.

Calculating the VAR at the 99.9th percentile of the annual loss distribution will therefore yield a diversified operational risk capital charge number for the Group, where correlation has been taken into account.

Using insurance as mitigation agent

Insurance can be used as a mitigation instrument when calculating operational risk capital requirements. Insurance is applied to losses generated during the Monte Carlo simulation process. In the case of independent simulation, insurance is applied to losses as they are generated from various distributions. When correlation is taken into account, insurance is applied to losses generated after dependence structures are modelled. However, the principles of insurance application for independent and correlated losses are the same.

In order to incorporate the effect of insurance, available insurance policies and coverage clauses need to be mapped to the modelling structure, ie business lines and Basel II loss-event type combinations. This is quite a large project that needs to be conducted before insurance data are in a format usable for the capital model.

In addition to the policy and clause mapping to each cell, various insurance properties need to be parameterised for each cell, including maximum coverage, deductible and an indication whether cover is global or per event. It is also important for information on all applicable policies' compliance with Basel II minimum standards to be available. This includes parameters that will be used in haircut (discount) parameter calculations.

All of the above-mentioned parameterised insurance characteristics are consequently applied during the simulation process to each simulated loss in order to arrive at a mitigated aggregate loss distribution where insurance has been taken into account.

Capital allocation

After calculating the Group's total capital charge, the extent to which each business line and loss-event type combination contributes to the overall operational risk profile is estimated. This information will enable risk managers to focus efforts on and prioritise the mitigation of operational risk. In the case of independent simulation, each business line's capital charge is simply the sum of the VAR numbers at the 99.9th percentile across all loss event types.

Where an annual aggregate loss distribution has been constructed for the Group taking correlation structures into account, total capital is allocated based on the marginal contribution of each division/loss-event type combination's unexpected loss (UL) to the Group's unexpected loss. This is done on the principle of marginal UL contribution to the overall risk profile. The normalised contribution of each cell's UL to the Group's UL is also referred to as residual operational risk.

A very important property of this capital allocation methodology is that the sum of the allocated capital numbers equals the total calculated Group capital. Statistical (theoretical)

allocations are only made down to business line level in the Group – allocations to lower levels in the organisation are done utilising subjectively compiled risk scorecards.

Conclusion

The implementation of an advanced measurement approach for operational risk was a very big project of extensive scope that involved all business areas in the Group. Many benefits can be associated with this project and lessons were learnt that will be extremely useful for future projects and implementations. The importance and value of advanced risk management practices and measurement cannot be overestimated: they play a critical role in protecting the bank's value.

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Discussant comments on session IPM68: Risks in finance – the state of the art in statistical methods

Filipa Lima[1]

This session covered two approaches to risks in finance and to the management of those risks: a data collection approach – the European Central Bank (ECB) and South African Reserve Bank (SARB) papers – and a research approach

The paper by the ***ECB*** focused on the opaqueness of credit risk transfer (CRT) and the lack of available information. The ECB response to this problem is twofold: developing new or enhanced euro area statistics, and improving the existing statistics on credit derivatives and reusing supervisory information. The discussion centred on the future challenges as regards CRT measurement, highlighting the need to enhance the data on the shadow banking sector (financial intermediation by institutions, markets and products outside the banking sector and traditional securities markets), to develop harmonised definitions, to widen the scope of CRT statistics, to promote transparency in financial innovation, and to further coordinate efforts among supervisory authorities, policymakers, statisticians and, possibly, market players.

The paper by the ***SARB*** presented a widely used tool to assess the soundness of the financial system, whereby quantitative information is complemented by qualitative information on structure and regulation. The paper covered two major components, scenario analysis and stress testing. The authors also elaborated on the identification of macroprudential indicators and different assessment methods. The discussion focused on possible further work concerning refinements to the SARB methodology, which included, inter alia, capturing the whole distribution of losses to reflect unexpected as well as expected losses, considering credit risk alone vs credit risk combined with counterparty, liquidity and market risk, modelling the macroeconomic feedback loop, and allowing for some non-linearities, eg time-varying default dependencies.

There was also a reference to the International Monetary Fund-Financial Stability Board Users Conference on the Financial Crisis and Information Gaps. In particular, emphasis was placed on the need to strengthen the analytical and conceptual framework for financial stability analysis, which would be helpful in clarifying data priorities. Moreover, it was mentioned that further investigating the increasingly global financial transmission mechanisms as well as the interactions between the financial system and the real economy would reinforce the importance of international and inter-agency cooperation and information sharing in data collection and improve data harmonisation. Furthermore, it was recognised that additional coordination in data collection between supervisory authorities and economic statisticians would reduce the respondents' burden. Finally, it was acknowledged that data gaps should be prioritised on the basis of cost-benefit analysis, especially considering the need for capacity building in some countries.

[1] Bank of Portugal.

Discussant comments on session IPM68: Risks in finance – the state of the art in statistical methods

Satoru Hagino[1]

Madoda Petros explained the supervisory review and evaluation process in South Africa, based on his experience of implementing this process in the Bank Supervision Department of the South African Reserve Bank. The internal capital adequacy assessment process (ICAAP) was implemented for the first time under the Basel II Framework, in addition to the minimum capital requirements in Basel I. The ICAAP aims at measuring the economic capital of banks and thus creating a buffer for various risks.

For measuring credit risks, I would like to raise the issue of data consortia. Databases of credit risks have been used to measure banks' regulated capital. To measure their economic capital, databases must be strengthened. In Japan, several associations of credit risk databases have been established recently. I wonder if there has been a similar phenomenon in South Africa.

Stress tests are one of the important elements in measuring the economic capital of banks. This issue is interesting, as there have been further developments in the light of the current financial crisis. In the recent stress tests in the United States, the authority provided a scenario from the macroeconomic perspective and had each bank consider its own scenario for stress testing. It will be interesting to learn how stress tests are conducted in South Africa at present and whether the South African Reserve Bank intends to conduct tests similar to those of the United States.

Lastly, a final package of measures to enhance the three pillars of the Basel II Framework was approved by the Basel Committee on Banking Supervision. This proposal introduces new standards to promote the build-up of capital buffers. It would be interesting to know how the South African Reserve Bank will modify banking supervision practices based on this proposal.

Jan Lubbe highlighted the advanced measurement approach (AMA) for banks based on his experience in implementing this approach in the Firstrand Banking Group. The AMA is the most complicated area in Basel II, requiring the expertise of the brightest engineers. Nevertheless, I found that it has interesting implications for central bank statisticians.

Currently, quite a few banks are also working on operational risk management. But so far, not many banks have been authorised by their countries' authorities to adopt the AMA. The biggest obstacle in implementing the AMA appears to be limited data availability. In the absence of a data consortium, banks have a difficult time obtaining external loss data. Banks tend to hesitate to provide operational loss data to other banks. Although there are some private data vendors who are trying to create data consortia, there might not be enough momentum. I assume that similar obstacles exist in South Africa as well.

Jan Lubbe pointed out that implementing the AMA would lead to an improved risk management process and more sophisticated risk measurement mechanisms. In this respect, banks face a dilemma. For results to be useful for management purposes, they

[1] Bank of Japan.

should have a detailed classification of categories of risks, while the measurement of risks for detailed classifications tends to be subjective in the absence of source data. It will be interesting to learn how the Firstrand Banking Group has resolved this dilemma.

Finally, I would like to know how the Firstrand Banking Group has overcome the difficulty of hiring clever engineers, who can deal with statistics in the AMA. In fact, a lack of engineers is one of the reasons why many banks are not rushing to implement the AMA.

Invited Paper Meeting 69

Quantification of qualitative data from surveys

Papers:

Measuring consumer inflation expectations in Europe and examining their forward-lookingness

Tomasz Łyziak, National Bank of Poland

Quantification of qualitative data: the case of the Central Bank of Armenia

Martin Galstyan and Vahe Movsisyan, Central Bank of Armenia

Measuring consumer inflation expectations in Europe and examining their forward-lookingness

Tomasz Łyziak[1]

1. Survey data and quantification methods applied

A straightforward method of measuring the inflation expectations of consumers is to ask them to present quantitative estimates. However, the uncertainty concerning such numerical estimates is considerably higher than in the case of indicating the direction of price changes (Jonung (1986)) and the empirical evidence on the benefits of using quantitative questions is ambiguous. Therefore, most surveys are designed in a qualitative way, even if their results have to be later quantified. The question on inflation expectations included in the European Commission Consumer Survey carried out every month in EU economies takes the following form: "Given what is currently happening, do you believe that over the next 12 months prices will: (1) rise faster than at present; (2) rise at the same rate; (3) rise more slowly; (4) stay at their present level; (5) go down; (6) difficult to say." There is an additional question concerning the perception of current price movements, which can be useful in quantifying the expected rate of inflation: "In your opinion, is the price level now compared to that 12 months ago: (1) much higher; (2) moderately higher; (3) a little higher; (4) about the same; (5) lower; (6) difficult to say."

The empirical part of this paper uses two kinds of measures of inflation perception and expectations based on survey data, ie the measures of expected inflation quantified with different methods and the balance statistics.

As far as the quantified measures of expected inflation are concerned, three kinds of quantification methods are applied to derive them, namely, the probability method, the regression method and the logistic (and linear) function method.

When quantifying the probability measures of inflation expectations, we refer to the canonical Carlson and Parkin (1975) approach, which we have modified in order to use all the information embodied in the survey data. However, different assumptions concerning the density function of the expected rate of inflation and a measure of perceived inflation are made. The probability measure *INFE_1* is calculated under the assumption that the expected inflation is normally distributed and that consumers' perception of price changes currently observed corresponds to the most recent CPI inflation figure (see Batchelor and Orr (1988), Berk (1999), Forsells and Kenny (2004)).[2] The probability measure *INFE_2* uses the same proxy for the perceived inflation, but the density function of the expected inflation is triangular. Due to the novelty of this approach, its detailed description is presented in the next section. In order to derive the probability measure *INFE_3*, the normal distribution is applied, but the CPI measure of current inflation is replaced with a subjective indicator

[1] National Bank of Poland (e-mail: tomasz.lyziak@nbp.pl). The author wishes to thank the participants of the seminar organised by the Monetary and Economic Department of the Bank for International Settlements in Basel, Switzerland (25 March 2009) and the participants of the Invited Paper Meeting on "Quantification of qualitative data from surveys" during the 57th Session of the International Statistical Institute in Durban, South Africa (17 August 2009) for discussions and helpful comments. The opinions expressed in this paper are those of the author and do not necessarily represent the views of the National Bank of Poland.

[2] The method applied is described in detail in Łyziak (2005).

quantified on the basis of additional survey questions (see Batchelor and Orr (1988), Dias et al (2007)).

The logistic (and linear) function method developed by Papadia and Basano (1981) is used to derive the fourth measure of consumer inflation expectations (*INFE_4*). The final measure of inflation expectations (*INFE_5*) is based on the regression method. Five models were estimated, namely, a model based on the balance statistic (weighting fractions of respondents to the survey question on inflation perception with weights: 3, 2, 1, 0, –1) as well as the models proposed by Anderson (1952), Pesaran (1984, 1987), Smith and McAleer (1995) and Cunningham (1997). The choice of the final specification, presented in Annex A, reflects both the statistical properties of the estimated regressions as well as their economic interpretation (eg correct signs of the estimated coefficients).

The balance statistics are defined as the differences between the (weighted or unweighted) proportions of respondents. They do not measure perceived or expected inflation directly (eg Dias et al (2007)), but at the same time they are not influenced by the assumptions imposed in quantification algorithms. Four different balance statistics are used. The first two are unweighted statistics: BS_1^e (BS_1^p) is the difference between the proportions of respondents expecting (noticing) an increase in prices and their decrease, while BS_2^e (BS_2^p) is the difference between the proportions of respondents expecting (noticing) an increase in prices and their stabilisation or decrease. The third balance statistic, BS_3^e (BS_3^p), is a weighted one, frequently used in the literature (eg Del Giovane and Sabbatini (2004, 2005), ECB (2002, 2003, 2005, 2007)), attaching weight 1 to the proportion of respondents expecting that prices will rise faster than at present (perceiving that current prices are much higher than 12 months ago), ½ to those claiming that prices will rise at the same rate (are moderately higher), 0 to those declaring that prices will rise at slower rate (are a little higher), –½ to the fraction of respondents predicting (noticing) the stabilisation of prices and –1 to those declaring that prices are likely to fall (noticing their fall). In another weighted balance statistic used in this study, BS_4^e (BS_4^p), the respective weights are: 3, 2, 0, 1 and –1.

2. Probability method based on triangular distribution

The assumption of expected inflation being normally distributed is questioned in some studies (eg Carlson (1975), Batchelor and Orr (1988)). Therefore, one of the probability measures of inflation expectations used in this study (*INFE_2*) is based on triangular distribution. When denoting its lower and upper limits by V_t and W_t, respectively, the height (h_t) may be defined in the following way:

$$h_t = \frac{2}{W_t - V_t} \tag{1}$$

In line with suggestions by Berk (1999), the distribution of expected inflation is assumed to become asymmetric when a gap between current inflation (π_t^0) and its (12-month) moving average ($\overline{\pi_t}$) occurs, ie the mode (d_t) equals:

$$d_t = \gamma_t \cdot V_t + \left(1 - \gamma_t\right) \cdot W_t \tag{2}$$

where:

$$\gamma_t = \frac{\pi_{0t}}{\pi_{0t} + \overline{\pi_t}} \tag{3}$$

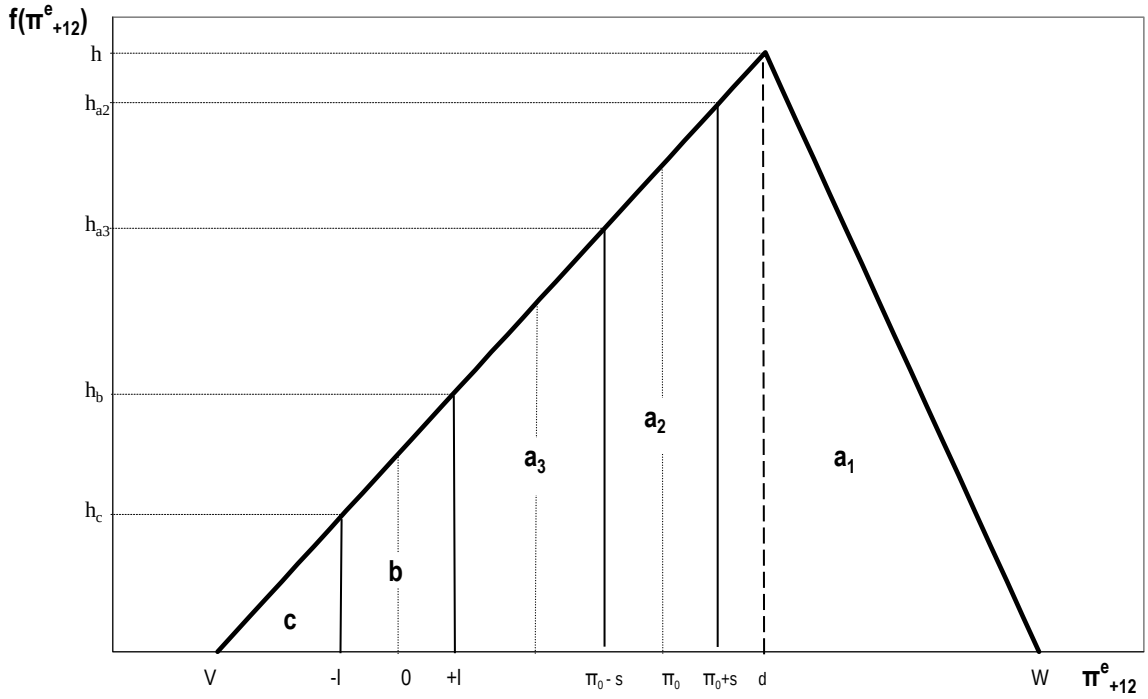
In the probability method, each fraction of respondents is expressed in terms of the respective areas below the density function. For example, the percentage of respondents

declaring that prices will increase at the same rate is equal to the probability that the expected inflation is between π_0-s_t and π_0+s_t, where s_t denotes the time-varying sensitivity interval surrounding the current inflation rate, while the fraction of individuals claiming that prices will be the same corresponds to the probability of inflation being between $-l_t$ and l_t, where l_t is the time-varying sensitivity interval surrounding zero. Other fractions of respondents are expressed in a similar way.

Figure 1 presents the case in which the mode exceeds π_0+s_t. As far as survey responses are concerned, the following symbols are used: a_{1t} is the percentage of respondents expecting prices to rise faster; a_{2t} is the percentage of respondents expecting prices to rise at the same rate; a_{3t} is the percentage of respondents expecting prices to rise more slowly; b_t is the percentage of respondents expecting prices to stay at their present level; and c_t is the percentage of respondents expecting prices to go down.

Figure 1

Triangular distribution probability quantification method



The quantification method presented in Figure 1 uses the following set of equations:

$$h_{ct} = f\left(-l_t\right) = \frac{2c_t}{-l_t - V_t} \tag{4}$$

$$h_{bt} = f\left(l_t\right) = \frac{2 \cdot \left(b_t + c_t\right)}{l_t - V_t} \tag{5}$$

$$h_{a3t} = f\left(\pi_{0t} - s_t\right) = \frac{2 \cdot \left(a_{3t} + b_t + c_t\right)}{\pi_{0t} - s_t - V_t} \tag{6}$$

$$h_{a2t} = f\left(\pi_{0t} + s_t\right) = \frac{2 \cdot \left(a_{2t} + a_{3t} + b_t + c_t\right)}{\pi_{0t} + s_t - V_t} \tag{7}$$

The following conditions hold:

$$\frac{h_t}{h_{ct}} = \frac{d_t - V_t}{-l_t - V_t} \tag{8}$$

$$\frac{h_t}{h_{bt}} = \frac{d_t - V_t}{l_t - V_t} \tag{9}$$

$$\frac{h_t}{h_{a3t}} = \frac{d_t - V_t}{\pi_{0t} - s_t - V_t} \tag{10}$$

$$\frac{h_t}{h_{a2t}} = \frac{d_t - V_t}{\pi_{0t} + s_t - V_t} \tag{11}$$

where d_t is given by equations (2)–(3).

The solution takes the following form:

$$V_t = \pi_{0t} \cdot \frac{\alpha_{1t}}{\alpha_{1t} - \alpha_{2t}} \tag{12}$$

$$W_t = \pi_{0t} \cdot \frac{\alpha_{1t}}{\alpha_{1t} - \alpha_{2t}} \cdot \left[1 + \frac{1}{\left(\pi_{0t} \cdot \frac{\alpha_{1t}}{\alpha_{1t} - \alpha_{2t}} + \sqrt{(1-\gamma) \cdot c} \right) \cdot \beta_{1t}} \right] \tag{13}$$

$$l_t = \pi_{0t} \cdot \frac{-\alpha_{1t}}{\beta_{1t} \cdot (\alpha_{1t} - \alpha_{2t})} \tag{14}$$

$$s_t = \pi_{0t} \cdot \frac{-\alpha_{2t}\alpha_{3t}}{(\alpha_{1t} - \alpha_{2t}) \cdot \alpha_{1t}} \tag{15}$$

where:

$$\alpha_{1t} = \frac{1}{\sqrt{1 - a_{1t}} + \sqrt{1 - a_{1t} - a_{2t}}} \tag{16}$$

$$\alpha_{2t} = \frac{1}{\sqrt{c_t} + \sqrt{b_t + c_t}} \tag{17}$$

$$\alpha_{3t} = \sqrt{1 - a_{1t}} - \sqrt{1 - a_{1t} - a_{2t}} \tag{18}$$

$$\beta_{1t} = -\frac{\sqrt{c_t} + \sqrt{b_t + c_t}}{\sqrt{c_t} - \sqrt{b_t + c_t}} \tag{19}$$

A similar procedure is developed for the mode located in other parts of the probability distribution. Table 1 presents the results.

Table 1

Quantification results for the mode located in other parts of the distribution

d_t	Equation	Results for a given location of d_t
π_{0t}-$s_t \le d_t < \pi_{0t}$+s_t	(12)	$V_t = 2\pi_{0t} \dfrac{\mu_t}{\mu_t \cdot (\lambda_t + 1) - \dfrac{1}{\beta_{1t}} - 1}$
	(13)	$W_t = 2\pi_{0t} \dfrac{\mu_t}{\mu_t \cdot (\lambda_t + 1) - \dfrac{1}{\beta_{1t}} - 1} \cdot \dfrac{\beta_{1t} + \beta_{2t} - 1}{\beta_{2t}}$
	(14)	$l_t = 2\mu_t \pi_{0t} \cdot \left[1 - \dfrac{\mu_t \cdot (\lambda_t + 1) - 1}{\mu_t \cdot (\lambda_t + 1) - \dfrac{1}{\beta_{1t}} - 1} \right]$
	(15)	$s_t = \pi_{0t} \cdot \left[\dfrac{2\lambda_{1t}\mu_t}{\mu_t \cdot (\lambda_t + 1) - \dfrac{1}{\beta_{1t}} - 1} - 1 \right]$
	Additional symbols	$\beta_{2t} = \dfrac{\sqrt{(1-\gamma_t)c_t} \cdot \left(\sqrt{c_t} + \sqrt{b_t + c_t} \right)}{\sqrt{c_t} - \sqrt{b_t + c_t}}$, $\lambda_{1t} = \dfrac{\beta_{1t} + \beta_{2t} - 1 - (\beta_{1t} - 1) \cdot \sqrt{\gamma_t a_{1t}}}{\beta_{2t}}$, $\mu_t = \dfrac{\sqrt{b_t + c_t}}{\sqrt{1 - a_{1t} - a_{2t}}}$
$l_t \le d_t < \pi_{0t}$-s_t	(12)	$V_t = \dfrac{2\pi_{0t}}{\lambda_{2t}}$
	(13)	$W_t = \dfrac{2\pi_{0t}}{\lambda_{2t}} \cdot \dfrac{\beta_{1t} + \beta_{2t} - 1}{\beta_{2t}}$
	(14)	$l_t = \dfrac{2\pi_{0t}}{\lambda_{2t}} \cdot \left[\sqrt{(1-\gamma_t)c_t} \cdot \left(1 - \dfrac{\beta_{1t} + \beta_{2t} - 1}{\beta_{2t}} \right) - 1 \right]$
	(15)	$s_t = \pi_{0t} \cdot \left[\dfrac{2 \cdot (\beta_{1t} + \beta_{2t} - 1)}{\beta_{2t}\lambda_{2t}} - 2\sqrt{\gamma_t a_{1t}} \cdot \dfrac{\beta_{1t} - 1}{\beta_{2t}\lambda_{2t}} - 1 \right]$
	Additional symbols	$\lambda_{2t} = \dfrac{2 \cdot (\beta_{1t} + \beta_{2t} - 1)}{\beta_{2t}} - \dfrac{\beta_{1t} - 1}{\beta_{2t}} \cdot \left[\sqrt{\gamma_t a_{1t}} + \sqrt{\gamma_t (a_{1t} + a_{2t})} \right]$
-$l_t \le d_t < l_t$	(12)	$V_t = \dfrac{2\pi_{0t}}{\lambda_{3t}}$
	(13)	$W_t = \dfrac{2\pi_{0t}}{\lambda_{3t}} \cdot \dfrac{\beta_{1t} + 1}{\beta_{1t} \cdot (\rho_{1t} - 1)}$
	(14)	$l_t = -\dfrac{2\pi_{0t}}{\lambda_{3t}\beta_{1t}}$
	(15)	$s_t = \pi_{0t} \cdot \left[\dfrac{2}{\lambda_{3t}} \cdot \left(\dfrac{\beta_{1t} + 1}{\beta_{1t} \cdot (\rho_{1t} - 1)} \cdot \left(1 - \sqrt{\gamma_t a_{1t}} \right) + \sqrt{\gamma_t a_{1t}} \right) - 1 \right]$
	Additional symbols	$\rho_{1t} = \sqrt{\gamma_t \cdot (a_{1t} + a_{2t} + a_{3t})}$, $\lambda_{3t} = \dfrac{2 \cdot (\beta_{1t}\rho_{1t} + 1)}{\beta_{1t} \cdot (\rho_{1t} - 1)} - \dfrac{\beta_{1t} + 1}{\beta_{1t} \cdot (\rho_{1t} - 1)} \cdot \left[\sqrt{\gamma_t a_{1t}} + \sqrt{\gamma_t (a_{1t} + a_{2t})} \right]$
$d_t < -l_t$	(12)	$V_t = \dfrac{2\pi_{0t}}{\lambda_{4t}}$
	(13)	$W_t = \dfrac{2\pi_{0t}}{\lambda_{4t}} \cdot \dfrac{\rho_{1t} + \rho_{2t}}{\rho_{1t} + \rho_{2t} - 2}$
	(14)	$l_t = \dfrac{2\pi_{0t}}{\lambda_{4t} \cdot (\rho_{1t} + \rho_{2t} - 2)} \cdot \left[2\sqrt{\gamma_t \cdot (1 - c_t)} - (\rho_{1t} + \rho_{2t}) \right]$
	(15)	$s_t = \pi_{0t} \cdot \left[\dfrac{2 \cdot (\rho_{1t} + \rho_{2t})}{\lambda_{4t} \cdot (\rho_{1t} + \rho_{2t} - 2)} \cdot \left(1 - \sqrt{\gamma_t a_{1t}} \right) - 1 \right]$
	Additional symbols	$\rho_{2t} = \sqrt{\gamma_t \cdot (1 - c_t)}$, $\lambda_{4t} = \dfrac{2 \cdot (\rho_{1t} + \rho_{2t})}{\rho_{1t} + \rho_{2t} - 2} - \dfrac{2}{\rho_{1t} + \rho_{2t} - 2} \cdot \left[\sqrt{\gamma_t a_{1t}} + \sqrt{\gamma_t (a_{1t} + a_{2t})} \right]$

The mean of the expected inflation ($\overline{\pi_t^e}$) is derived in the following way:

$$\overline{\pi_t^e} = \frac{1}{3} \cdot \left[\left(1+\gamma_t\right) \cdot V_t - \left(2-\gamma_t\right) \cdot W_t \right] \tag{20}$$

3. Balance statistics and quantification results

The balance statistics and quantified measures of inflation expectations described above were calculated for all EU economies and for the EMU as a whole. Table 2 and Table 3 present the averages of the balance statistics of inflation perception and expectations for the common sample period – starting in November 2002 – and for full individual samples (see Annex A for the graphs of the balance statistics).

Table 2

Balance statistics of inflation perception (period averages)

	Start of the sample	Common sample (Nov 2002–May 2007)				Full individual sample			
		BS_1^P	BS_2^P	BS_3^P	BS_4^P	BS_1^P	BS_2^P	BS_3^P	BS_4^P
Austria	01.1985	0.90	0.82	0.37	1.73	0.65	0.42	0.10	1.19
Belgium	01.1985	0.89	0.80	0.51	1.99	0.83	0.71	0.37	1.73
Bulgaria	05.2001	0.87	0.80	0.46	1.86	0.85	0.77	0.39	1.74
Cyprus	05.2001	0.82	0.75	0.43	1.78	0.82	0.73	0.40	1.73
Czech Republic	01.2001	0.42	0.08	–0.16	0.63	0.52	0.23	–0.07	0.82
Denmark	01.1985	0.34	–0.19	–0.25	0.48	0.43	–0.02	–0.18	0.63
EMU	01.1985	0.86	0.74	0.42	1.83	0.79	0.62	0.26	1.50
Estonia	04.2001	0.91	0.84	0.38	1.73	0.91	0.84	0.32	1.62
Finland	11.1995	0.71	0.47	–0.06	0.88	0.55	0.22	–0.13	0.72
France	01.1985	0.89	0.80	0.46	1.92	0.68	0.40	0.17	1.32
Germany	01.1985	0.82	0.67	0.34	1.66	0.82	0.68	0.24	1.46
Greece	01.1985	0.93	0.87	0.66	2.32	0.86	0.75	0.40	1.80
Hungary	02.1993	0.79	0.68	0.24	1.47	0.82	0.74	0.38	1.74
Ireland	01.1985	0.91	0.84	0.45	1.90	0.83	0.68	0.32	1.64
Italy	01.1985	0.86	0.73	0.46	1.91	0.85	0.73	0.36	1.72
Latvia	05.2001	0.93	0.89	0.45	1.88	0.90	0.84	0.37	1.71
Lithuania	05.2001	0.81	0.69	0.19	1.36	0.80	0.67	0.17	1.33
Luxembourg	01.2002	0.89	0.81	0.40	1.78	0.89	0.82	0.39	1.76
Malta	11.2002	0.79	0.65	0.41	1.79	0.79	0.65	0.41	1.79
Netherlands	01.1985	0.71	0.48	0.39	1.77	0.64	0.36	0.20	1.37
Poland	05.2001	0.78	0.61	0.19	1.34	0.78	0.61	0.18	1.34
Portugal	06.1986	0.90	0.84	0.44	1.85	0.89	0.80	0.38	1.74
Romania	05.2001	0.92	0.86	0.54	2.08	0.92	0.87	0.57	2.12
Slovakia	04.2000	0.86	0.76	0.27	1.51	0.89	0.81	0.33	1.64
Slovenia	03.1996	0.79	0.64	0.30	1.58	0.77	0.68	0.38	1.65
Spain	06.1986	0.96	0.94	0.54	2.07	0.88	0.80	0.33	1.64
Sweden	10.1995	0.37	–0.15	–0.27	0.45	0.35	–0.16	–0.26	0.45
United Kingdom	01.1985	0.57	0.32	0.03	1.03	0.72	0.52	0.12	1.23
Minimum		*0.34*	*–0.19*	*–0.27*	*0.45*	*0.35*	*–0.16*	*–0.26*	*0.45*
Maximum		*0.96*	*0.94*	*0.66*	*2.32*	*0.92*	*0.87*	*0.57*	*2.12*
Mean		***0.79***	***0.64***	***0.31***	***1.59***	***0.77***	***0.60***	***0.25***	***1.47***

Source: Author's calculations based on EC data.

Table 3

Balance statistics of inflation expectations (period averages)

	Start of the sample	Common sample (Nov 2002–May 2007)				Full individual sample			
		BS_1^e	BS_2^e	BS_3^e	BS_4^e	BS_1^e	BS_2^e	BS_3^e	BS_4^e
Austria	01.1985	0.72	0.48	0.24	1.46	0.61	0.32	0.16	1.30
Belgium	01.1985	0.63	0.35	0.14	1.20	0.69	0.48	0.21	1.34
Bulgaria	05.2001	0.76	0.68	0.36	1.56	0.75	0.67	0.33	1.50
Cyprus	05.2001	0.70	0.61	0.36	1.52	0.74	0.66	0.40	1.65
Czech Republic	01.2001	0.67	0.50	0.31	1.52	0.70	0.56	0.34	1.58
Denmark	01.1985	0.46	0.08	0.00	0.96	0.56	0.24	–0.06	0.84
EMU	01.1985	0.63	0.34	0.13	1.19	0.69	0.47	0.22	1.39
Estonia	04.2001	0.85	0.79	0.50	1.93	0.86	0.80	0.50	1.92
Finland	11.1995	0.68	0.43	0.18	1.34	0.60	0.30	0.13	1.24
France	01.1985	0.66	0.39	0.14	1.23	0.59	0.27	0.12	1.18
Germany	01.1985	0.68	0.45	0.19	1.32	0.77	0.60	0.29	1.53
Greece	01.1985	0.68	0.49	0.25	1.39	0.80	0.69	0.38	1.70
Hungary	02.1993	0.93	0.92	0.56	2.06	0.92	0.91	0.51	1.97
Ireland	01.1985	0.73	0.59	0.22	1.34	0.77	0.62	0.23	1.41
Italy	01.1985	0.41	–0.06	–0.11	0.72	0.66	0.42	0.24	1.42
Latvia	05.2001	0.89	0.85	0.49	1.92	0.86	0.80	0.43	1.80
Lithuania	05.2001	0.85	0.77	0.51	1.98	0.85	0.76	0.48	1.92
Luxembourg	01.2002	0.70	0.47	0.17	1.31	0.69	0.46	0.17	1.29
Malta	11.2002	0.55	0.29	0.24	1.34	0.55	0.29	0.24	1.34
Netherlands	01.1985	0.49	0.10	0.07	1.10	0.60	0.31	0.21	1.35
Poland	05.2001	0.74	0.58	0.28	1.47	0.76	0.61	0.30	1.51
Portugal	06.1986	0.84	0.74	0.39	1.72	0.80	0.70	0.31	1.54
Romania	05.2001	0.88	0.84	0.48	1.91	0.89	0.85	0.50	1.95
Slovakia	04.2000	0.84	0.74	0.42	1.80	0.86	0.78	0.44	1.84
Slovenia	03.1996	0.71	0.55	0.33	1.61	0.79	0.67	0.41	1.78
Spain	06.1986	0.70	0.54	0.20	1.27	0.71	0.58	0.15	1.18
Sweden	10.1995	0.53	0.20	0.19	1.38	0.49	0.12	0.14	1.23
United Kingdom	01.1985	0.63	0.38	0.14	1.25	0.75	0.59	0.29	1.53
Minimum		*0.41*	*–0.06*	*–0.11*	*0.72*	*0.49*	*0.12*	*–0.06*	*0.84*
Maximum		*0.93*	*0.92*	*0.56*	*2.06*	*0.92*	*0.91*	*0.51*	*1.97*
Mean		***0.70***	***0.50***	***0.26***	***1.46***	***0.73***	***0.55***	***0.29***	***1.51***

Source: Author's calculations based on EC data.

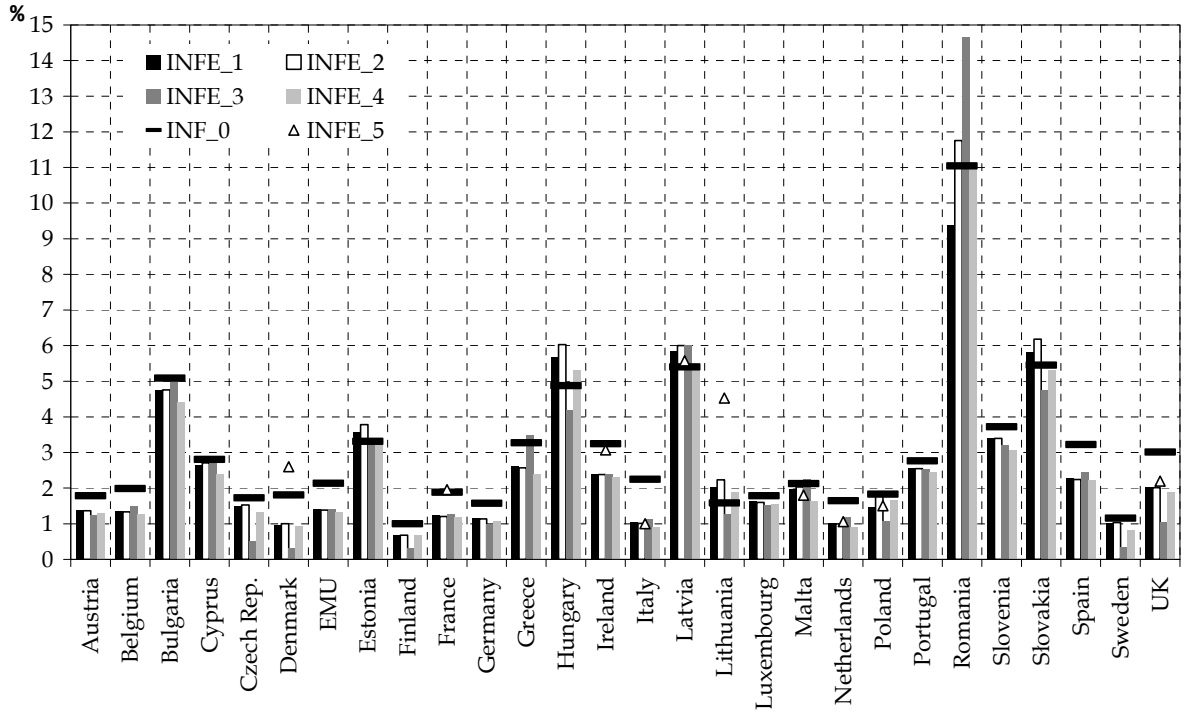
Taking into consideration the common sample period, it may be observed that a vast majority of consumers in European economies declare that prices are higher than 12 months before; the balance statistic BS_1^p equals approximately 79 percentage points, while BS_2^p equals 64 percentage points. Both reach their maximum values in Spain (96 and 94 percentage points, respectively) and minimum values in Denmark (34 and –19 percentage points, respectively). The balance statistics capturing different degrees of price increase noticed by respondents, ie BS_3^p and BS_4^p, indicate that consumers in Sweden are the most optimistic in terms of perceived changes in the price level, while Greeks seem to be the most pessimistic.

Opinions about future changes in the price level are generally better than survey responses to the question on perceived price changes: the difference between the fraction of respondents expecting a price increase and decrease, ie balance statistic BS_1^e, amounts to 70 percentage points on average, while the difference between the fraction of respondents declaring expectations of a price increase on the one hand, and their stabilisation or decrease on the other, ie balance statistic BS_2^e, equals approximately 51 percentage points. The weighted balance statistics of inflation expectations BS_3^e and BS_4^e, which equal 0.27 and 1.47, respectively, are also lower than their counterparts measuring opinions on perceived price changes (BS_3^p equals 0.31; BS_3^p equals 1.59). All the balance statistics show that Italian consumers reveal the highest degree of optimism when assessing future price changes, while Hungarian consumers are the most pessimistic.

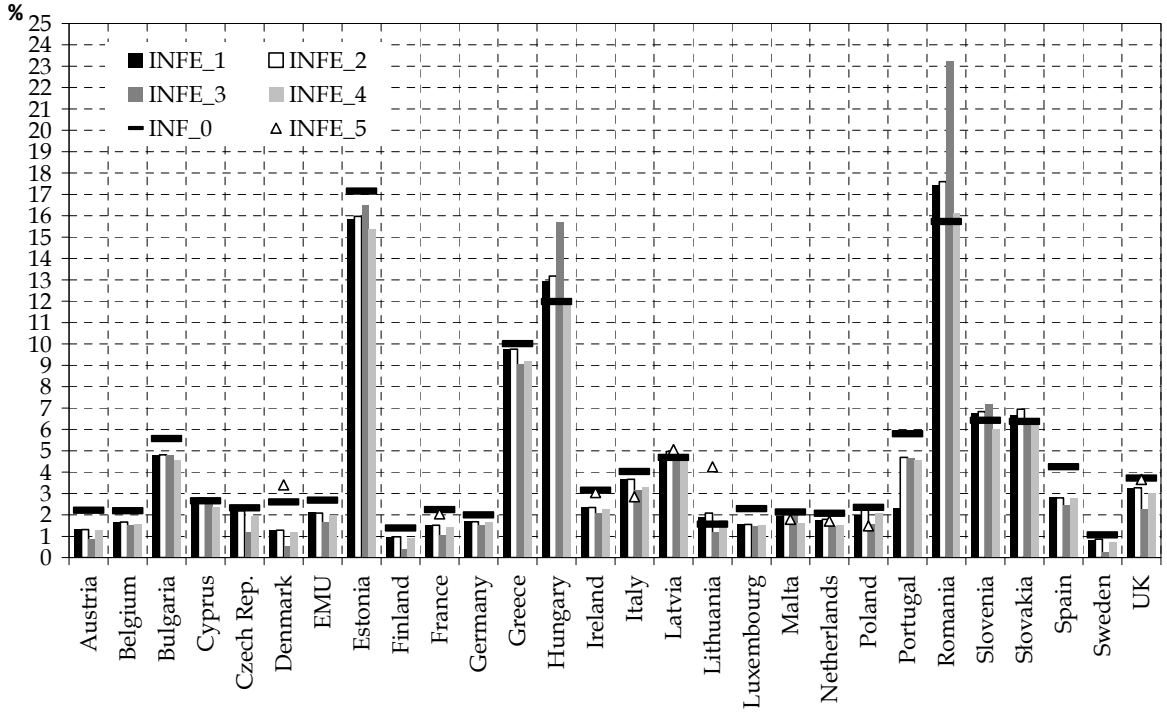
Figure 2

Averages of current inflation (*INF_0*) and different measures of inflation expectations[1]

2.A Common sample (Nov 2002–May 2007)



2.B Full individual sample[2]



Notes: [1] *INFE_1*: objectified probability measure assuming normal distribution of expected inflation; *INFE_2*: objectified probability measure assuming triangular distribution of expected inflation; *INFE_3*: subjectified probability measure assuming normal distribution of expected inflation; *INFE_4*: objectified logistic function measure; *INFE_5*: regression measure. [2] Start of the sample period: see Table 2 or Table 3.

Source: Author's calculations based on EC and IFS data.

As far as quantified indicators of expected inflation are concerned, probability and logistic function measures are available for all the economies under consideration, while the regression measure is available only for some of them (see Annex B for the estimation results of the regression models applied). Figure 1 presents the averages of available measures of inflation expectations and current inflation for the common sample period and full individual samples (Annex C presents the graphs with detailed quantification results).

To assess the uncertainty in measuring inflation expectations, the differences between the maximum and minimum estimates were calculated. Table 4 shows the results for the common sample, while Table 5 presents the results for all observations available for each economy.

Table 4

Differences between inflation expectation measures, common sample

	Data availability		Wedge (in pp), *INFE_i*, *i*=1, 2, 3, 4				Average correlation: *INFE_i*, 1<*i*<5 with *INFE_1*	Wedge (in pp), *INFE_i*, *i*=1, 2, 3, 4, 5				Average correlation: *INFE_i*, 1<*i*<5 with *INFE_1*
	INFE_1 – INFE_4	*INFE_5*	Mean	Minimum	Maximum	Relative to mean		Mean	Minimum	Maximum	Relative to mean	
Austria	x		0.25	0.06	0.61	18.7%	0.95	0.25	0.06	0.61	18.7%	0.95
Belgium	x		0.30	0.06	0.81	23.5%	0.96	0.30	0.06	0.81	23.5%	0.96
Bulgaria	x		1.19	0.08	3.78	23.6%	0.97	1.19	0.08	3.78	23.6%	0.97
Cyprus	x		0.86	0.02	2.86	45.4%	0.91	0.86	0.02	2.86	45.4%	0.91
Czech Republic	x		1.06	0.00	2.96	68.2%	0.94	1.06	0.00	2.96	68.2%	0.94
Denmark	x	x	0.70	0.19	2.18	74.9%	0.95	1.60	1.19	2.18	193.6%	0.90
EMU	x		0.19	0.06	0.47	14.3%	0.91	0.19	0.06	0.47	14.3%	0.91
Estonia	x		1.00	0.24	2.87	40.8%	0.95	1.00	0.24	2.87	40.8%	0.95
Finland	x		0.42	0.00	1.15	36.5%	0.96	0.42	0.00	1.15	36.5%	0.96
France	x	x	0.17	0.02	0.47	14.8%	0.90	0.81	0.35	1.14	71.5%	0.75
Germany	x		0.25	0.05	0.73	22.3%	0.95	0.25	0.05	0.73	22.3%	0.95
Greece	x		1.09	0.20	1.98	43.8%	0.94	1.09	0.20	1.98	43.8%	0.94
Hungary	x		1.88	0.10	6.29	33.2%	0.97	1.88	0.10	6.29	33.2%	0.97
Ireland	x	x	0.54	0.05	1.43	23.8%	0.93	0.99	0.16	1.80	45.0%	0.92
Italy	x	x	0.28	0.10	0.65	27.4%	0.94	0.33	0.11	0.71	32.1%	0.90
Latvia	x	x	1.55	0.09	3.31	30.9%	0.97	2.78	1.24	3.90	74.2%	0.90
Lithuania	x	x	1.29	0.45	3.46	47.4%	0.97	3.43	0.81	9.16	92.6%	0.91
Luxembourg	x		0.21	0.06	0.73	13.8%	0.95	0.21	0.06	0.73	13.8%	0.95
Malta	x	x	1.00	0.09	2.49	54.9%	0.94	1.41	0.09	3.61	70.8%	0.78
Netherlands	x	x	0.46	0.09	1.78	45.5%	0.80	1.00	0.10	3.25	107.9%	0.71
Poland	x	x	0.84	0.03	2.86	48.0%	0.97	0.97	0.26	2.86	51.1%	0.95
Portugal	x		0.37	0.06	0.86	15.1%	0.96	0.37	0.06	0.86	15.1%	0.96
Romania	x		3.73	0.25	9.08	29.3%	1.00	3.73	0.25	9.08	29.3%	1.00
Slovakia	x		1.61	0.11	4.68	30.8%	0.98	1.61	0.11	4.68	30.8%	0.98
Slovenia	x		0.77	0.15	1.93	24.1%	0.98	0.77	0.15	1.93	24.1%	0.98
Spain	x		0.30	0.03	0.83	15.0%	0.96	0.30	0.03	0.83	15.0%	0.96
Sweden	x		0.74	0.02	2.38	51.3%	0.96	0.74	0.02	2.38	51.3%	0.96
United Kingdom	x	x	0.98	0.56	1.83	50.4%	0.94	1.27	0.90	2.19	66.9%	0.81
Minimum			*0.17*	*0.00*	*0.47*	*13.8%*	*0.80*	*0.19*	*0.00*	*0.47*	*13.8%*	*0.71*
Maximum			*3.73*	*0.56*	*9.08*	*74.9%*	*1.00*	*3.73*	*1.24*	*9.16*	*193.6%*	*1.00*
Mean			***0.86***	***0.11***	***2.34***	***34.6%***	***0.95***	***1.10***	***0.24***	***2.71***	***48.4%***	***0.92***

Source: Author's calculations based on EC and IFS data.

When summarising the 2002–2007 results, the following points should be made. First, regression measures seem quite different from the other measures. The difference between the extreme estimates of inflation expectations equals 1.1 percentage points on average for all the measures and 0.9 percentage points for the probability and logistic function measures, which corresponds to 48.4% and 34.6% of their average, respectively. Second, taking into consideration the relative wedge between the probability and logistic function measures, it

appears that the uncertainty in measuring consumer expectations is relatively low in the EMU as a whole and its member economies (Austria, France, Germany, Luxembourg, Portugal and Spain), whereas it is relatively high in the Czech Republic, Denmark, Lithuania, Malta, Poland, Sweden and the United Kingdom. The relative wedge between the analysed measures of inflation expectations is positively correlated with the relative gap between the perceived current inflation quantified on the basis of survey data and its statistical measure and with the volatility of the parameter γ, ie the difference between current inflation and its 12-month moving average (Figure 3). Third, all the measures of consumer inflation expectations are highly correlated, which suggests that, even in economies where measurement uncertainty is elevated, all the proxies follow similar tendencies.

Table 5

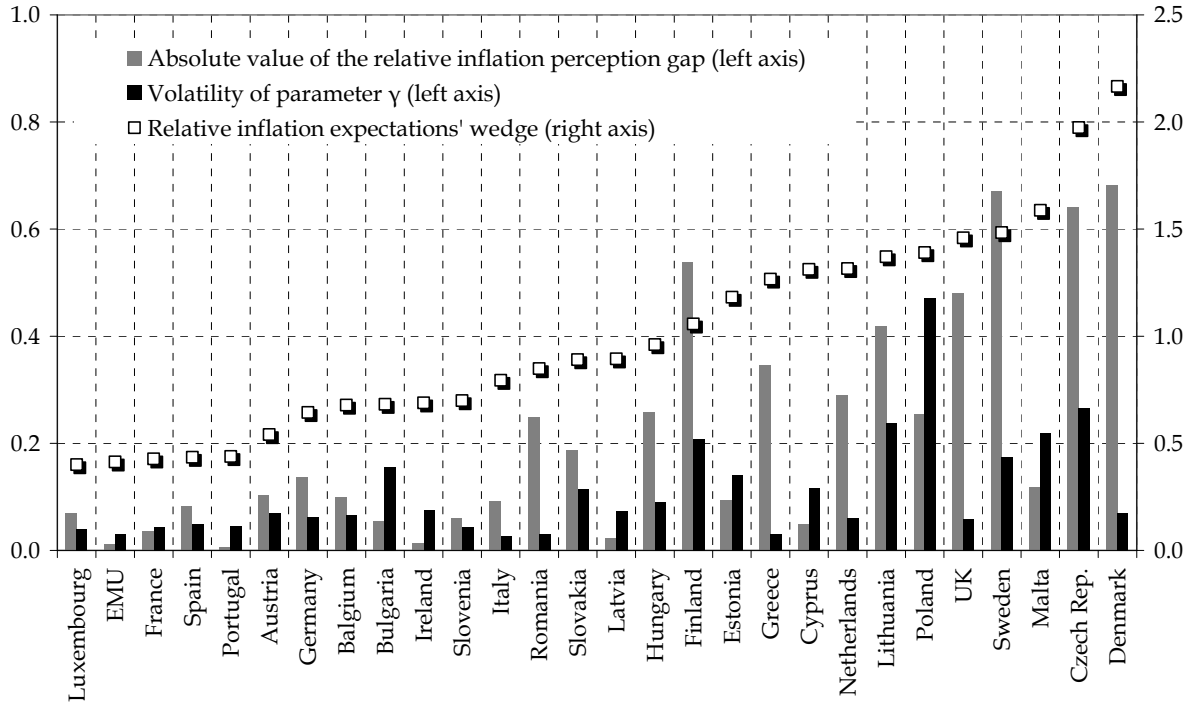
Differences between inflation expectation measures, full individual sample

	Start of the sample	Data availability		Wedge (in pp), *INFE_i*, *i*=1, 2, 3, 4				Average correlation: *INFE_i*, 1<*i*<5 with *INFE_1*	Wedge (in pp), *INFE_i*, *i*=1, 2, 3, 4, 5				Average correlation: *INFE_i*, 1<*i*<5 with *INFE_1*
		INFE_1 – INFE_4	*INFE_5*	Mean	Minimum	Maximum	Relative to mean		Mean	Minimum	Maximum	Relative to mean	
Austria	01.1985	x		0.24	0.00	1.36	23.2%	0.95	0.24	0.00	1.36	23.2%	0.95
Belgium	01.1985	x		0.32	0.01	1.94	24.3%	0.96	0.32	0.01	1.94	24.3%	0.96
Bulgaria	05.2001	x		1.26	0.03	3.78	24.3%	0.95	1.26	0.03	3.78	24.3%	0.95
Cyprus	05.2001	x		0.88	0.02	2.86	42.1%	0.90	0.88	0.02	2.86	42.1%	0.90
Czech Republic	01.2001	x		1.09	0.00	2.96	57.4%	0.97	1.09	0.00	2.96	57.4%	0.97
Denmark	01.1985	x	x	0.68	0.10	2.18	65.4%	0.98	1.71	0.10	3.16	200.5%	0.85
EMU	01.1985	x		0.43	0.06	1.39	24.2%	0.98	0.43	0.06	1.39	24.2%	0.98
Estonia	04.2001	x		3.62	0.05	48.77	27.6%	0.99	3.62	0.05	48.77	27.6%	0.99
Finland	11.1995	x		0.59	0.00	1.92	59.1%	0.98	0.59	0.00	1.92	59.1%	0.98
France	01.1985	x	x	0.41	0.02	2.20	32.5%	0.96	1.01	0.03	3.02	100.5%	0.91
Germany	01.1985	x		0.36	0.03	2.05	25.6%	0.99	0.36	0.03	2.05	25.6%	0.99
Greece	01.1985	x		1.51	0.15	6.32	22.8%	0.99	1.51	0.15	6.32	22.8%	0.99
Hungary	02.1993	x		5.08	0.10	36.44	30.5%	0.99	5.08	0.10	36.44	30.5%	0.99
Ireland	01.1985	x	x	0.47	0.03	1.69	22.8%	0.97	1.05	0.13	2.21	55.2%	0.96
Italy	01.1985	x	x	0.60	0.10	3.18	21.4%	0.99	0.92	0.11	4.31	29.6%	0.98
Latvia	05.2001	x	x	1.38	0.03	3.31	34.6%	0.98	2.69	1.24	3.90	98.6%	0.94
Lithuania	05.2001	x	x	1.21	0.12	3.46	50.6%	0.96	3.24	0.81	9.16	121.9%	0.90
Luxembourg	01.2002	x		0.20	0.06	0.73	13.6%	0.95	0.20	0.06	0.73	13.6%	0.95
Malta	11.2002	x	x	1.00	0.09	2.49	54.9%	0.94	1.41	0.09	3.61	70.8%	0.78
Netherlands	01.1985	x	x	0.63	0.01	2.79	35.4%	0.96	1.15	0.09	3.72	71.6%	0.89
Poland	05.2001	x	x	0.80	0.03	2.86	43.7%	0.97	0.91	0.19	2.86	43.7%	0.95
Portugal	06.1986	x		0.75	0.03	3.46	18.2%	0.99	0.75	0.03	3.46	18.2%	0.99
Romania	05.2001	x		7.23	0.25	27.23	34.7%	0.99	7.23	0.25	27.23	34.7%	0.99
Slovakia	04.2000	x		1.65	0.11	6.16	28.2%	0.97	1.65	0.11	6.16	28.2%	0.97
Slovenia	03.1996	x		1.81	0.15	5.38	26.8%	0.98	1.81	0.15	5.38	26.8%	0.98
Spain	06.1986	x		0.49	0.03	1.36	21.4%	0.98	0.49	0.03	1.36	21.4%	0.98
Sweden	10.1995	x		0.69	0.02	2.38	43.4%	0.94	0.69	0.02	2.38	43.4%	0.94
United Kingdom	01.1985	x	x	0.96	0.06	3.03	36.7%	0.99	1.82	0.24	4.99	85.6%	0.96
Minimum				*0.20*	*0.00*	*0.73*	*13.6%*	*0.90*	*0.20*	*0.00*	*0.73*	*13.6%*	*0.78*
Maximum				*7.23*	*0.25*	*48.77*	*65.4%*	*0.99*	*7.23*	*1.24*	*48.77*	*200.5%*	*0.99*
Mean				***1.33***	***0.06***	***6.89***	***33.0%***	***0.97***	***1.58***	***0.15***	***7.05***	***50.9%***	***0.95***

Source: Author's calculations based on EC and IFS data.

Figure 3

Factors affecting relative wedge between probability and logistic function measures of inflation expectations



Source: Author's calculations based on EC and IFS data.

4. Are European consumers forward looking?

Direct measures of inflation expectations are particularly useful in testing various hypotheses concerning the formation of expectations. The empirical part of the present paper is focused on assessing the degree of forward-lookingness of consumer inflation expectations in European economies.

Before presenting the results of the estimations using quantified proxies for consumer expectations, it should be underlined that the assumptions of quantification methods may cause some correlation between the quantified measures of inflation expectations and the current inflation rate, thereby affecting the assessment of the forward-lookingness of expectations. This is due to the fact that the survey question makes the respondents express their foresights in terms of their perception of price changes currently observed. The proxies for the perceived current inflation used in quantification methods are – at least to some extent – related to the official measure of current inflation. To illustrate the reaction of the measures of inflation expectations applied in the present study to changes in the current inflation rate, the following experiment was conducted. It was assumed that the current inflation rate was rising from 2% to 3% with a different distribution of responses to the survey question. The responses of expectation measures *INFE_1*, *INFE_2*, *INFE_3* and *INFE_4* were then checked. The results obtained (Table 6 and Figure 4) show, in general terms, that all the measures change following a change in the current rate of inflation, with the magnitude of the reaction dependent on the survey responses.

Table 6

Response of different measures of inflation expectations (*INFE_1*, *INFE_2*, *INFE_3*, *INFE_4*) to a change in current inflation (*INF_0*)

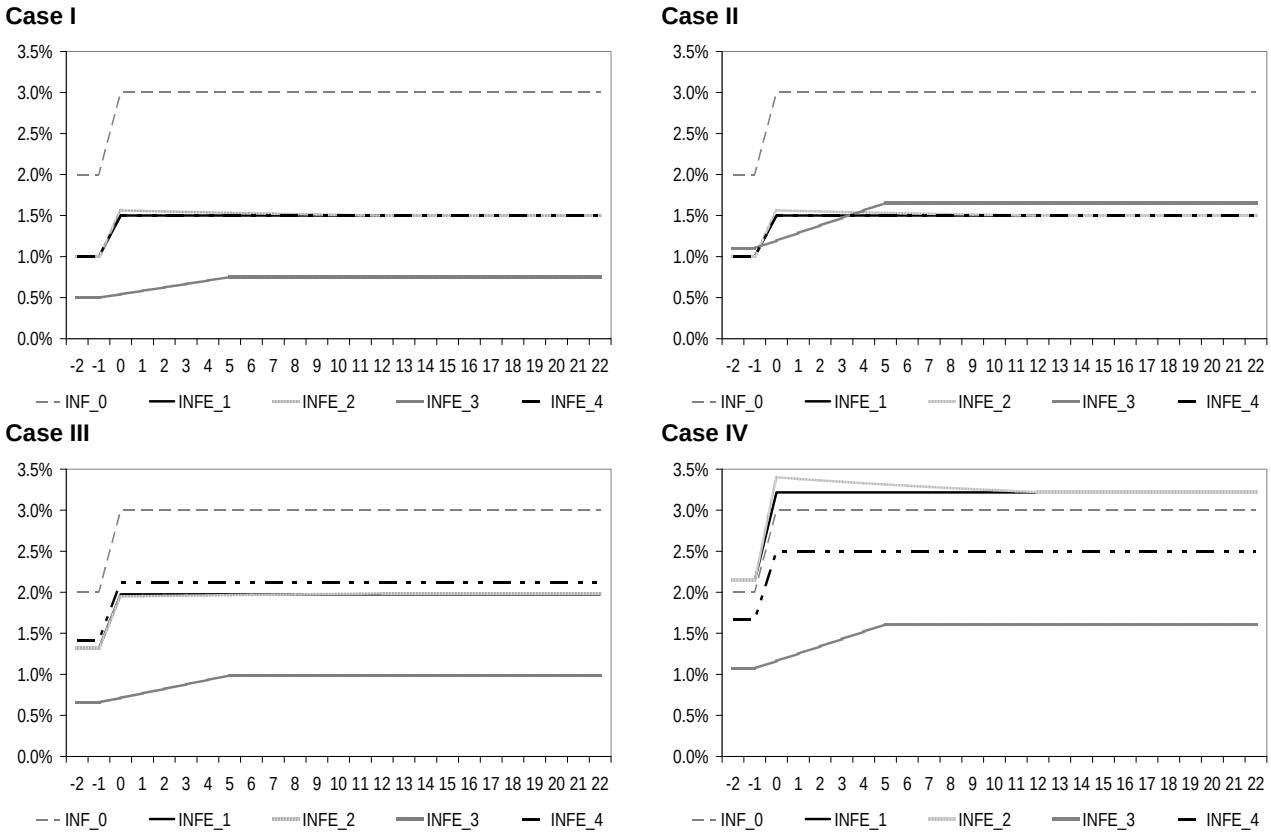
		Change in *INF_0* (in pp)	Response (in pp)			
			INFE_1	*INFE_2*	*INFE_3*	*INFE_4*
Case I	Maximum response [lag]	1 [0]	0.50 [0]	0.56 [0]	0.25 [12]	0.50 [0]
	Response in the long-term	1	0.50	0.50	0.25	0.50
Case II	Maximum response [lag]	1 [0]	0.50 [0]	0.56 [0]	0.55 [12]	0.50 [0]
	Response in the long-term	1	0.50	0.50	0.55	0.50
Case III	Maximum response [lag]	1 [0]	0.66 [0]	0.66 [0]	0.33 [12]	0.71 [0]
	Response in the long-term	1	0.66	0.66	0.33	0.71
Case IV	Maximum response [lag]	1 [0]	1.07 [0]	1.25 [0]	0.54 [12]	0.83 [0]
	Response in the long-term	1	1.07	1.07	0.54	0.83

Case I: A_1^p=20%, A_2^p=20%, A_3^p=20%, B^p=20%, C^p=20%, A_1^e=20%, A_2^e=20%, A_3^e=20%, B^e=20%, C^e=20%;
Case II: A_1^p=40%, A_2^p=30%, A_3^p=20%, B^p=5%, C^p=5%, A_1^e=20%, A_2^e=20%, A_3^e=20%, B^e=20%, C^e=20%;
Case III: A_1^p=20%, A_2^p=20%, A_3^p=20%, B^p=20%, C^p=20%, A_1^e=5%, A_2^e=50%, A_3^e=35%, B^e=5%, C^e=5%;
Case IV: A_1^p=20%, A_2^p=20%, A_3^p=20%, B^p=20%, C^p=20%, A_1^e=40%, A_2^e=25%, A_3^e=10%, B^e=15%, C^e=10%.
In all the cases: D^p=0, D^e=0.

Source: Author's calculations.

Figure 4

Response of different measures of inflation expectations (*INFE_1*, *INFE_2*, *INFE_3*, *INFE_4*) to a change in current inflation (*INF_0*)



Case I: A_1^p=20%, A_2^p=20%, A_3^p=20%, B^p=20%, C^p=20%, A_1^e=20%, A_2^e=20%, A_3^e=20%, B^e=20%, C^e=20%;

Case II: A_1^p=40%, A_2^p=30%, A_3^p=20%, B^p=5%, C^p=5%, A_1^e=20%, A_2^e=20%, A_3^e=20%, B^e=20%, C^e=20%;
Case III: A_1^p=20%, A_2^p=20%, A_3^p=20%, B^p=20%, C^p=20%, A_1^e=5%, A_2^e=50%, A_3^e=35%, B^e=5%, C^e=5%;
Case IV: A_1^p=20%, A_2^p=20%, A_3^p=20%, B^p=20%, C^p=20%, A_1^e=40%, A_2^e=25%, A_3^e=10%, B^e=15%, C^e=10%.
In all the cases: D^p=0, D^e=0.

Source: Author's calculations.

To address the risk that the degree of forward-lookingness estimated on the basis of quantified measures of inflation expectations may be biased downwards, the balance statistics are also used to assess how opinions about past price changes affect price expectations.

4.1 Degree of forward-lookingness assessed with quantified measures of inflation expectations

Empirical studies examining the formation of consumer inflation expectations in European economies indicate that backward-looking mechanisms are relatively more important than forward-looking ones. Gerberding (2001) verifies the model of consumer inflation expectation formation in France, Germany and Italy, showing that expectations are neither purely forward-looking nor purely adaptive, although the relative weight of the adaptive mechanism is, in all cases, greater than one half. Forsells and Kenny (2004) show that consumer inflation expectations in the euro area are characterised by an intermediate degree of rationality, with consumers taking into consideration a wide – but not complete – set of information in forming their expectations. Consumers seem to gradually adjust their expectations in order to eliminate any systematic expectational error, so their expectations approach actual future inflation in the long term. Döpke et al (2006) estimate Carroll's sticky information model of households' inflation expectations in France, Germany, Italy and the United Kingdom. They show that, in the formation of inflation expectations, households mainly use past inflation, although there is also a role for available professional forecasts, which are interpreted as a forward-looking variable. It is found that European households adjust sluggishly to new information, which is similar to the findings of Forsells and Kenny (2004).

In order to assess the formation of European consumers' inflation expectations on the basis of the survey measures described above, two types of equations are estimated in the present paper. The first specification tests rational versus adaptive expectations in line with the approach used by Gerberding (2001), Carlson and Valev (2002) and Heineman and Ullrich (2006). The equation has the following form:

$$\pi^{e}_{t+12|t} = \alpha_1 + \alpha_2 \cdot \pi_{t+12} + \left(1-\alpha_2\right)\cdot\left[\pi^{e}_{t-2|t-14} + \alpha_3 \cdot \left(\pi^{e}_{t-2|t-14} - \pi_{t-2}\right) + \alpha_4 \cdot \left(\pi_{t-2} - \pi_{t-14}\right)\right] + \varepsilon_t \qquad (21)$$

where $\pi^{e}_{t+i|t}$ denotes inflation expectations formed at time t with respect to inflation at time $t+i$, while π_t denotes inflation at time t.

If the hypothesis that the estimated parameter α_2 equals 1 is not rejected, it suggests that inflation expectations meet the unbiasedness requirement of the rational expectations hypothesis.[3] If the estimation results show that α_2 is insignificantly different from zero, inflation expectations are adaptive, ie they depend on their lag adjusted for previous expectations' errors (ie the difference between current inflation[4] and the expectations formed with respect to it a year before). Moreover, the specification takes into account the possible impact of a change in the current inflation on inflation expectations.

An alternative version of the test equation – similarly to equation (21) – has a hybrid nature, capturing both forward- and backward-looking determinants of inflation expectations.

[3] It requires economic agents not to make systematic forecast errors, which implies that their expectations are equal to actual inflation on average and to actual inflation plus a random forecast error period by period.

[4] Surveys are carried out at the beginning of each month; therefore, the year-on-year CPI index lagged two months (due to publication lags) is used as the current inflation (known to the respondents while answering the survey question).

However, the static mechanism is applied in its backward-looking part, in which expectations depend on the currently observed inflation:

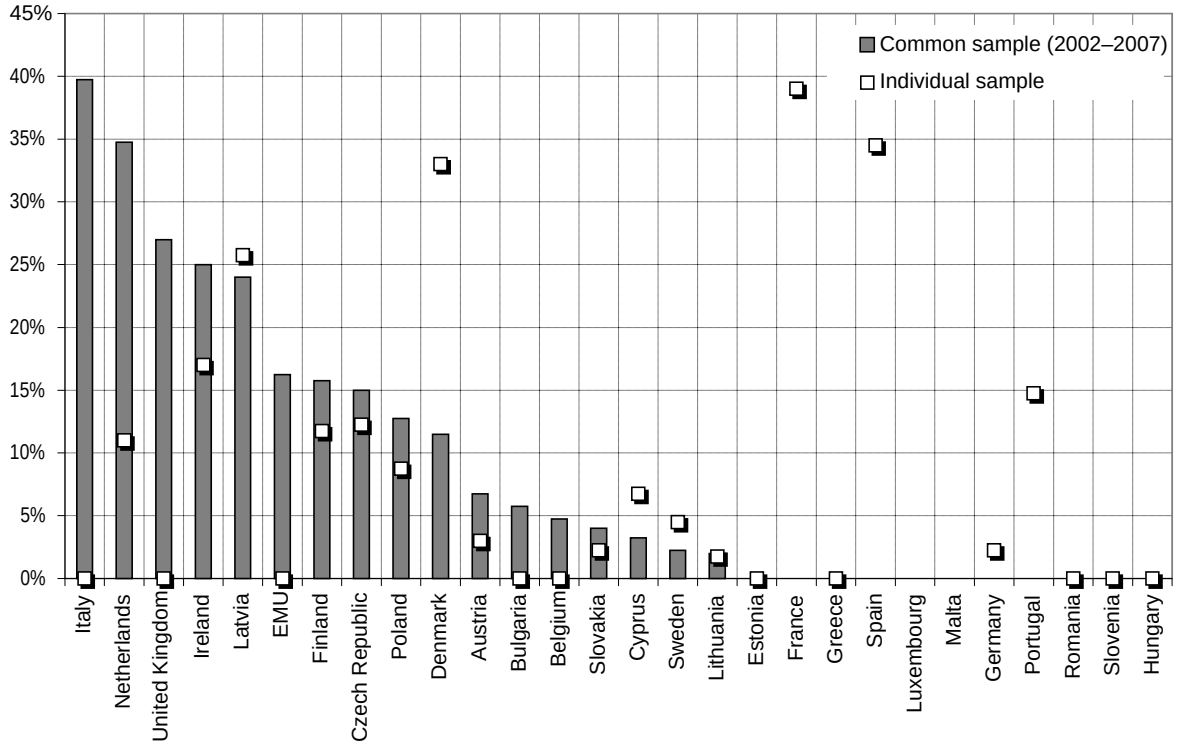
$$\pi^{e}_{t+12|t} = \alpha_1 + \alpha_2 \cdot \pi_{t+12} + (1-\alpha_2) \cdot \pi_{t-2} + v_t \qquad (22)$$

Both test equations were estimated using four quantified measures of inflation expectations available for all economies (*INFE_1*, *INFE_2*, *INFE_3*, *INFE_4*). The final version of the estimated equation for each of the economies was selected on the basis of a comparison of statistical properties. Where both equations were satisfactory in terms of statistical properties, the selection was based on the empirical fit measured with the adjusted R^2 coefficient.

Figure 5 presents the average weight of the forward-looking factor in the formation of consumer inflation expectations in individual economies across all the measures considered. Table 7 provides detailed estimation results for every measure of inflation expectation as well as a description of the estimation technique applied. The results are presented both for the common sample and individual sample periods.

Figure 5

The weight of the forward-looking mechanism in the formation of consumer inflation expectations (average for all measures under consideration)



Source: Author's calculations based on the results presented in Table 7.

Table 7

Formation of inflation expectations – estimation results[1] of equations (21) and (22)

	Start of the individual sample	Common sample (Nov 2002–May 2007)					Individual sample				
		Expectations' measure, equation version[(2)], R^2_{adj}	Weight of forward-lookingness, α_2	Weight of backward-lookingness $(1-\alpha_2)$	α_3	α_4	Expectations' measure, equation version[(2)], R^2_{adj}	Weight of forward-lookingness, α_2	Weight of backward-lookingness $(1-\alpha_2)$	α_3	α_4
Austria	01.1985	1,A* 0,95	–	1	–1,06 (0,10)	–0,14 (0,07)	1,A 0,60	–	1	–	0,73 (0,07)
		2,S* 0,93	0,08 (0,03)	0,92 (0,03)			2,A 0,61	0,07 (0,04)	0,93 (0,04)	–	0,74 (0,06)
		3,A* 0,86	0,13 (0,08)	0,87 (0,08)	–1,86 (0,32)	–0,88 (0,22)	3,A* 0,78	–	1	–0,70 (0,04)	–
		4,A* 0,97	0,06 (0,04)	0,94 (0,04)	–1,14 (0,12)	–0,20 (0,08)	4,A 0,65	0,05 (0,03)	0,95 (0,03)	–	0,68 (0,05)
Belgium	01.1985	1,A* 0,94	0,05 (0,03)	0,95 (0,03)	–0,88 (0,03)	–	1,A* 0,91	–	1	–0,91 (0,02)	–
		2,A* 0,93	0,06 (0,04)	0,94 (0,04)	-0,87 (0,03)	–	2,A* 0,90	–	1	–0,91 (0,02)	–
		3,A* 0,81	–	1	–0,92 (0,04)	–	3,A* 0,73	–	1	–1,47 (0,19)	–0,66 (0,17)
		4,A* 0,94	0,08 (0,03)	0,92 (0,03)	–0,85 (0,03)	–	4,A* 0,92	–	1	–0,89 (0,02)	–
Bulgaria	05.2001	1,A* 0,95	–	1	–0,94 (0,02)	–	1,A* 0,92	–	1	–0,93 (0,02)	–
		2,S* 0,92	0,07 (0,04)	0,93 (0,04)			2,A* 0,92	–	1	–0,93 (0,02)	–
		3,S* 0,70	0,16 (0,08)	0,84 (0,08)			3,A* 0,68	–	1	–0,85 0,08)	–
		4,A* 0,97	–	1	–0,91 (0,02)	–	4,A* 0,95	–	1	–0,91 (0,02)	–
Cyprus	05.2001	1,A 0,81	–	1	–1,03 (0,05)	–	1,A 0,74	–	1	–1,06 (0,06)	–
		2,A 0,73	–	1	–1,04 (0,05)	–	2,A 0,63	–	1	–1,07 (0,07)	–
		3,– –	–	–	–	–	3,– –	–	–	–	–
		4,S* 0,83	0,13 (0,07)	0,87 (0,07)			4,A 0,75	0,27 (0,11)	0,73 (0,11)	–1,07 (0,09)	–
Czech Republic	01.2001	1,A* 0,90	0,12 (0,06)	0,88 (0,06)	–0,46 (0,23)	0,63 (0,27)	1,A* 0,90	0,13 (0,04)	0,87 (0,04)	–1,02 (0,04)	–
		2,S* 0,85	0,10 (0,05)	0,90 (0,05)			2,S* 0,88	0,10 (0,04)	0,90 (0,04)		
		3,A* 0,64	0,27 (0,05)	0,73 (0,05)	–0,70 (0,03)	–	3,A* 0,78	0,12 (0,03)	0,88 (0,03)	–0,64 (0,03)	–
		4,A* 0,93	0,11 (0,04)	0,89 (0,04)	–0,52 (0,17)	0,48 (0,18)	4,A* 0,93	0,14 (0,03)	0,86 (0,03)	–0,97 (0,03)	–
Denmark	01.1985	1,A* 0,92	0,09 (0,04)	0,81 (0,04)	–1,07 (0,14)	–0,21 (0,13)	1,A* 0,62	0,46 (0,18)	0,54 (0,18)	–	0,63 (0,10)
		1,A* 0,72	0,14 (0,05)	0,86 (0,05)	–1,21 (0,20)	–0,29 (0,15)	2,A* 0,60	0,42 (0,19)	0,58 (0,19)	–	0,59 (0,09)
		1,A* 0,67	0,15 (0,04)	0,85 (0,04)	–0,46 (0,04)	–	3,A 0,72	–	1	–	0,25 (0,05)
		4,A* 0,91	0,08 (0,05)	0,92 (0,05)	–0,81 (0,03)	–	4,A* 0,61	0,44 (0,18)	0,56 (0,18)	–	0,60 (0,10)

	Start of the individual sample	Common sample (Nov 2002–May 2007)					Individual sample				
		Expectations' measure, equation version[2], R^2_{adj}	Weight of forward-lookingness, α_2	Weight of backward-lookingness ($1 - \alpha_2$)	α_3	α_4	Expectations' measure, equation version[2], R^2_{adj}	Weight of forward-lookingness, α_2	Weight of backward-lookingness ($1 - \alpha_2$)	α_3	α_4
EMU	01.1985	1,S* 0,71	0,20 (0,12)	0,80 (0,12)			1,A* 0,93	–	1	–1,01 (0,04)	–
		2,S* 0,67	0,22 (0,13)	0,78 (0,13)			2,A* 0,92	–	1	–1,01 (0,04)	–
		3,– –	–	–	–	–	3,A* 0,88	–	1	–0,76 0,05)	–
		4,S* 0,67	0,23 (0,12)	0,77 (0,12)			4,A* 0,94	–	1	–0,99 (0,04)	–
Estonia	04.2001	1,A* 0,90	–	1	–1,07 (0,06)	–	1,A* 0,90	–	1	–1,07 (0,05)	–
		2,A* 0,73	–	1	–1,09 (0,09)	–	2,A* 0,99	–	1	–0,96 (0,05)	0,09 (0,05)
		3,A* 0,64	–	1	–1,65 (0,27)	–0,50 (0,22)	3,A* 0,97	–	1	–1,01 (0,02)	–
		4,A* 0,93	–	1	–1,03 (0,04)	–	4,A* 0,99	–	1	–1,04 (0,01)	–
Finland	11.1995	1,A* 0,91	0,19 (0,02)	0,81 (0,02)	–	–	1,A* 0,93	0,12 (0,08)	0,88 (0,08)	–0,96 (0,05)	–
		2,A* 0,87	0,22 (0,03)	0,78 (0,03)	–0,83 (0,03)	–	2,A* 0,92	0,14 (0,08)	0,86 (0,08)	–0,94 (0,05)	–
		3,– –	–	–	–	–	3,A 0,46	–	1	–	0,33 (0,03)
		4,A* 0,87	0,22 (0,03)	0,78 (0,03)	–0,82 (0,03)	–	4,A* 0,91	0,21 (0,07)	0,79 (0,07)	–0,93 (0,05)	–
France	01.1985	1,S* 0,42	–	1			1,S* 0,60	0,54 (0,17)	0,46 (0,17)		
		2,A* 0,37	–	1	–0,77 (0,10)	–	2,S* 0,56	0,55 (0,18)	0,45 (0,18)		
		3,A* 0,29	–	1	–	0,37 (0,08)	3,– –	–	–	–	–
		4,A* 0,40	–	1	–0,72 (0,08)	–	4,A* 0,60	0,47 (0,24)	0,53 (0,24)	–	0,86 (0,21)
Germany	01.1985	1,A* 0,93	–	1	–0,77 (0,04)	–	1,S* 0,96	–	1		
		2,A* 0,93	–	1	–0,76 (0,04)	–	2,S* 0,95	–	1		
		3,A* 0,83	–	1	–0,73 (0,04)	–0,20 (0,06)	3,S* 0,86	–	1		
		4,A* 0,93	–	1	–0,73 (0,04)	–	4,A* 0,96	0,09 (0,03)	0,91 (0,03)	–0,95 (0,04)	–
Greece	01.1985	1,A* 0,60	–	1	–1,18 (0,09)	–	1,A 0,97	–	1	–1,00 (0,04)	–
		2,A* 0,59	–	–	–1,17 (0,10)	–	1,A 0,96	–	1	–1,01 (0,04)	–
		3,A* 0,54	–	1	–0,99 (0,14)	–	3,A* 0,90	–	1	–0,96 (0,07)	–
		4,A* 0,63	–	1	–1,15 (0,08)	–	4,A* 0,98	–	1	–0,98 (0,03)	–

	Start of the individual sample	Common sample (Nov 2002–May 2007)					Individual sample				
		Expectations' measure, equation version[2], R^2_{adj}	Weight of forward-lookingness, α_2	Weight of backward-lookingness ($1 - \alpha_2$)	α_3	α_4	Expectations' measure, equation version[2], R^2_{adj}	Weight of forward-lookingness, α_2	Weight of backward-lookingness ($1 - \alpha_2$)	α_3	α_4
Hungary	02.1993	1,A* 0,91	–	1	–1,11 (0,05)	–	1,A* 0,97	–	1	–1,19 (0,06)	–
		2,A 0,88	–	1	–1,13 (0,05)	–	2,A* 0,96	–	1	–1,21 (0,07)	–
		3,A* 0,80	–	1	–0,91 (0,05)	–	3,A 0,70	–	1	–0,70 (0,10)	–
		4,A* 0,93	–	1	–1,06 (0,04)	–	4,A* 0,99	–	1	–1,13 (0,03)	–
Ireland	01.1985	1,A* 0,92	0,23 (0,02)	0,77 (0,02)	–0,85 (0,03)	–	1,S* 0,91	0,21 (0,04)	0,79 (0,04)		
		2,A* 0,92	0,23 (0,02)	0,77 (0,02)	–0,83 (0,03)	–	2,S* 0,91	0,22 (0,04)	0,78 (0,04)		
		3,A* 0,77	0,31 (0,12)	0,69 (0,12)	–1,82 (0,52)	–0,74 (0,40)	3,S* 0,82	–	1		
		4,A* 0,93	0,23 (0,02)	0,77 (0,02)	–0,83 (0,03)	–	4,S* 0,90	0,25 (0,04)	0,75 (0,04)		
Italy	01.1985	1,S* 0,57	0,49 (0,12)	0,51 (0,12)			1,A 0,88	–	1	–	1,15 (0,07)
		2,S* 0,53	0,53 (0,12)	0,47 (0,12)			2,A 0,85	–	1	–	1,17 (0,07)
		3,A* 0,75	–	1	–0,94 (0,13)	–	3,A 0,86	–	1	–	1,19 (0,09)
		4,S* 0,49	0,57 (0,12)	0,43 (0,12)			4,A 0,91	–	1	–	1,03 (0,06)
Latvia	05.2001	1,A 0,88	0,26 (0,07)	0,74 (0,27)	–	0,98 (0,11)	1,A 0,88	0,26 (0,07)	0,74 (0,07)	–	0,98 (0,11)
		2,A 0,75	0,30 (0,10)	0,70 (0,10)	–	1,00 (0,17)	2,A 0,81	0,31 (0,09)	0,69 (0,09)	–	1,00 (0,17)
		3,A 0,61	0,23 (0,12)	0,77 (0,12)	–	0,92 (0,19)	3,A 0,65	0,27 (0,11)	0,73 (0,11)	–	0,86 (0,20)
		4,A 0,87	0,17 (0,07)	0,83 (0,07)	–	0,93 (0,07)	4,A 0,90	0,19 (0,06)	0,81 (0,06)	–	0,92 (0,07)
Lithuania	05.2001	1,A 0,98	0,08 (0,02)	0,92 (0,02)	–1,14 (0,01)	–	1,A 0,98	0,07 (0,02)	0,93 (0,02)	–1,13 (0,01)	–
		2,A* 0,92	–	1	–1,08 (0,03)	–	2,A* 0,92	–	1	–1,08 (0,03)	–
		3,S* 0,83	–	1			3,A* 0,90	–	1	–1,46 (0,15)	–0,62 (0,16)
		4,A* 0,98	–	1	–0,98 (0,02)	–	4,A* 0,98	–	1	–0,98 (0,02)	–
Luxembourg	01.2002	1,A* 0,72	–	1	–0,78 (0,12)	–					
		2,A* 0,70	–	1	–0,76 (0,12)	–					
		3,A 0,35	–	1	–0,11 (0,05)	–					
		4,A* 0,74	–	1	–0,75 (0,11)	–					

	Start of the individual sample	Common sample (Nov 2002–May 2007)					Individual sample				
		Expectations' measure, equation version[2], R^2_{adj}	Weight of forward-lookingness, α_2	Weight of backward-lookingness ($1-\alpha_2$)	α_3	α_4	Expectations' measure, equation version[2], R^2_{adj}	Weight of forward-lookingness, α_2	Weight of backward-lookingness ($1-\alpha_2$)	α_3	α_4
Malta	11.2002	1,A 0,71	–	1	–0,82 (0,07)	–					
		1,A 0,71	–	1	–0,84 0,08	–					
		3,A 0,50	–	1	–1,22 0,16	–0,58 0,13					
		4,A* 0,75	–	1	–0,83 0,10	–					
Netherlands	01.1985	1,A* 0,30	0,46 (0,13)	0,54 (0,13)	–1,30 (0,20)	–	1,A* 0,87	–	1	–1,29 (0,07)	–
		2,A* 0,32	0,44 (0,13)	0,56 (0,13)	–1,30 (0,18)	–	2,A* 0,81	–	1	–1,29 (0,10)	–
		3,S* 0,72	–	1			3,A* 0,84	–	1	–1,06 (0,09)	–
		4,A* 0,28	0,49 (0,07)	0,51 (0,07)	–1,34 (0,23)	–	4,A* 0,81	0,44 (0,10)	0,56 (0,10)	–1,22 (0,15)	–
Poland	05.2001	1,S* 0,92	0,19 (0,03)	0,81 (0,03)			1,S* 0,95	0,07 (0,04)	0,93 (0,04)		
		2,A 0,93	0,18 (0,07)	0,82 (0,07)	–1,17 (0,08)	–	2,S 0,94	0,08 (0,02)	0,92 (0,02)		
		3,A* 0,75	–	1	–0,73 (0,04)	–	3,S* 0,85	0,11 (0,05)	0,89 (0,05)		
		4,A* 0,93	0,14 (0,04)	0,86 (0,04)	–1,07 (0,04)	–	4,S* 0,98	0,09 (0,01)	0,91 (0,01)		
Portugal	06.1986	1,A* 0,88	–	1	–1,05 (0,05)	–	1,A 0,95	–	1	–0,20 (0,06)	0,77 (0,07)
		2,A* 0,87	–	1	–1,05 (0,05)	–	1,A* 0,95	–	1	–0,28 (0,08)	0,68 (0,09)
		3,S* 0,77	–	1			3,A 0,89	0,36 (0,18)	0,64 (0,18)	–	1,00 (0,12)
		4,A* 0,93	–	1	–1,02 (0,04)	–	4,A 0,95	0,23 (0,09)	0,77 (0,09)	–	0,92 (0,04)
Romania	05.2001	1,A 0,98	–	1	–0,92 (0,01)	–	1,A 0,97	–	1	–0,89 (0,03)	–
		2,A 0,97	–	1	–0,92 (0,01)	–	2,A 0,95	–	1	–0,88 (0,03)	–
		3,A* 0,95	–	1	–0,81 (0,01)	–	3,A 0,76	–	1	–0,71 (0,06)	–
		4,A* 0,98	–	1	–0,95 (0,02)	–	4,A* 0,98	–	1	–0,90 (0,04)	–
Slovakia	04.2000	1,A* 0,92	–	1	–1,25 (0,04)	–	1,A* 0,92	–	1	–1,25 (0,04)	–
		2,A* 0,81	–	1	–1,33 (0,07)	–	2,A* 0,81	–	1	–1,32 (0,06)	–
		3,A 0,87	–	1	–1,15 (0,06)	–	3,A 0,83	–	1	–1,09 (0,04)	–
		4,A* 0,97	0,16 (0,03)	0,84 (0,03)	–1,28 (0,04)	–	4,A* 0,95	0,09 (0,04)	0,91 (0,04)	–1,20 (0,04)	–

	Start of the individual sample	Common sample (Nov 2002–May 2007)					Individual sample				
		Expectations' measure, equation version[2], R^2_{adj}	Weight of forward-lookingness, α_2	Weight of backward-lookingness ($1-\alpha_2$)	α_3	α_4	Expectations' measure, equation version[2], R^2_{adj}	Weight of forward-lookingness, α_2	Weight of backward-lookingness ($1-\alpha_2$)	α_3	α_4
Slovenia	03.1996	1,A 0,95	–	1	–1,00 (0,09)	0,30 (0,12)	1,S* 0,88	–	1		
		2,A 0,95	–	1	–1,01 (0,08)	0,32 (0,12)	2,S* 0,86	–	1		
		3,A* 0,92	–	1	–0,69 (0,07)	0,38 (0,17)	3,S* 0,75	–	1		
		4,A* 0,97	–	1	–1,10 (0,10)	0,21 (0,12)	4,S* 0,95	–	1		
Spain	06.1986	1,S* 0,84	–	1			1,A* 0,70	0,47 (0,24)	0,53 (0,24)	–	0,90 (0,18)
		2,S* 0,84	–	1			2,A* 0,71	0,45 (0,23)	0,55 (0,23)	–	0,87 (0,16)
		3,A* 0,44	–	1	–0,78 (0,07)	–	3,A 0,58	–	1	–	0,75 (0,08)
		4,S* 0,85	–	1			4,A* 0,71	0,46 (0,24)	0,54 (0,24)	–	0,89 (0,17)
Sweden	10.1995	1,A* 0,99	–	1	–0,96 (0,01)	–	1,A* 0,96	–	1	–0,92 (0,04)	–
		2,A* 0,99	–	1	–0,95 (0,02)	–	2,A* 0,95	–	1	–0,81 (0,04)	–
		3,– –	–	–	–	–	3,– –	–	–	–	–
		4,A* 0,99	0,09 (0,02)	0,91 (0,02)	–0,85 (0,02)	–	4,A* 0,92	0,18 (0,06)	0,82 (0,06)	–0,76 (0,04)	–
United Kingdom	01.1985	1,S* 0,71	0,27 (0,07)	0,73 (0,07)			1,A* 0,95	–	1	–1,06 (0,03)	–
		2,S* 0,68	0,27 (0,07)	0,73 (0,07)			2,A 0,89	–	1	–	1,11 (0,07)
		3,A* 0,50	0,23 (0,12)	0,77 (0,12)	–0,54 (0,09)	–	3,S* 0,91	–	1		
		4,S* 0,68	0,31 (0,06)	0,69 (0,06)			4,A* 0,96	–	1	–1,03 (0,03)	–

Notes: [1] Estimation technique: following the usual method, actual future inflation is used as a measure of rational expectations. As a consequence, the error term of the estimated equation includes the expectations error of rational expectations (see Fair (1993)). Therefore, the two-stage least squares method (2SLS) is used to estimate both versions of the test equation with constant and 12 lags of current inflation being the instruments (in line with Gerberding (2001)). [2] "A" denotes that the estimated equation is consistent with the specification in equation (21), while "S" denotes the alternative version of the test equation (22). Symbol "*" denotes the use of a constant in the estimated equation.

Source: Author's calculations.

The estimation results show the small importance of the forward-looking mechanism in the formation of consumer inflation expectations in Europe, which seems consistent with the results of other studies (eg Gerberding (2001)). The average weight of forward-looking factors is lower than 10% both in the common sample and individual sample periods. Taking into consideration the years 2002–2007, the highest fraction of consumers forming expectations rationally are in Italy (approximately 40%), the Netherlands (approximately 35%) and the United Kingdom (approximately 27%). The positive weight of forward-looking behaviour is also observed in Ireland and Latvia (approximately 25%), in the Czech Republic, the euro area, Finland and Poland (approximately 15%), as well as in Austria, Belgium,

Bulgaria, Cyprus, Denmark, Lithuania, Slovakia and Sweden. In the remaining countries, consumer inflation expectations are fully backward-looking (either adaptive or static[5]).

In the case of some economies with relatively longer samples of observations available, the weight of forward- vs backward-looking behaviour can vary with time. For example, Italian consumers, whose expectations are characterised by the highest forward-lookingness in 2002–2007, seem to be fully backward-looking when the full individual sample (1985–2007) is considered. Similar differences may be observed in other economies: Belgium, the euro area and the United Kingdom. It suggests that there was an increase in the forward-lookingness of inflation expectations formed by consumers, which confirms the results of other studies (eg Forsells and Kenny (2004)). However, there was a concurrent increase in the backward-lookingness of consumer expectations in some economies, ie in France, Portugal and Spain.

To compare the results obtained using consumer inflation expectation measures developed in this paper with Gerberding's (2001) assessment of the forward-lookingness of consumer inflation expectations in France and Italy in 1991–1999, based on an analogous methodology, equations (21) and (22) were estimated using the same sample period.[6] A fraction of backward-looking consumers in both tests is similar – according to Gerberding, it amounts to 0.30 and 1.00 respectively, while calculations using the quantified measures presented in this paper lead to estimates of 0.43 and 1.00.

4.2 Impact of subjective opinions about past price changes on predicted price changes

The impact of survey opinions about past price changes on the survey views about future price changes may be treated as another proxy for the degree of backward-lookingness of the inflation expectations. Such an approach avoids the problems caused by quantification methods, which automatically impose a certain degree of backward-lookingness on the resulting series of inflation expectations.

To assess the impact of subjective opinions about past price changes on predicted price changes, correlations of respective balance statistics of perceived and expected inflation (BS_1^p-BS_1^e, BS_2^p-BS_2^e, BS_3^p-BS_3^e and BS_4^p-BS_4^e) were calculated both in full individual samples and in the common sample. Figure 6 presents the correlation coefficients for all the pairs of balance statistics of perceived and expected inflation, while Table 8 provides the detailed results of the calculations.

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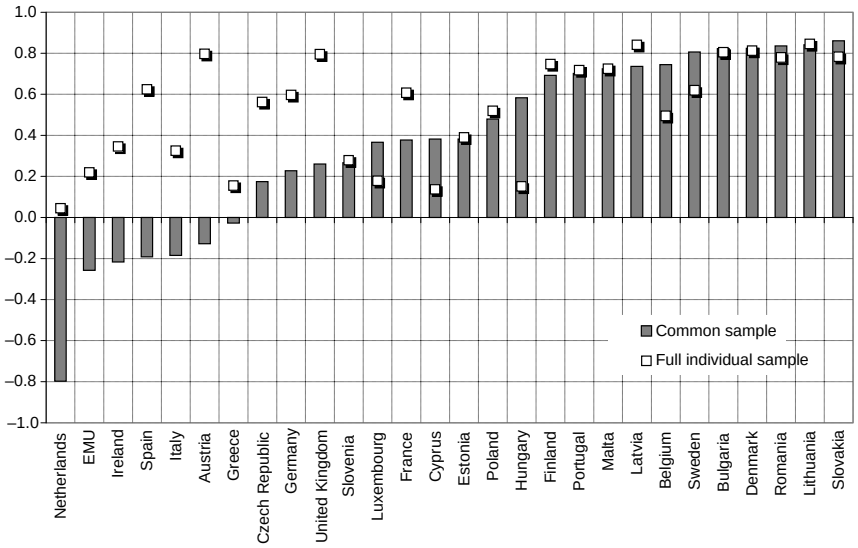
[5] As far as the backward-looking component of inflation expectations is concerned, its adaptive form is more frequent than its static one. In a number of cases in which the static version of the test equation was finally chosen, its adaptive version's estimation results were also satisfactory, but were characterised by a slightly smaller degree of fit. However, the assessment of the degree of forward- and backward-lookingness in both types of equations was similar.

[6] Germany was not taken into account due to the fact that the quantified measures of inflation expectations used in this study start in 1992.

Figure 6

Correlation of balance statistics of perceived and expected inflation (average for all pairs of balance statistics)



Source: Author's calculations.

Taking into account the average correlations, in a vast majority of countries under consideration the correlation of consumer opinions about past and future inflation is positive. Contrary to the assessment based on quantified measures of inflation expectations, being approximately the same in the common sample period (2002–2007) and in the individual sample period, the average correlation of balance statistics is significantly higher in the former period (0.53) than in the latter (0.37). The difference in correlation coefficients is particularly large (0.86 on average) in Austria, the Netherlands and Spain (individual sample periods: 1985–2007 in the case of Austria and the Netherlands; 1986–2007 in the case of Spain). When comparing the results for the common and individual samples there is another interesting observation concerning the signs of the correlation coefficient. Individual sample period correlation coefficients in all the economies are positive, while in the years 2002–2007 consumer opinions concerning past and future price movements are correlated negatively in the Netherlands, the euro area as a whole, Austria, Greece, Italy, Ireland and Spain (although only in the case of the Netherlands and the euro area are they statistically lower than zero, with a 10% significance level).

Individual pairs of balance statistics display different degrees of correlation: it is relatively lower in the case of disaggregated balance statistics BS_3 and BS_4, while relatively larger in the case of balance statistics BS_1 and BS_2, treating respondents declaring a price increase as a homogenous group independently of the fact that the size of the increase in prices they declare differs. With regard to the balance statistics BS_3 and BS_4, it may be observed that in both the common and individual sample periods the correlation of consumer subjective opinions on price changes perceived and expected reaches its lowest (negative) levels in the Netherlands, while the highest are in Bulgaria. Moreover, in many of the old EU member states and the euro area as a whole, the impact of changes in the perception of past price movements on consumer foresights is significantly weaker in 2002–2007 than in individual sample periods.

Table 8

Correlation of balance statistics of perceived and expected inflation

	Start of the individual sample	Common sample (Nov 2002–May 2007)				Full individual sample			
		BS1	*BS2*	*BS3*	*BS4*	*BS1*	*BS2*	*BS3*	*BS4*
Austria	01.1985	-0.04(n)	–0.09(n)	–0.19(n)	–0.19(n)	0.90	0.85	0.71	0.73
Belgium	01.1985	0.65	0.71	0.81	0.81	0.53	0.54	0.46	0.45
Bulgaria	05.2001	0.79	0.84	0.84	0.82	0.73	0.78	0.86	0.85
Cyprus	05.2001	0.43	0.35	0.28	0.47	0.31	0.12(n)	–0.06(n)	0.18(n)
Czech Republic	01.2001	0.26	0.23	0.09(n)	0.12(n)	0.68	0.66	0.44	0.47
Denmark	01.1985	0.89	0.84	0.78	0.79	0.90	0.92	0.73	0.70
EMU	01.1985	–0.10(n)	–0.14(n)	–0.40	–0.39	0.38	0.36	0.07(n)	0.07(n)
Estonia	04.2001	0.53	0.52	0.23	0.25	0.55	0.54	0.24	0.23
Finland	11.1995	0.70	0.70	0.68	0.69	0.83	0.80	0.67	0.69
France	01.1985	0.59	0.59	0.15(n)	0.18(n)	0.78	0.76	0.44	0.45
Germany	01.1985	0.49	0.53	–0.07(n)	–0.04(n)	0.77	0.82	0.40	0.40
Greece	01.1985	0.05(n)	0.05(n)	–0.08(n)	–0.13(n)	0.40	0.38	–0.06(n)	–0.09(n)
Hungary	02.1993	0.53	0.58	0.61	0.61	0.17	0.19	0.12(n)	0.12(n)
Ireland	01.1985	0.09(n)	0.00(n)	–0.49	–0.46	0.34	0.48	0.32	0.25
Italy	01.1985	–0.11(n)	–0.21(n)	–0.24	–0.17(n)	0.53	0.51	0.13	0.13
Latvia	05.2001	0.89	0.91	0.55	0.60	0.92	0.93	0.75	0.77
Lithuania	05.2001	0.93	0.92	0.75	0.77	0.93	0.91	0.76	0.78
Luxembourg	01.2002	0.40	0.42	0.32	0.33	0.14(n)	0.18(n)	0.19(n)	0.20(n)
Malta	11.2002	0.67	0.73	0.76	0.74	0.67	0.73	0.76	0.74
Netherlands	01.1985	–0.71	–0.78	–0.85	–0.85	0.30	0.19	–0.19	–0.12
Poland	05.2001	0.76	0.74	0.19(n)	0.23	0.74	0.71	0.29	0.33
Portugal	06.1986	0.78	0.81	0.63	0.59	0.80	0.87	0.63	0.57
Romania	05.2001	0.88	0.90	0.78	0.78	0.70	0.79	0.81	0.81
Slovakia	04.2000	0.91	0.91	0.81	0.81	0.89	0.89	0.67	0.68
Slovenia	03.1996	0.41	0.47	0.09(n)	0.10(n)	0.07(n)	0.41	0.44	0.19
Spain	06.1986	–0.16(n)	–0.11(n)	–0.24	–0.26	0.55	0.57	0.71	0.67
Sweden	10.1995	0.88	0.81	0.77	0.77	0.69	0.70	0.52	0.56
United Kingdom	01.1985	0.61	0.16(n)	0.15(n)	0.12(n)	0.87	0.82	0.74	0.75
Average		***0.46***	***0.44***	***0.28***	***0.29***	***0.61***	***0.62***	***0.45***	***0.45***
Minimum		*–0.71*	*–0.78*	*–0.85*	*–0.85*	*0.07*	*0.12*	*–0.19*	*–0.12*
Maximum		*0.93*	*0.92*	*0.84*	*0.82*	*0.93*	*0.93*	*0.86*	*0.85*

Notes: Symbol (n) denotes correlation coefficients not significant with a 10% significance level.

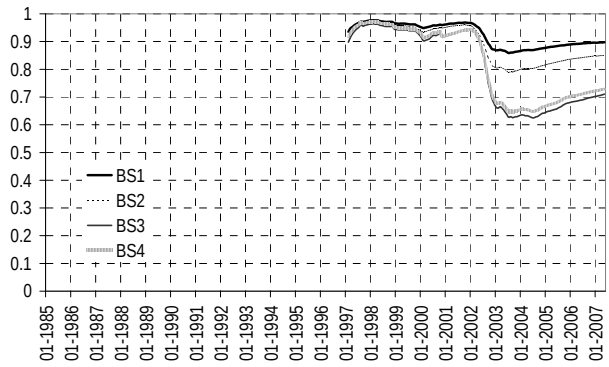
Source: Author's calculations based on EC survey data.

An analysis of dynamic correlation indices calculated with a gradually widened sample (Figure 7) indicates a significant change in the relationship between the opinions about past and future price changes after the launch of the euro in January 2002. In the economies forming the EMU, there was a fall in the correlation coefficients between survey responses to the question on inflation perception and expectations. In the remaining economies of the European Union, such an effect did not appear.

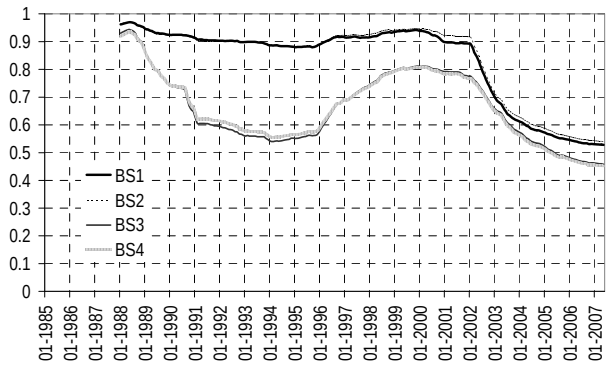
Figure 7

Dynamic correlations of balance statistics of perceived and expected inflation

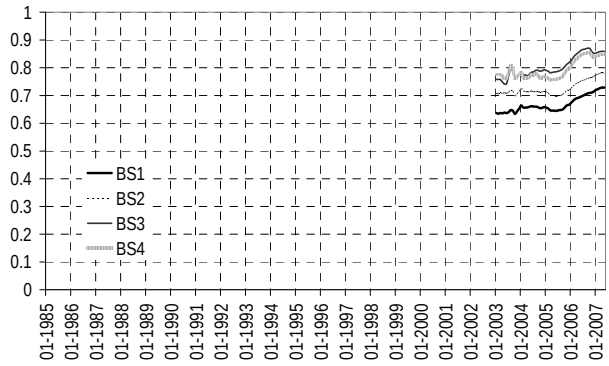
Austria



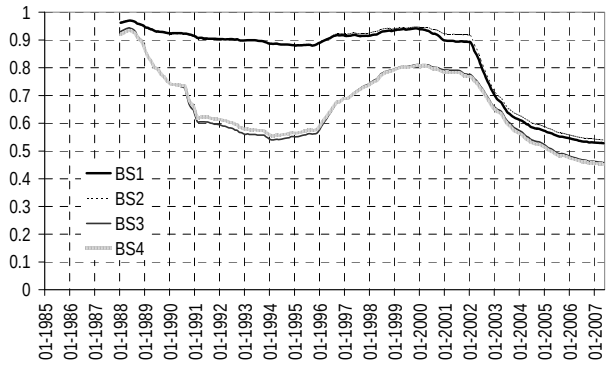
Belgium



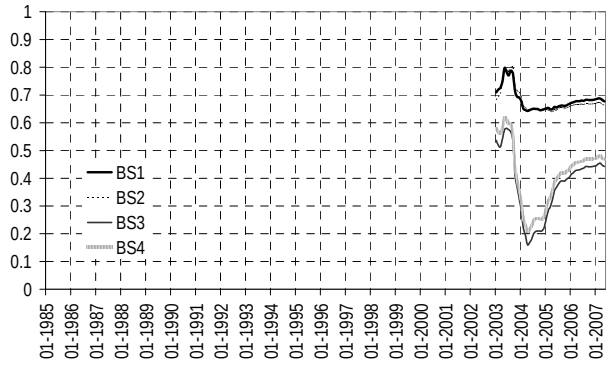
Bulgaria



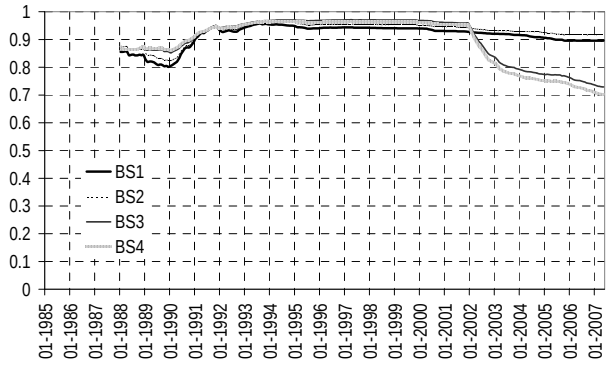
Cyprus



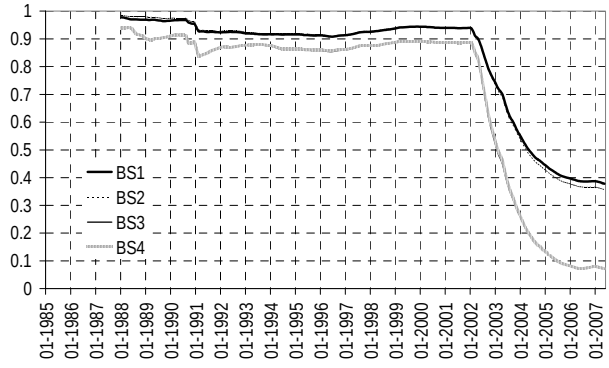
Czech Republic



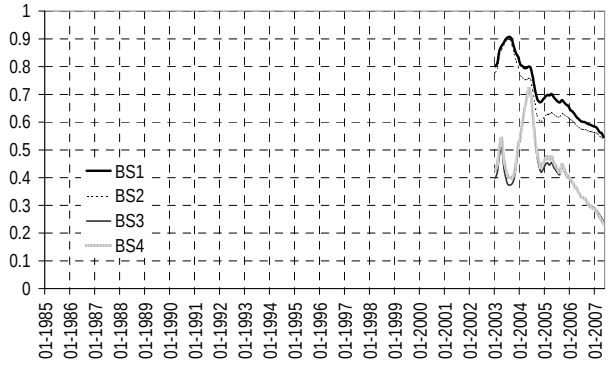
Denmark



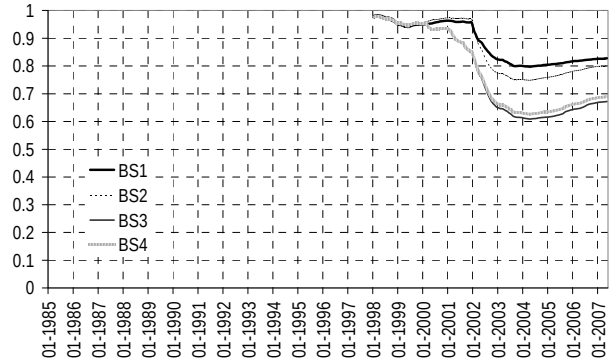
EMU



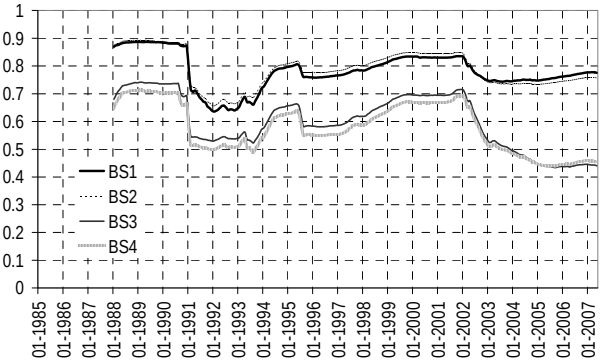
Estonia



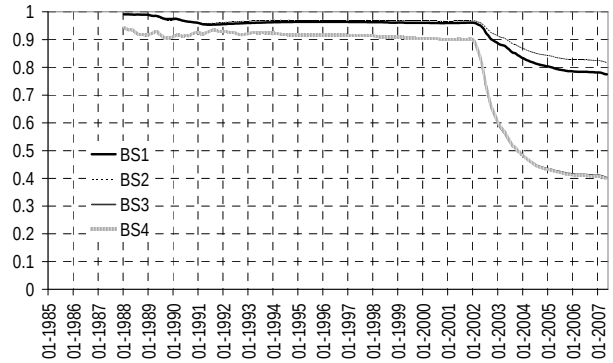
Finland



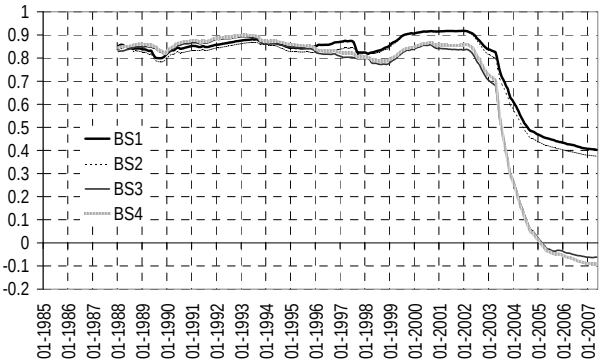
France



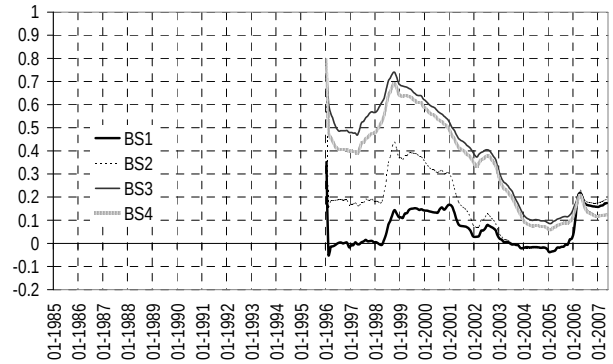
Germany



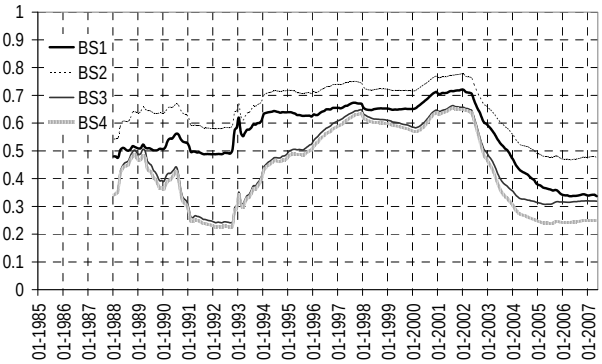
Greece



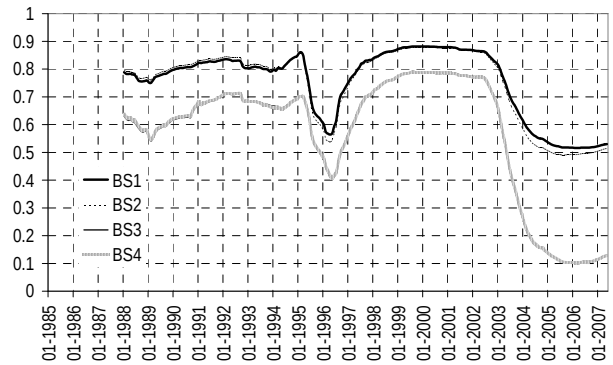
Hungary



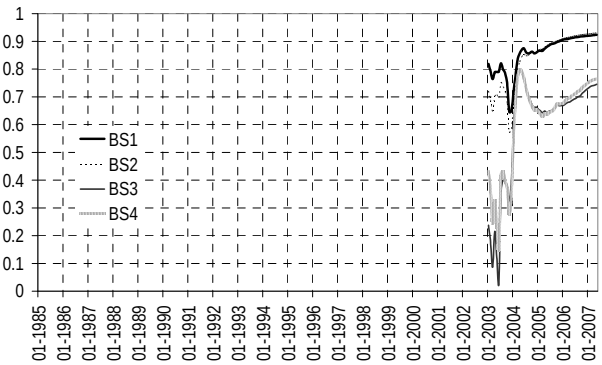
Ireland



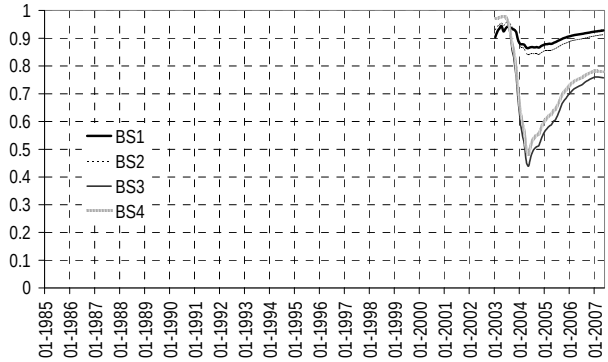
Italy



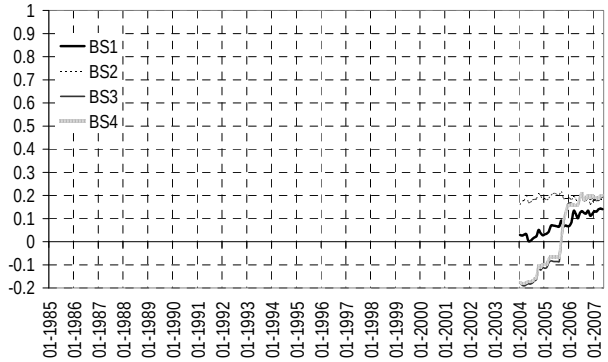
Latvia



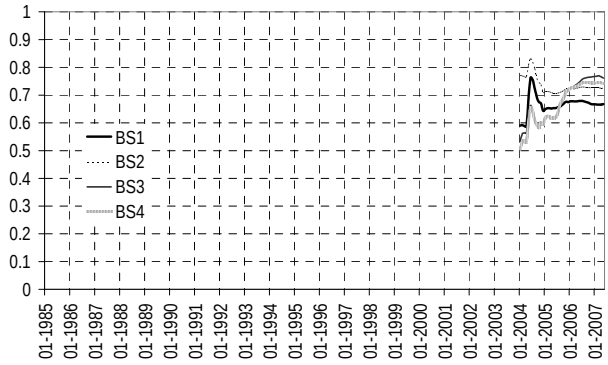
Lithuania



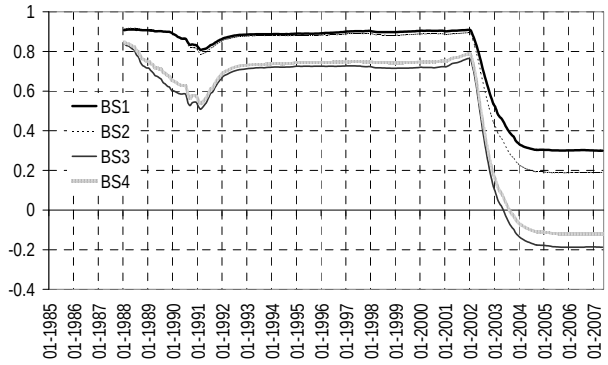
Luxembourg



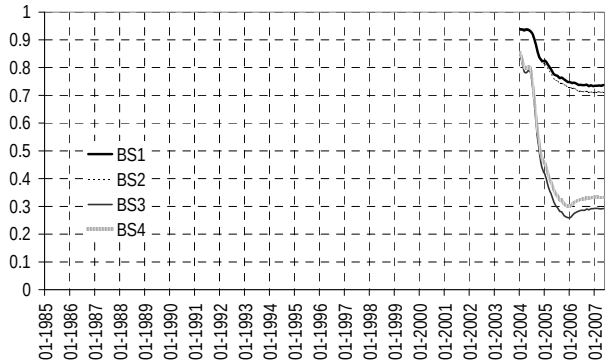
Malta



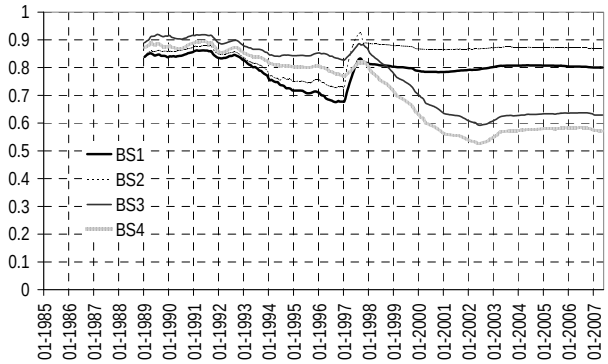
Netherlands



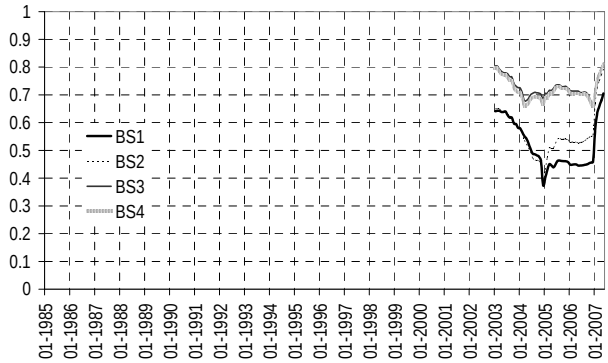
Poland



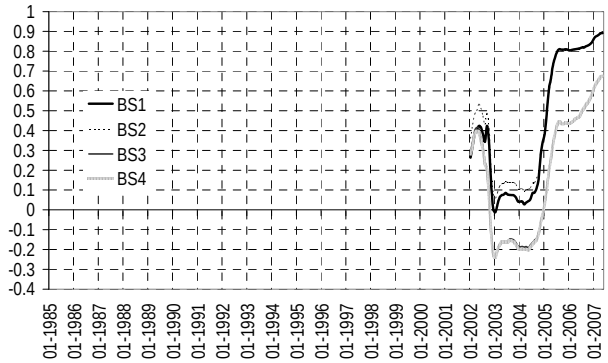
Portugal



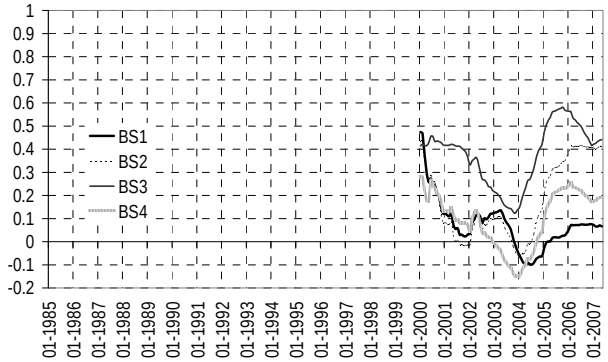
Romania



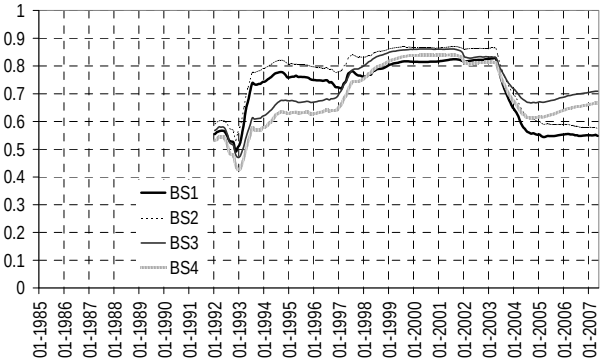
Slovakia



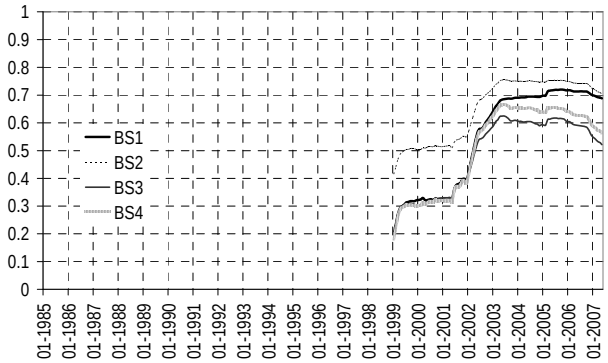
Slovenia



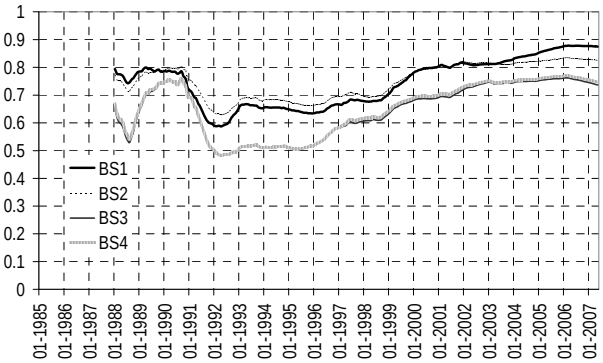
Spain



Sweden



United Kingdom



Source: Author's calculations on the basis of EC survey data.

The introduction of euro banknotes and coins was an important factor affecting consumer views on both past and future price changes. On the one hand, there was an increase of subjectively perceived price dynamics, with statistical inflation measures relatively stable;[7] on the other hand, there was an improvement in consumer expectations of future price movements (Figure 8).

The highest impact of the euro's introduction on consumer inflation perception was noted in Germany and the Netherlands, whereas the lowest was seen in Belgium. The persistence of the euro effect on perceived price changes, measured with changes in balance statistics in 2002–2006,[8] seems to be highest in Austria, France and Greece and lowest in the Netherlands, Germany and Ireland, where the distribution of responses to the survey question on inflation perception in 2006 was even better than in 2001, ie prior to the launch of the euro. It should be noted, however, that the persistence of the inflation perception gap seems sizeably smaller while using quantified measures of inflation perception instead of balance statistics (Figure 9).[9]

[7] See: Łyziak (2009), pp 101–2.

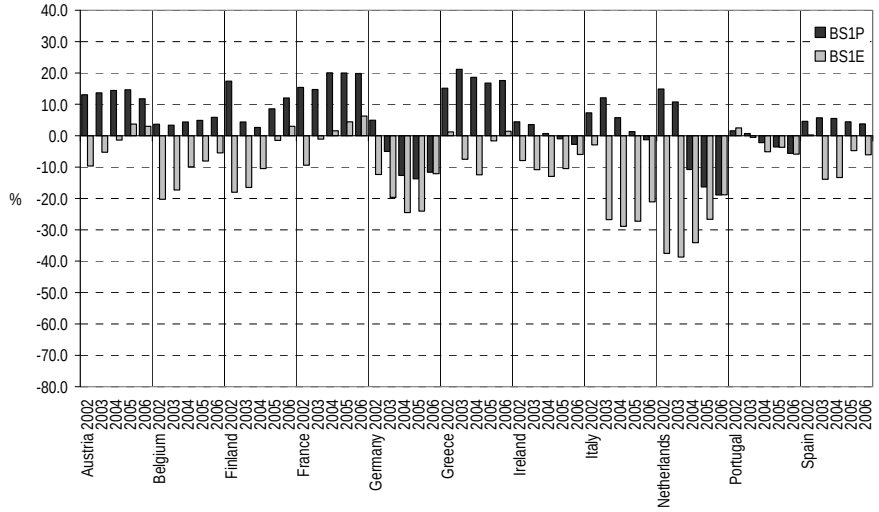
[8] Balance statistics BS_3 and BS_4 have a relatively higher weight due to their richer information content. An assessment of the persistence of the euro effect on consumer perception of price changes relies on two indicators, ie a difference between the average level of a given balance statistic in the years 2002–2006 and 2001, and a difference between the average level of a given balance statistic in 2006 and 2001.

[9] For example, Dias et al (2007).

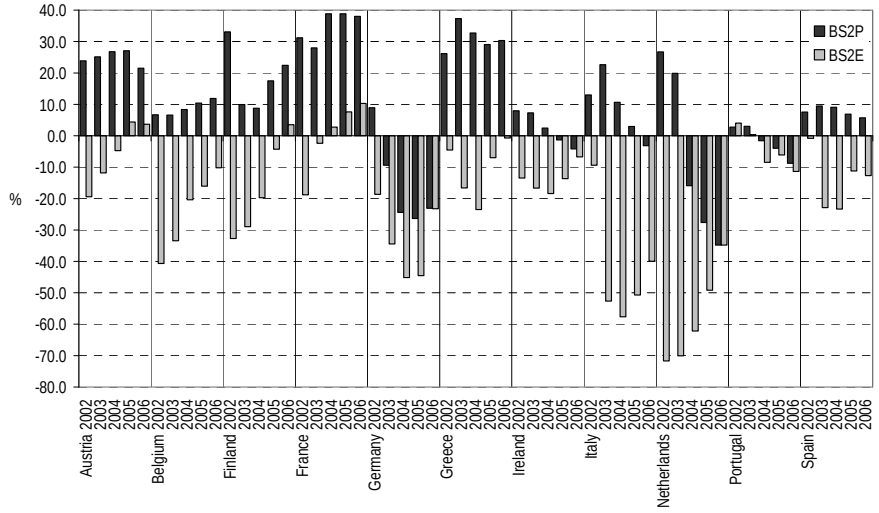
Figure 8

Changes in balance statistics of perceived and expected inflation relative to 2001 average in countries launching the euro in 2002†

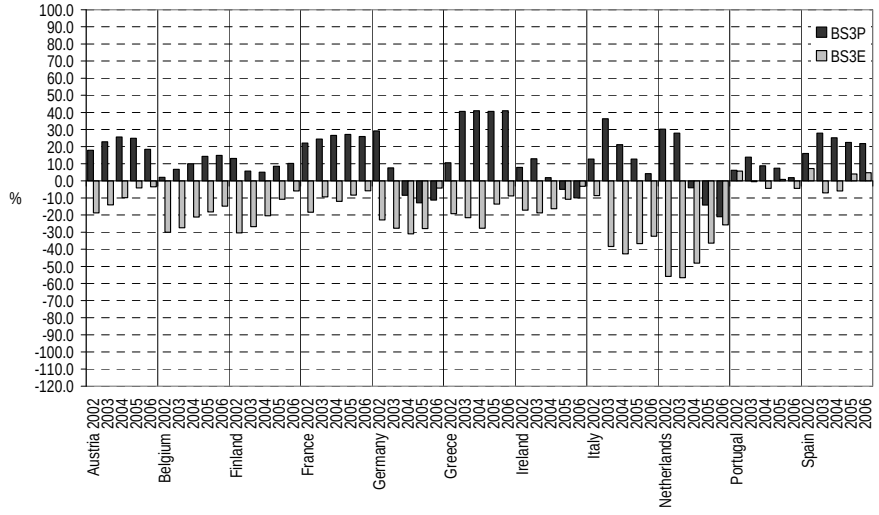
Balance statistics BS_1^p and BS_1^e



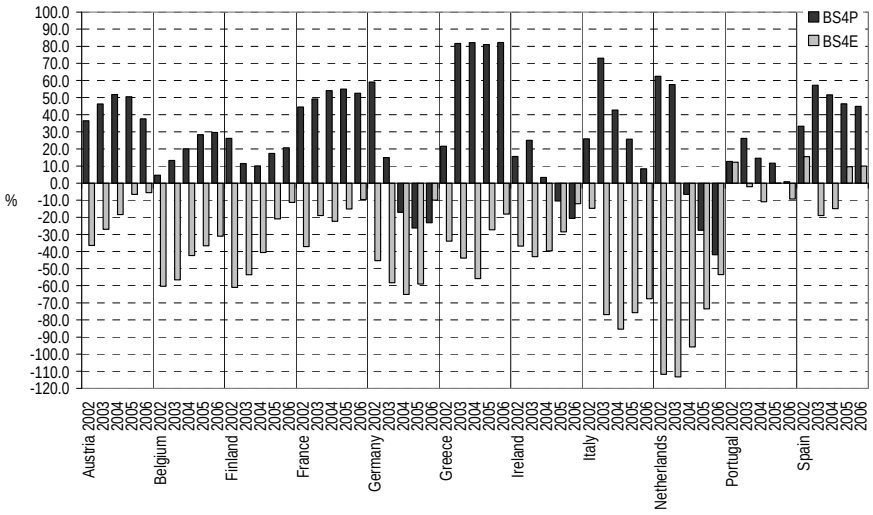
Balance statistics BS_2^p and BS_2^e



Balance statistics BS_3^p and BS_3^e



Balance statistics BS_4^p and BS_4^e

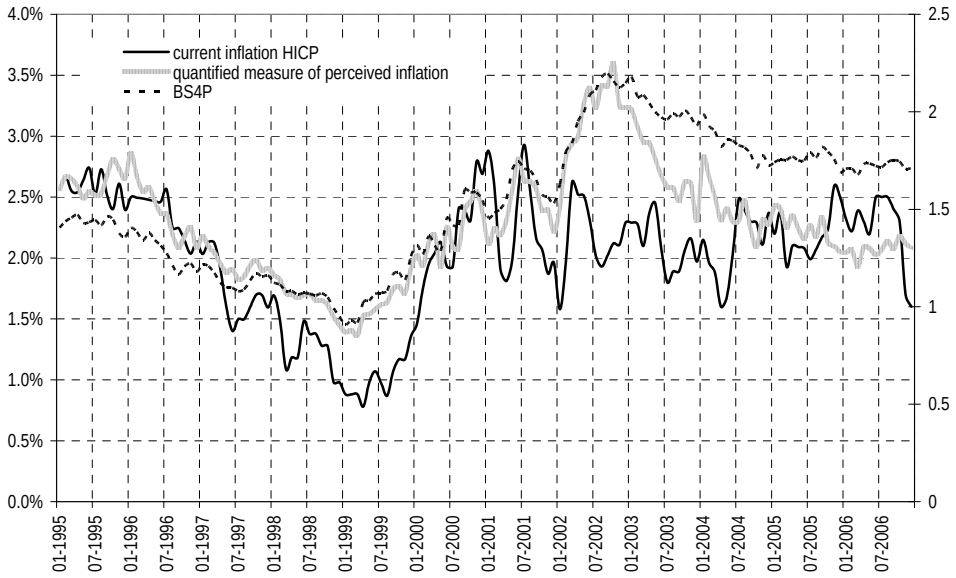


† Luxembourg not considered due to a lack of survey data for 2001.

Source: Author's calculations on the basis of EC survey data.

Figure 9

Inflation perception gap – two survey measures of perceived inflation vs HICP inflation



Source: Author's calculations on the basis of EC survey data and IFS data.

The impact of the euro's introduction on consumer inflation perception is widely discussed in the literature,[10] while there is almost no discussion of its impact on inflation expectations.

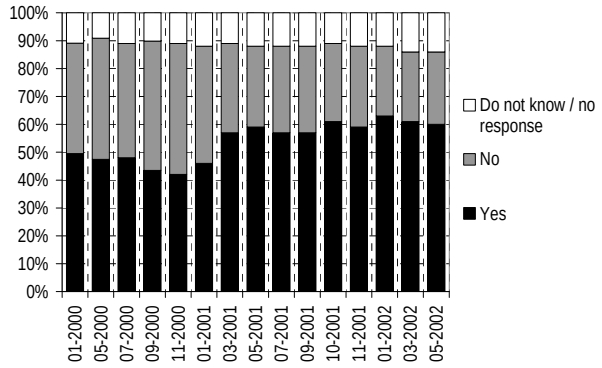
[10] There are different explanations for the inflation perception gap after the euro's introduction. Many studies point out the sizeable increase in prices of frequently bought products and services (eg Dziuda and Mastrobuoni (2006), Álvarez González et al (2004), Fluch and Stix (2006), ECB (2003)) and the discussion on that effect in the mass media (Del Giovane and Sabbatini (2004, 2005)). There are also some psychological factors to be considered, such as: recalculating the prices to former domestic currencies and rounding effects;

Despite increased inflation perception, expectations that the euro would contribute to price stability were very strong even before the euro's introduction. The EOS Gallup Europe survey data (Eurobarometer) show that in 2000–2002 the percentage of individuals in the euro area sharing that opinion was high and rising – from approximately 46% in 2000 to more than 60% in 2002 (Figure 10). In November 2001, ie two months before the introduction of the euro banknotes and coins, consumers in Belgium and Ireland were the most convinced that the euro would contribute to price stability, while relatively low percentages of individuals shared this view in Finland, Germany and the Netherlands. After the launch of the euro, consumers in many of the EMU economies became more optimistic about future price changes. For example, the balance statistics of price expectations by Dutch consumers – whose perception of price changes was most affected by the launch of the common currency – decreased in 2002 to the highest extent among euro area economies. An improvement in price change predictions in 2002 was similarly strong in Belgium and Finland. On the other hand, there was a worsening of survey responses to the question on inflation expectations in Portugal and Spain. As far as long-term effects are concerned, a decrease in the balance statistics of inflation expectations in the years 2002–2006 was greatest in Italy and the Netherlands.

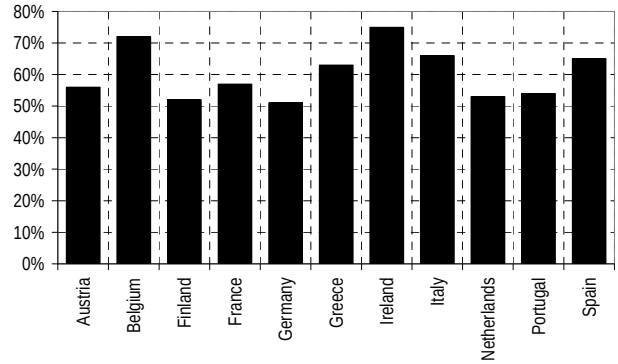
Figure 10

Opinions of the public on the impact of the euro's introduction on price stability

Survey responses in the euro area, 2000–2002



Fraction of respondents declaring that the euro will contribute to price stability, November 2001



Notes: Survey question: "Do you think that the euro will contribute to price stability in the euro zone countries?"

Sources: EOS Gallup Europe (2001), Table 15; EOS Gallup Europe (2002), Table 18, see: http://ec.europa.eu/public_opinion/flash

5. Conclusions

This paper develops the different measures of European consumer inflation expectations quantified on the basis of qualitative survey data with different quantification schemes, ie with the probability method, the regression method and the logistic (and linear) function method. It then assesses the differences between those measures and tests the formation process of consumer expectations.

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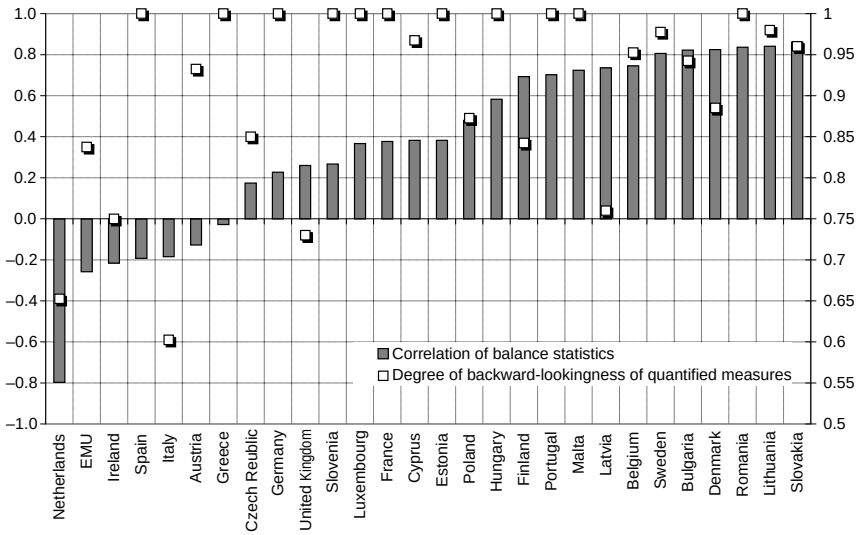
price increases being perceived by consumers more strongly than price reductions (Fluch and Stix (2005), Kurri (2006)); or the effect of expectancy confirmation in spite of the disconfirming evidence (Stix (2006)).

All the quantified measures of consumer inflation expectations seem highly correlated with each other; therefore, even in economies where uncertainty concerning the exact level of inflation expected by consumers is elevated, all the proxies follow similar trends.

As far as the formation of consumer inflation expectations is concerned, the results of empirical tests – conducted both with quantified measures of inflation expectations and balance statistics – show that, in general, the weight of the forward-looking mechanism is rather small, although in some euro area economies and the euro area as a whole an increase in the forward-lookingness of expectations may be observed following the introduction of the common currency. An analysis of the detailed results is, to some extent, dependent on the method chosen. From the perspective of individual countries, the results based on an estimation of the weight of a backward- vs forward-looking mechanism in the formation of expectations does not fully correspond to the assessment based on a correlation of the balance statistics (Figure 11). However, after dividing the economies under consideration into groups, in which the correlation of balance statistics of perceived and expected inflation is negative, statistically insignificant, positive (statistically higher than zero, but lower than 0.75) and strongly positive (higher than 0.75), it occurs that those groups display a simultaneous increase in the weight of the backward-looking mechanism in inflation expectation formation estimated on the basis of the probability measures of expectations (Table 9).

Figure 11

Correlation of balance statistics of perceived and expected inflation vs a degree of backward-lookingness of quantified measures of inflation expectations, common sample



Source: Author's calculations.

Therefore, by combining the results of both empirical approaches, consumers in the Netherlands and the euro area as a whole seem to be the least backward-looking, whereas consumers in Austria, the Czech Republic, Greece, Ireland, Italy and Spain form inflation expectations in a slightly more backward-looking manner. There is a medium level of backward-lookingness of inflation expectations in Belgium, Cyprus, Estonia, Finland, France, Germany, Hungary, Latvia, Luxembourg, Malta, Poland, Portugal, Slovenia and the United Kingdom, and a high level of backward-lookingness in consumer inflation expectations in Bulgaria, Denmark, Lithuania, Romania, Slovakia and Sweden.

Table 9

Correlation of balance statistics of perceived and expected inflation vs a degree of backward-lookingness of quantified measures of inflation expectations in selected groups of EU economies, common sample

Economies in which the correlation of balance statistics of perceived and expected inflation is:	Average correlation of balance statistics	Average weight of backward-looking expectations
▪ Negative (Netherlands, EMU)	–0.53	0.75
▪ Insignificantly different from zero (Austria, Czech Republic, Germany, Greece, Ireland, Italy, Spain)	–0.10	0.86
▪ Positive (Belgium, Bulgaria, Cyprus, Denmark, Estonia, Finland, France, Hungary, Latvia, Lithuania, Luxembourg, Malta, Poland, Portugal, Romania, Slovakia, Slovenia, Sweden, United Kingdom)	0.60	0.94
· *Lower than 0.75 (Belgium, Cyprus, Estonia, Finland, France, Hungary, Latvia, Luxembourg, Malta, Poland, Portugal, Slovenia, United Kingdom)*	*0.49*	*0.94*
· *Higher than 0.75 (Bulgaria, Denmark, Lithuania, Romania, Slovakia, Sweden)*	*0.83*	*0.96*

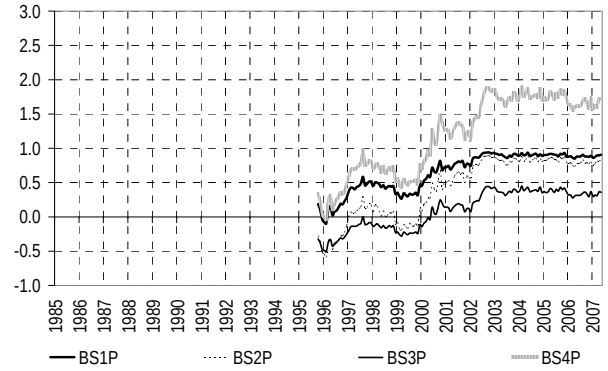
Source: Author's calculations.

Annex A

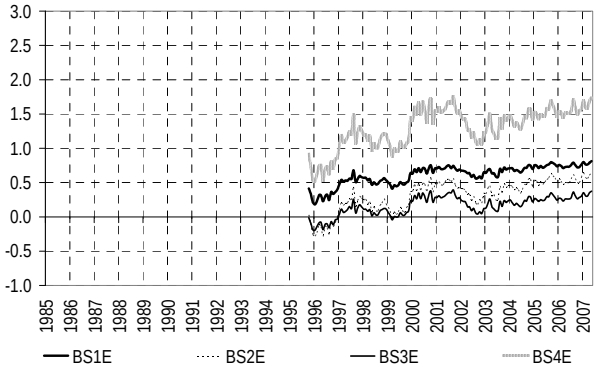
Figure A1

Balance statistics of inflation perception and expectations

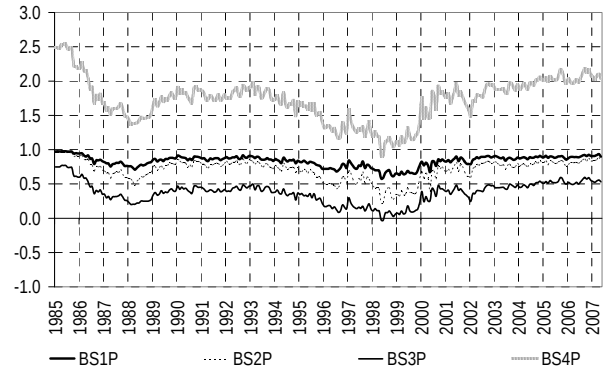
Austria – perception



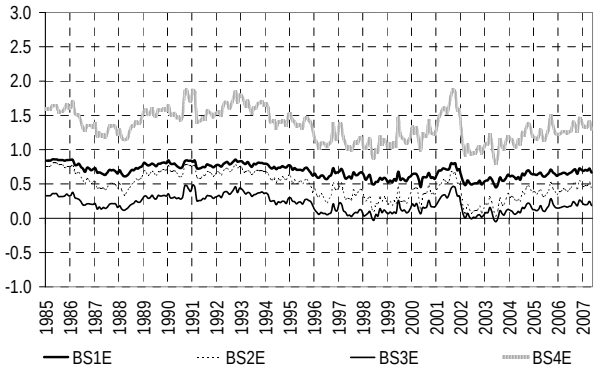
Austria – expectations



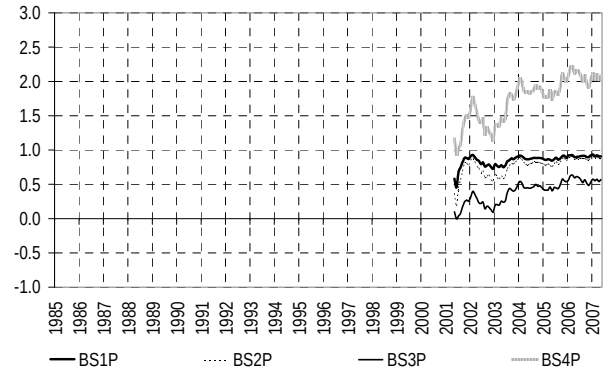
Belgium – perception



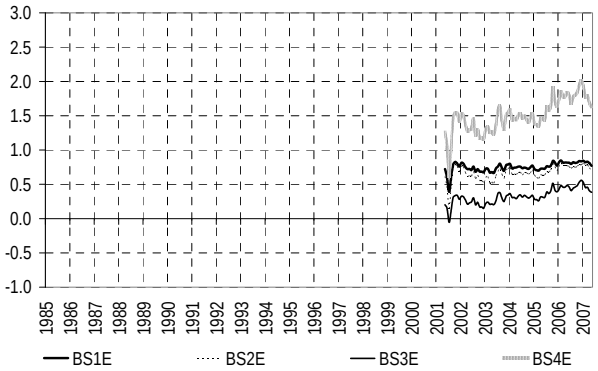
Belgium – expectations



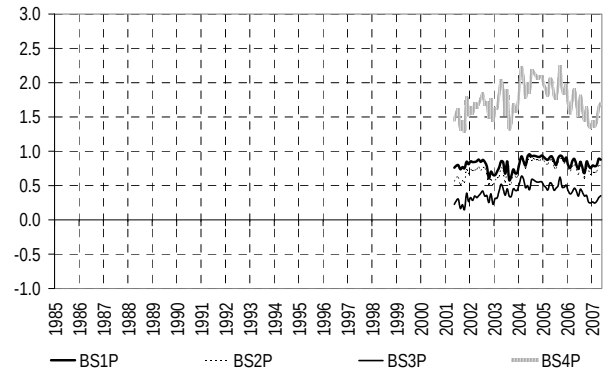
Bulgaria – perception



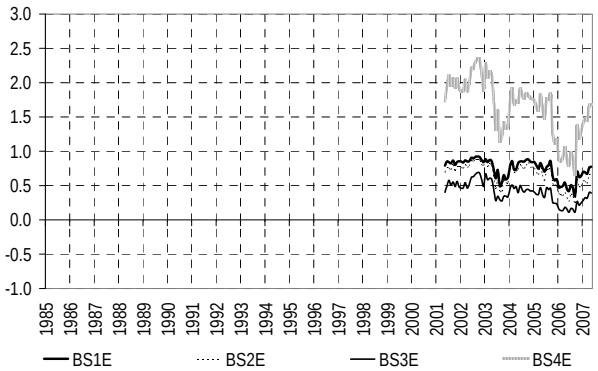
Bulgaria – expectations



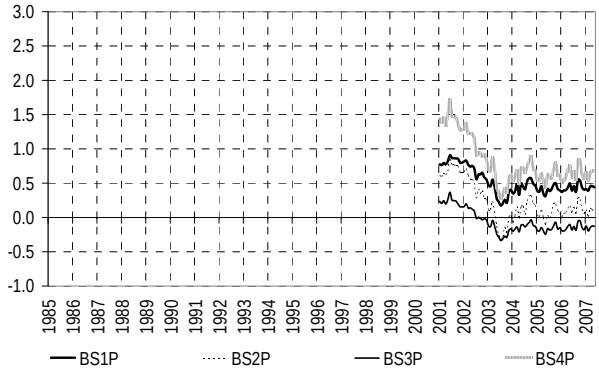
Cyprus – perception



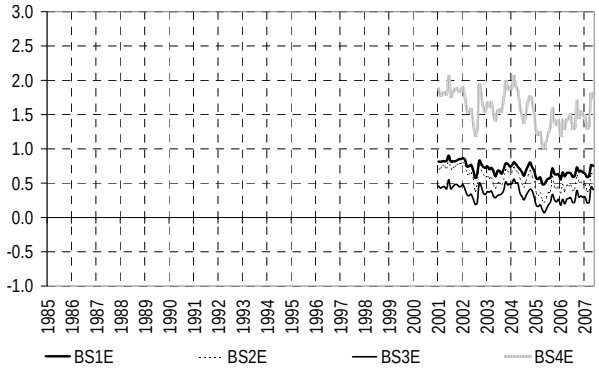
Cyprus – expectations



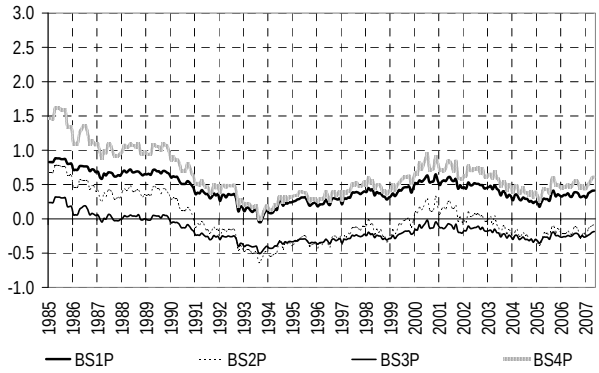
Czech Republic – perception



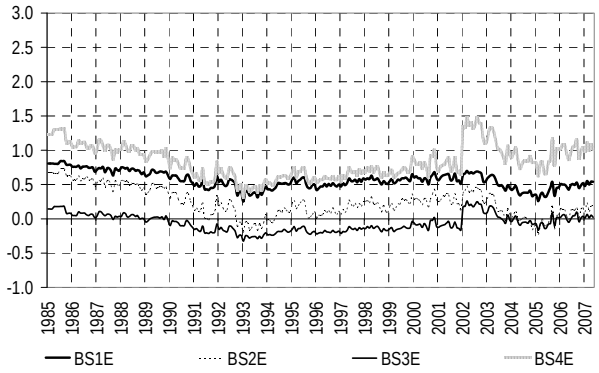
Czech Republic – expectations



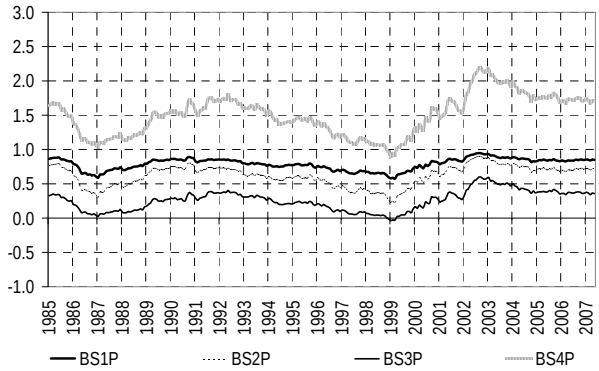
Denmark – perception



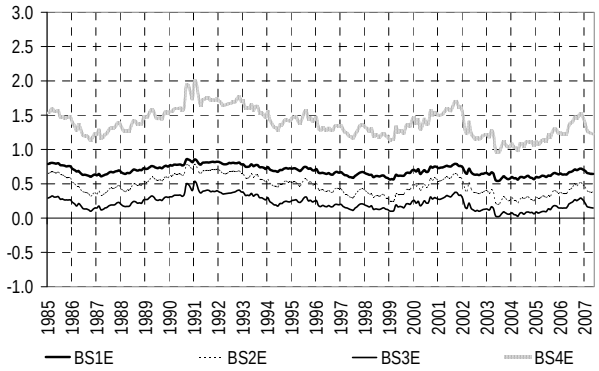
Denmark – expectations



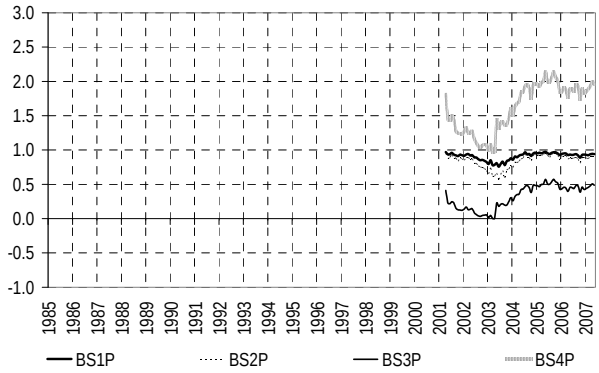
EMU – perception



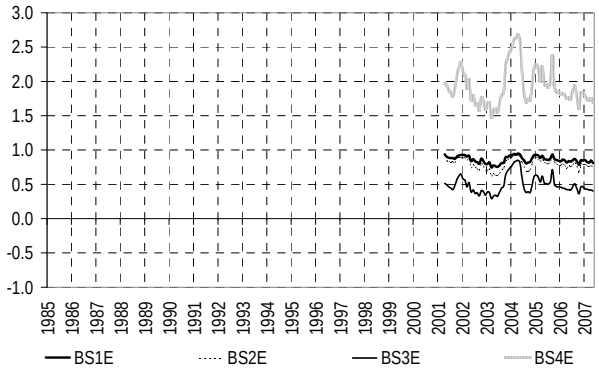
EMU – expectations



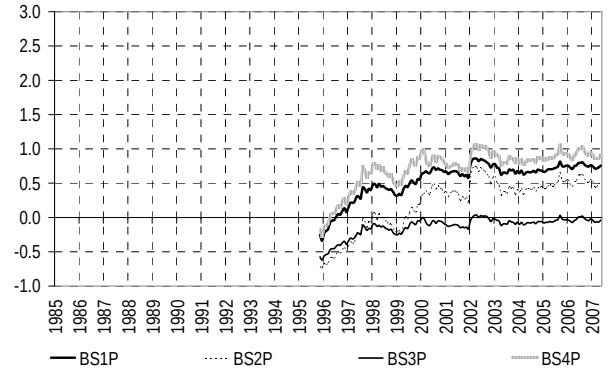
Estonia – perception



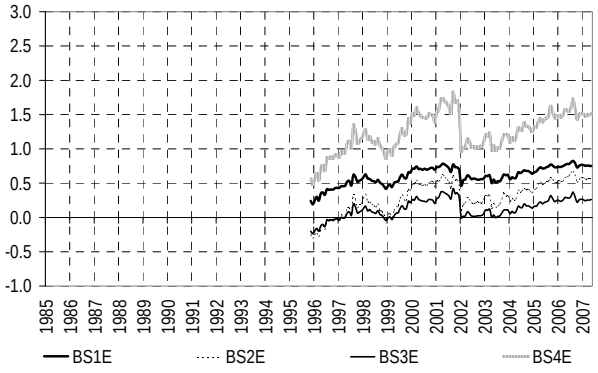
Estonia – expectations



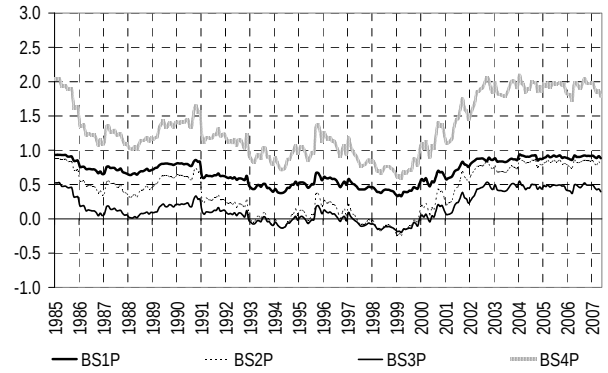
Finland – perception



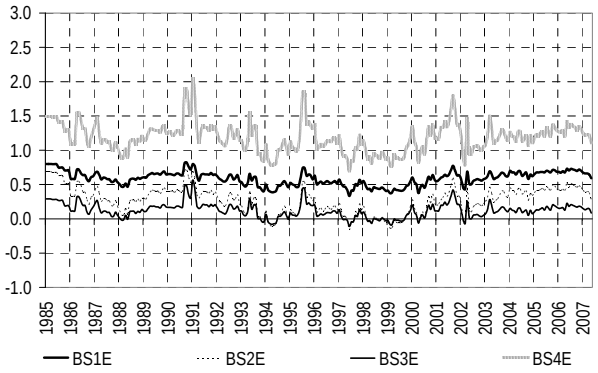
Finland – expectations



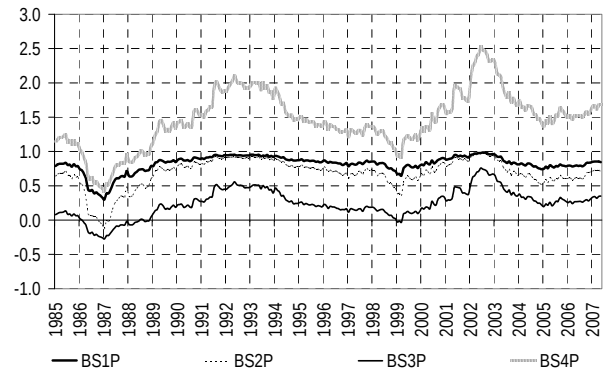
France – perception



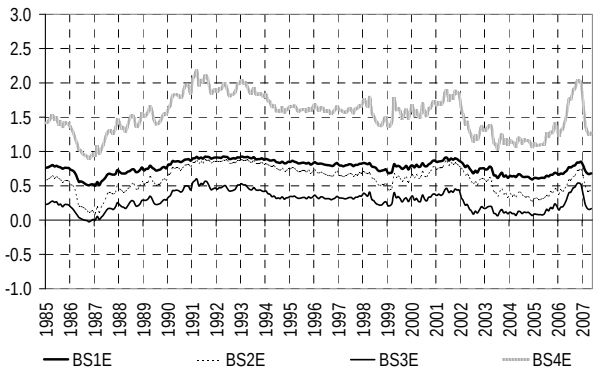
France – expectations



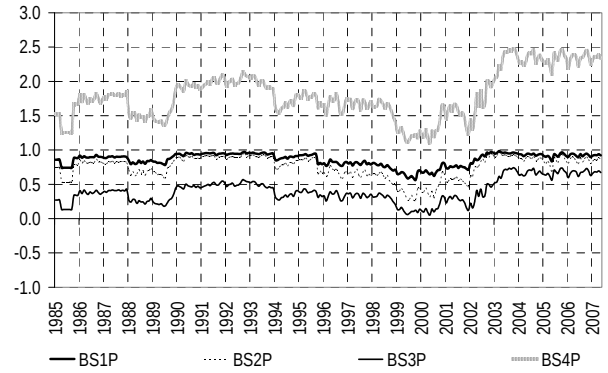
Germany – perception



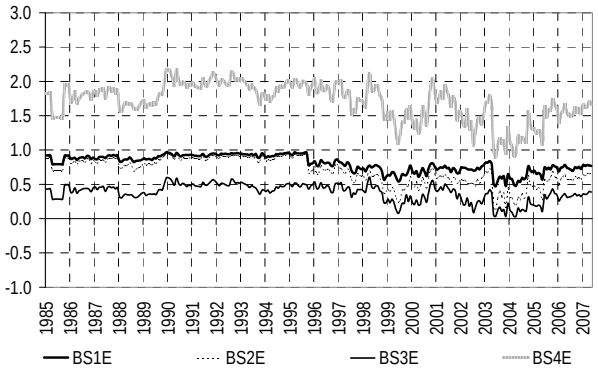
Germany – expectations



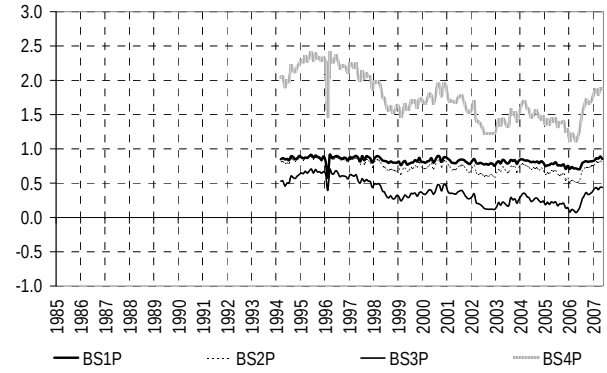
Greece – perception



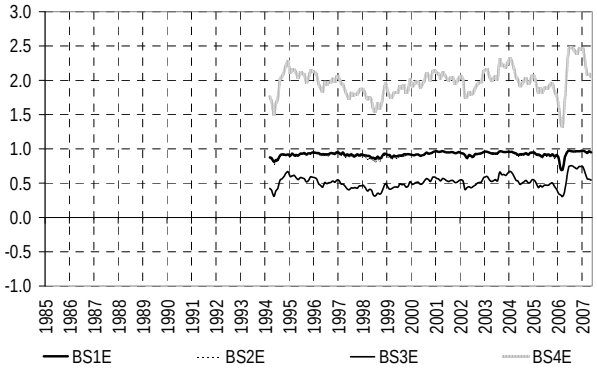
Greece – expectations



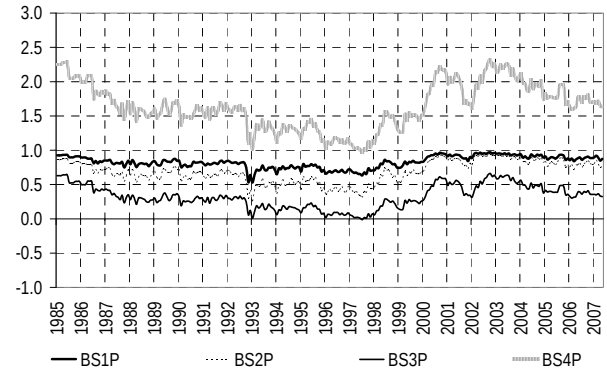
Hungary – perception



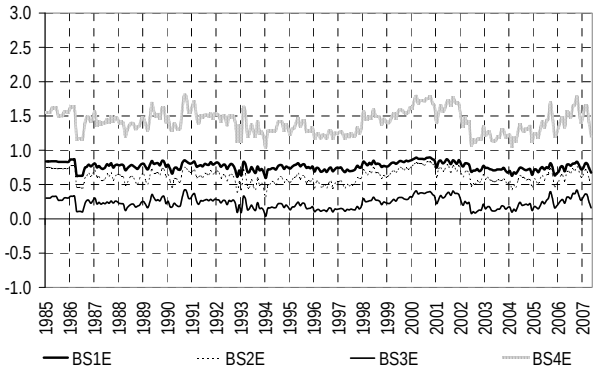
Hungary – expectations



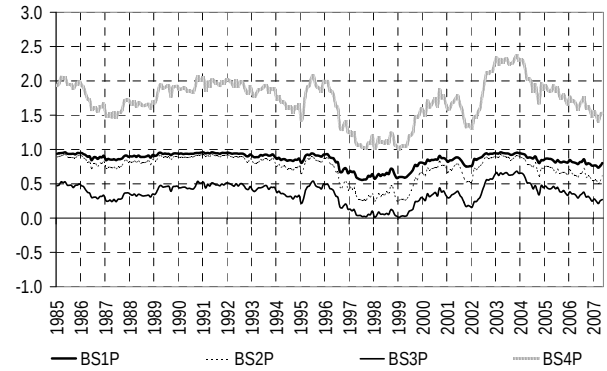
Ireland – perception



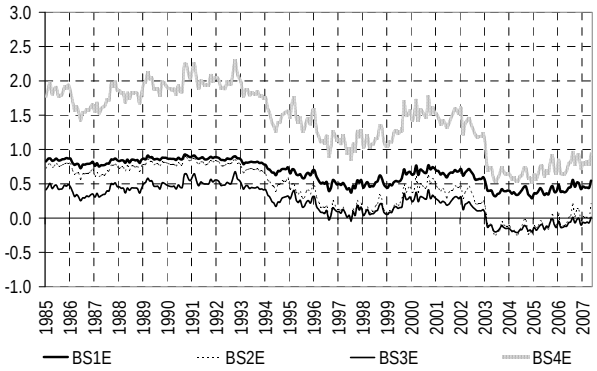
Ireland – expectations



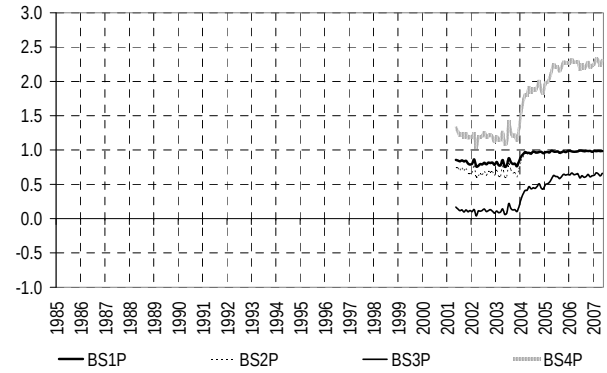
Italy – perception



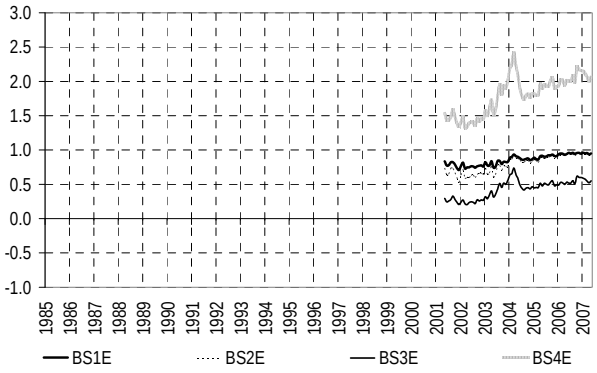
Italy – expectations



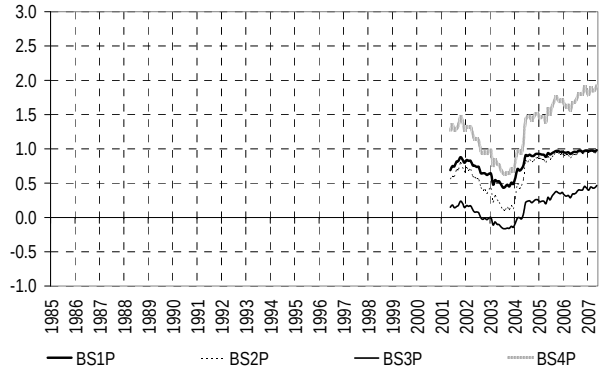
Latvia – perception



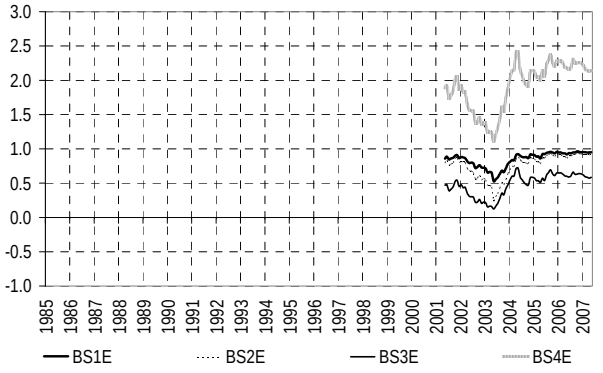
Latvia – expectations



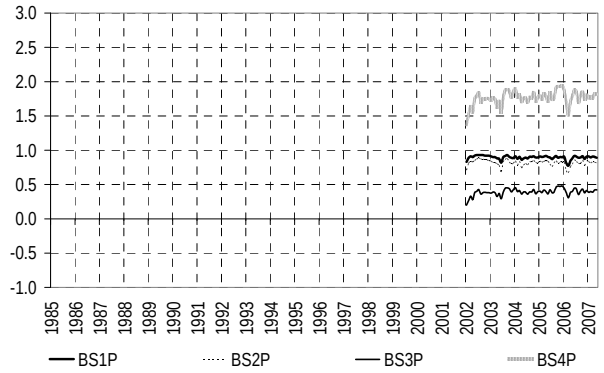
Lithuania – perception



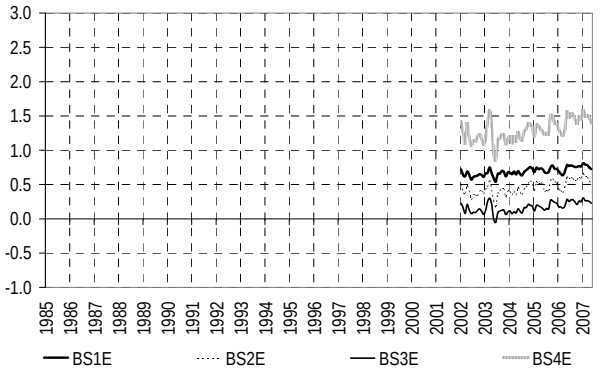
Lithuania – expectations



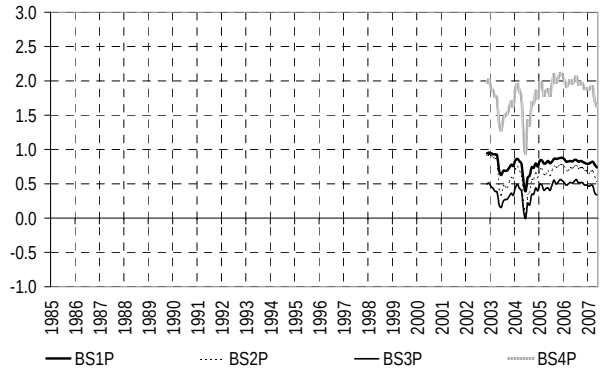
Luxembourg – perception



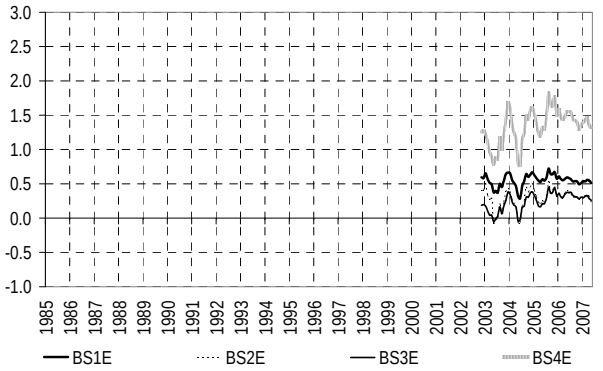
Luxembourg – expectations



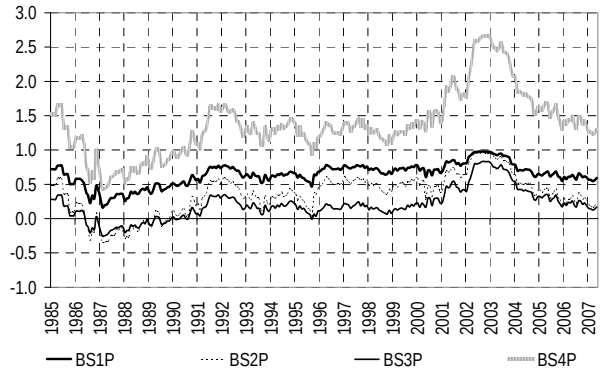
Malta – perception



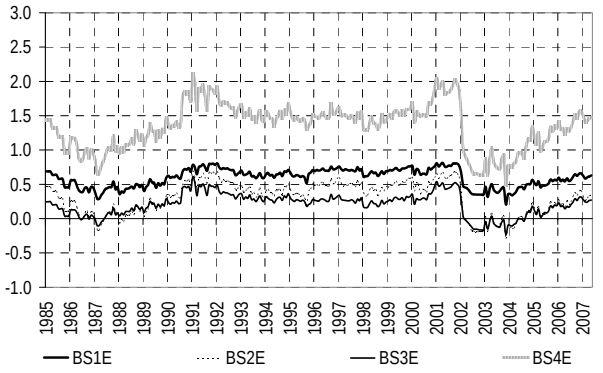
Malta – expectations



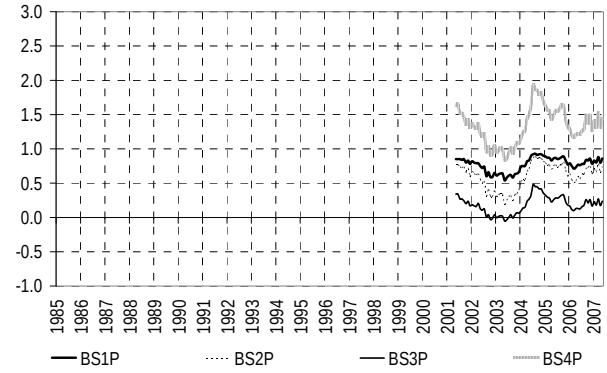
Netherlands – perception



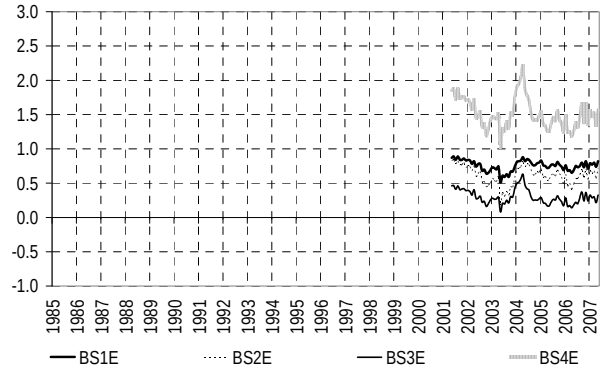
Netherlands – expectations



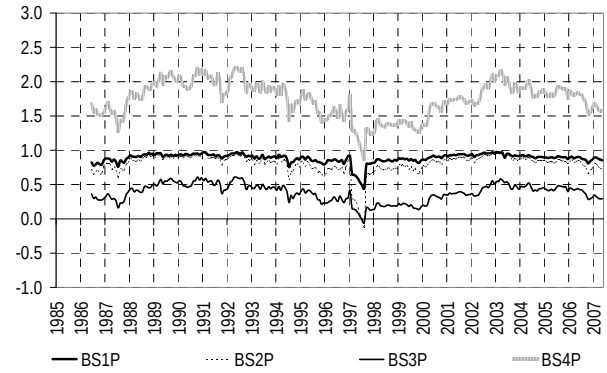
Poland – perception (GfK Polonia)



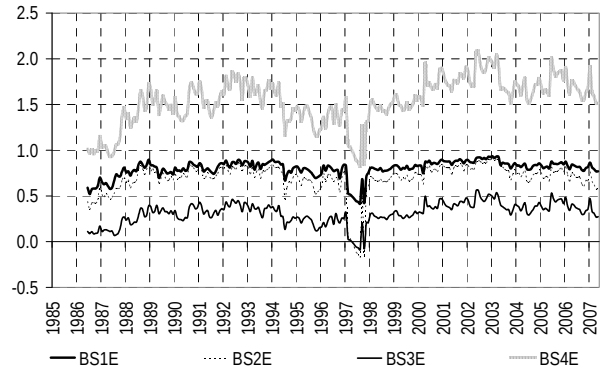
Poland – expectations (GfK Polonia)



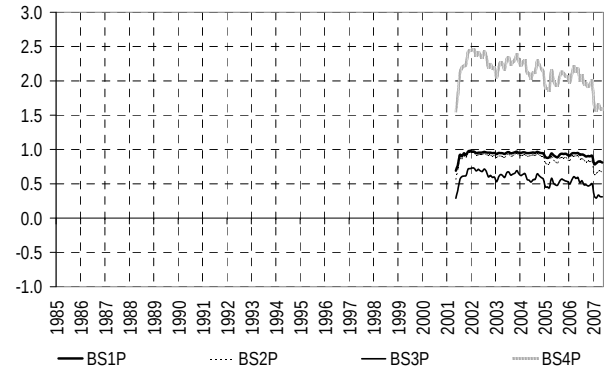
Portugal – perception



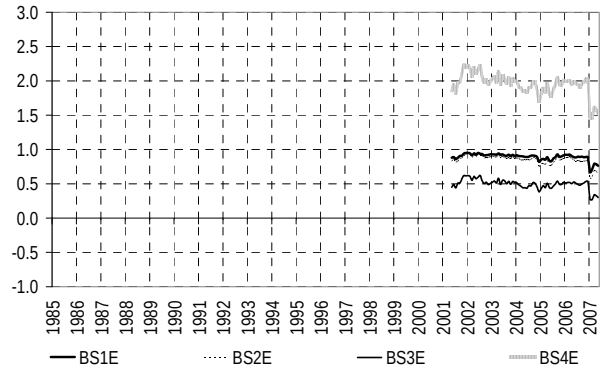
Portugal – expectations



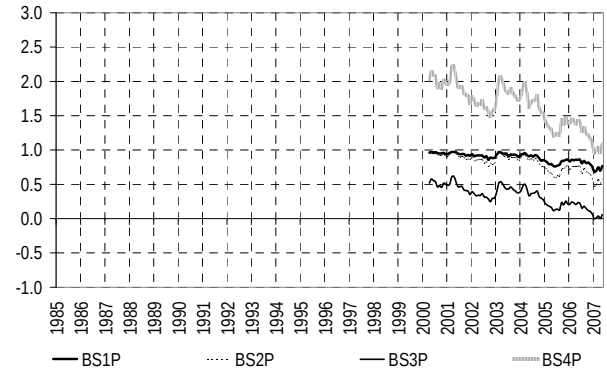
Romania – perception



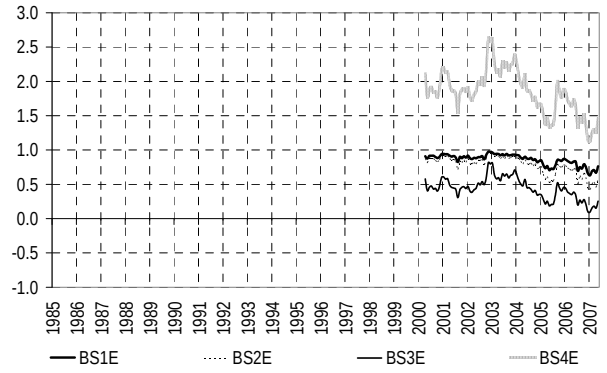
Romania – expectations



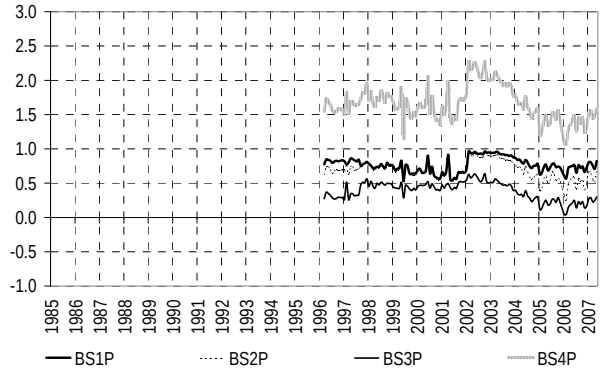
Slovakia – perception



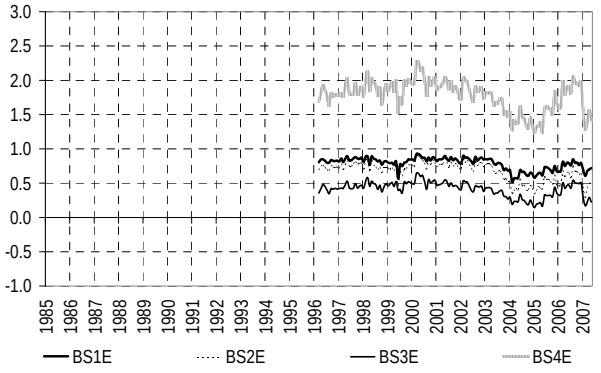
Slovakia – expectations



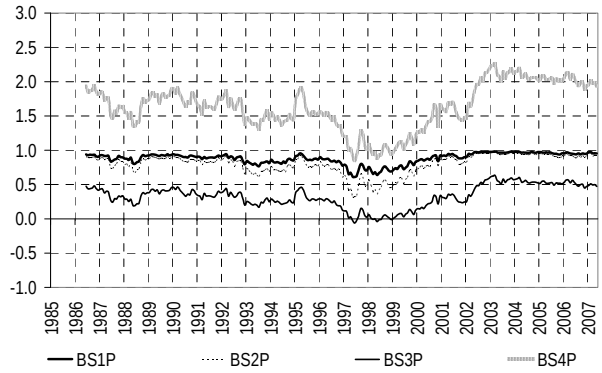
Slovenia – perception



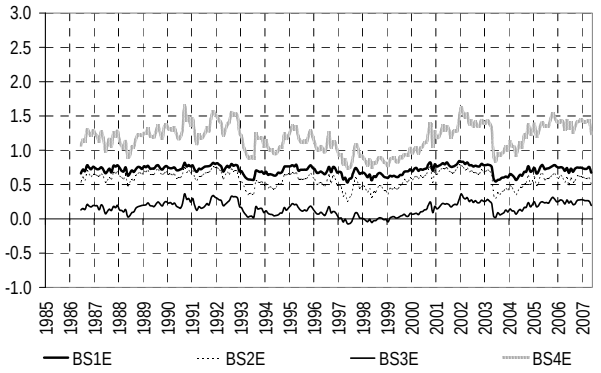
Slovenia – expectations



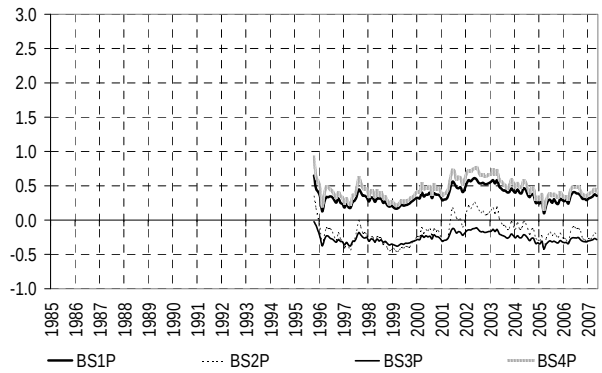
Spain – perception



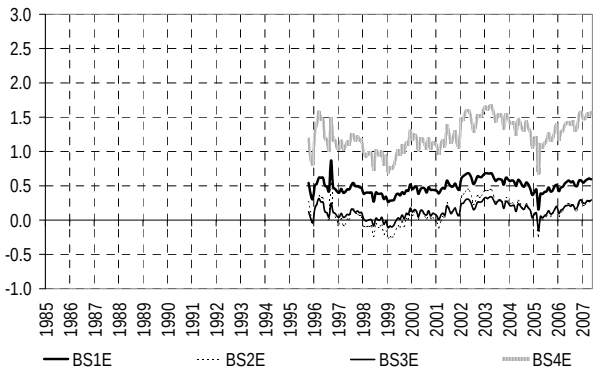
Spain – expectations



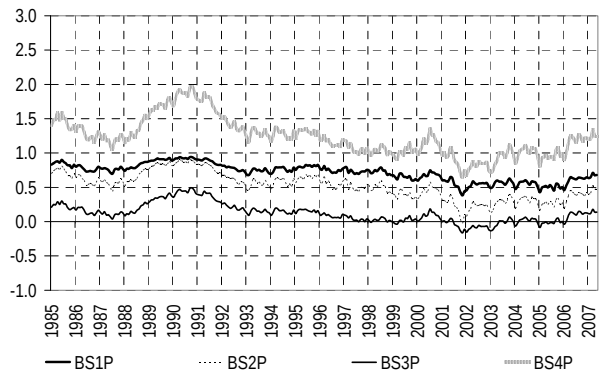
Sweden – perception



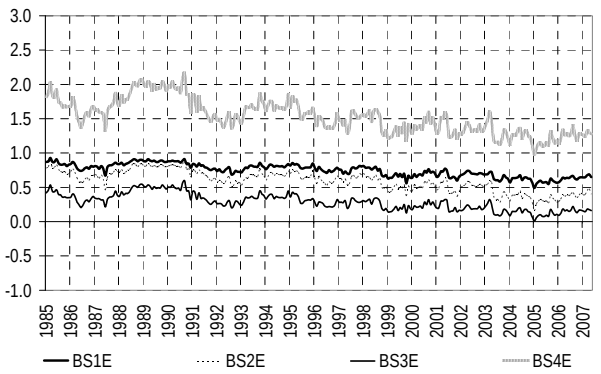
Sweden – expectations



United Kingdom – perception



United Kingdom – expectations



Source: Author's calculations on the basis of EC data.

Annex B

Denmark – Cunningham (1997) regression model

Equation A: (weight: 0.25)		$\log\left(\frac{\sum_{i=1}^{3} A_{it}^{p}}{1-\sum_{i=1}^{3} A_{it}^{p}}\right) = \underset{(0.108)}{-1.482} + \underset{(3.942)}{54.041}\cdot \pi_{0t} + \varepsilon_t$
Equation B: (weight: 0.75)		$\log\left(\frac{C_t^p}{1-C_t^p}\right) = \underset{(0.233)}{-1.456} - \underset{(9.018)}{73.366}\cdot \pi_{0t} + u_t$
Sample:	Mar 1985–May 2007	Standard errors in parentheses
R^2 adj:	0.73 (A) 0.55 (B)	

France – Smith and McAleer (1995) regression model

$\pi_{0t} = \frac{\sum_{i=1}^{3} A_{it}^{p} \cdot \left(\underset{(0.032)}{0.051} + \underset{(0.169)}{0.318} \cdot \sum_{j=1}^{12} \pi_{0,t-j} \right) - \underset{(0.426)}{0.574} \cdot C_t^p}{1 + \underset{(3.265)}{4.919} \cdot \sum_{i=1}^{3} A_{it}^{p} - \underset{(19.919)}{30.604} \cdot C_t^p} + \varepsilon_t$		
Sample:	Mar 1986–May 2007	Standard errors in parentheses
R^2 adj:	0.68	

Netherlands – Anderson (1952) regression model

$\pi_{0t} = \underset{(0.002)}{0.039} \cdot \sum_{i=1}^{3} A_{it}^{p} - \underset{(0.044)}{0.288} \cdot C_t^p + \varepsilon_t$		
Sample:	Mar 1985–May 2007	Standard errors in parentheses
R^2 adj:	0.64	

Ireland – Smith and McAleer (1995) regression model

$\pi_{0t} = \frac{\sum_{i=1}^{3} A_{it}^{p} \cdot \left(\underset{(0.002)}{0.010} + \underset{(1.057)}{3.463} \cdot \pi_{0,t-1} - \underset{(0.258)}{0.497} \cdot \pi_{0,t-2} \right)}{1 + \underset{(0.923)}{2.109} \cdot \sum_{i=1}^{3} A_{it}^{p}} + \varepsilon_t$		
Sample:	May 1985–May 2007	Standard errors in parentheses
R^2 adj:	0.94	

Italy – Smith and McAleer (1995) regression model

$$\pi_{0t} = \frac{\sum_{i=1}^{3} A_{it}^{p} \cdot \left(\underset{(0.001)}{0.007} + \underset{(0.009)}{0.043} \cdot \sum_{i=1}^{12} \pi_{0,t-i} \right)}{1 - \underset{(0.109)}{0.419} \cdot \sum_{k=1}^{3} A_{kt}^{p}} + \varepsilon_t$$

Sample:	Mar 1986–May 2007	Standard errors in parentheses
R^2 adj:	0.91	

Latvia – regression model based on the balance statistic BS_4

$$\pi_{0t} = -\underset{(0.007)}{0.025} + \underset{(0.003)}{0.042} \cdot BS_{4t}^{p} + \varepsilon_t$$

Sample:	May 2001–May 2007	Standard errors in parentheses
R^2 adj:	0.82	

Lithuania – regression model based on the balance statistic BS_4

$$\pi_{0t} = -\underset{(0.005)}{0.045} + \underset{(0.003)}{0.046} \cdot BS_{4t}^{p} + \varepsilon_t$$

Sample:	May 2001–May 2007	Standard errors in parentheses
R^2 adj:	0.81	

Malta – Smith and McAleer (1995) regression model

$$\pi_{0t} = \frac{\sum_{i=1}^{3} A_{it}^{p} \cdot \sum_{j=2\ (\Phi_j^{SD})}^{12} \Phi_j \cdot \pi_{0,t-j} - C_t^{p} \cdot \left(\underset{(0.545)}{1.122} + \sum_{k=1\ (\Gamma_k^{SD})}^{12} \Gamma_k \cdot \pi_{0,t-k} \right)}{1 - \underset{(0.011)}{0.970} \cdot \sum_{i=1}^{3} A_{it}^{p} + \underset{(36.613)}{57.514} \cdot C_t^{p}} + \varepsilon_t$$

$$\Phi = \begin{bmatrix} 0.332 \\ -0.387 \\ 0.549 \\ -0.422 \\ 0.773 \\ -0.559 \\ 0 \\ 0.540 \\ -0.464 \\ 0.116 \\ -0.252 \end{bmatrix}, \quad \Phi^{SD} = \begin{bmatrix} 0.025 \\ 0.054 \\ 0.065 \\ 0.066 \\ 0.059 \\ 0.035 \\ 0 \\ 0.044 \\ 0.051 \\ 0.014 \\ 0.032 \end{bmatrix}, \quad \Gamma = \begin{bmatrix} 55.753 \\ -33.433 \\ 35.842 \\ -67.570 \\ 51.640 \\ -50.148 \\ 45.183 \\ -36.613 \\ 0 \\ 42.139 \\ -54.682 \\ 26.852 \end{bmatrix}, \quad \Gamma^{SD} = \begin{bmatrix} 27.028 \\ 17.075 \\ 18.908 \\ 18.223 \\ 12.782 \\ 17.244 \\ 15.942 \\ 10.737 \\ 0 \\ 15.913 \\ 12.093 \\ 9.0273 \end{bmatrix}$$

Sample:	Nov 2003–May 2007	Standard errors in parentheses
R^2 adj:	0.82	

Poland – Smith and McAleer (1995) regression model

$$\pi_{0t} = \frac{\underset{(0.001)}{0.004} \cdot \sum_{i=1}^{3} A_{it}^{p} - \underset{(0.082)}{0.216} \cdot C_t^{p} \cdot \sum_{j=1}^{12} \pi_{0,t-j}}{1 - \underset{(0.058)}{0.933} \cdot \sum_{i=1}^{3} A_{it}^{p}} + \varepsilon_t$$

Sample:	May 2002–May 2007	Standard errors in parentheses
R^2 adj:	0.74	

United Kingdom – Smith and McAleer (1995) regression model

$$\pi_{0t} = \frac{\sum_{i=1}^{3} A_{it}^{p} \cdot \left(\underset{(0.001)}{0.012} + \underset{(0.006)}{0.010} \cdot \sum_{i=1}^{12} \pi_{0,t-i} \right)}{1 - \underset{(0.066)}{0.825} \cdot \sum_{k=1}^{3} A_{kt}^{p}} + \varepsilon_t$$

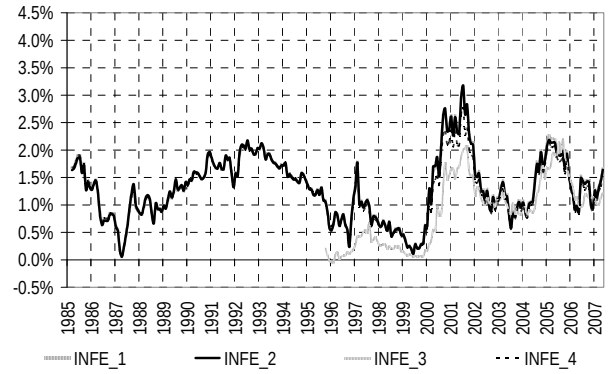
Sample:	Mar 1986–May 2007	Standard errors in parentheses
R^2 adj:	0.80	

Annex C

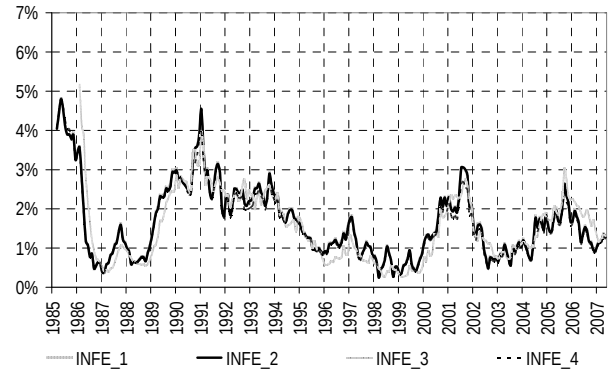
Figure 12

Quantified measures of inflation expectations

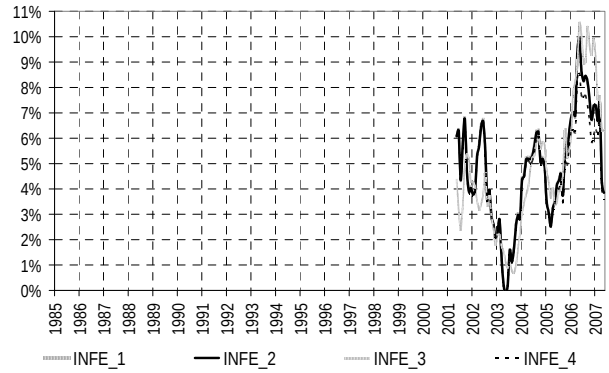
Austria



Belgium



Bulgaria



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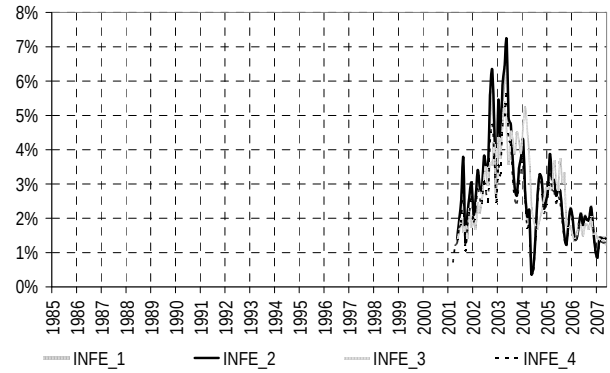
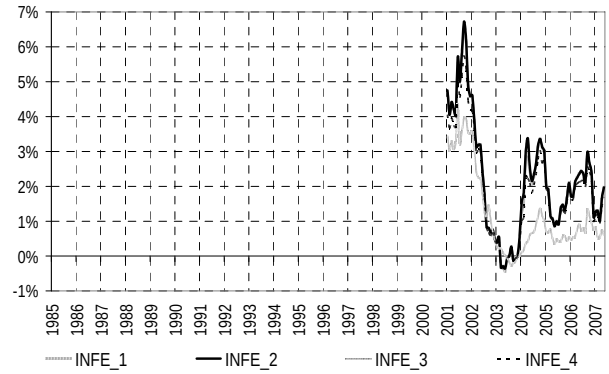
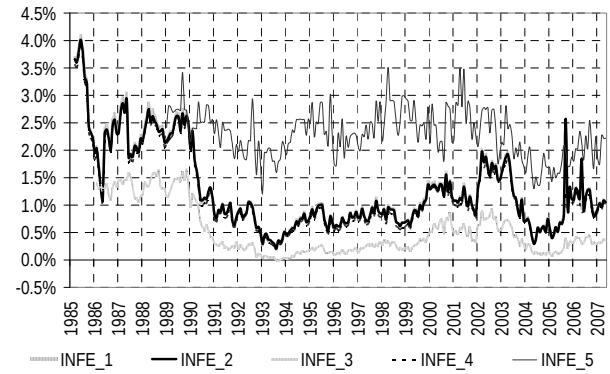


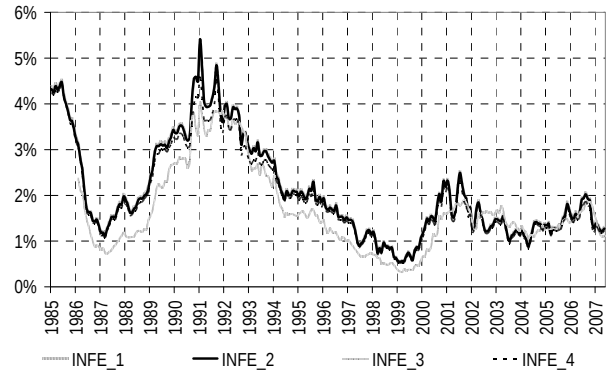
Czech Republic



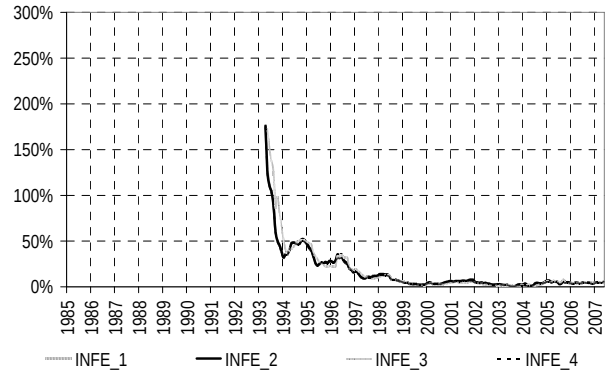
Denmark



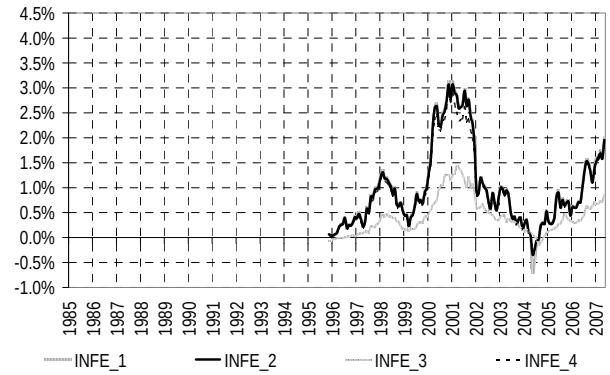
EMU



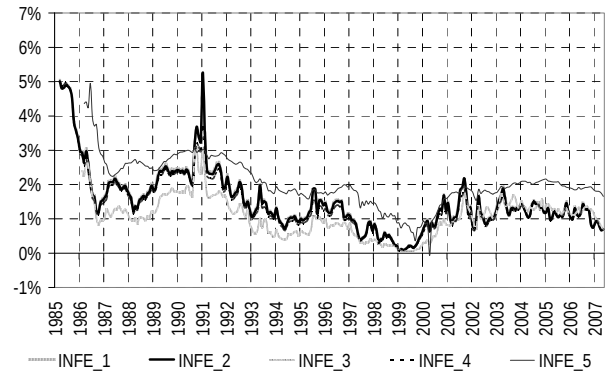
Estonia



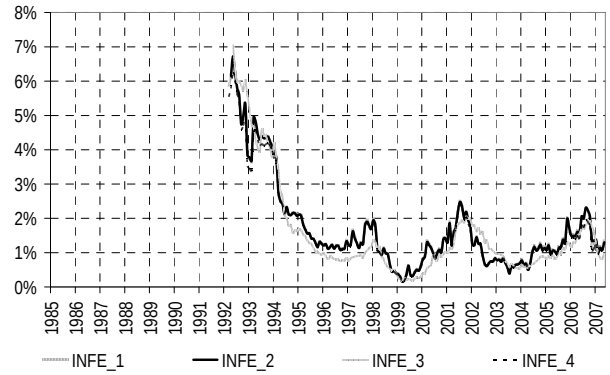
Finland



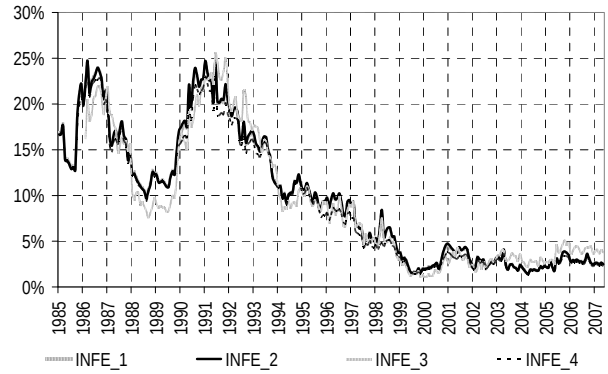
France



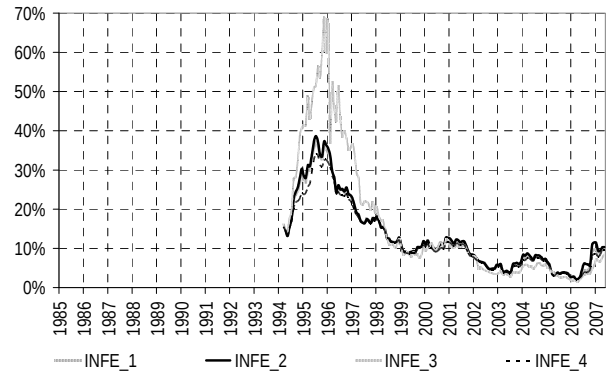
Germany



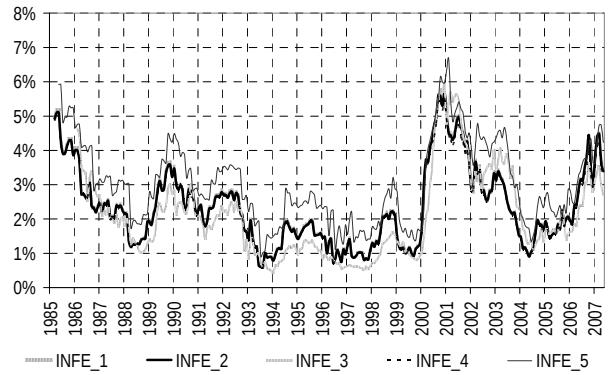
Greece



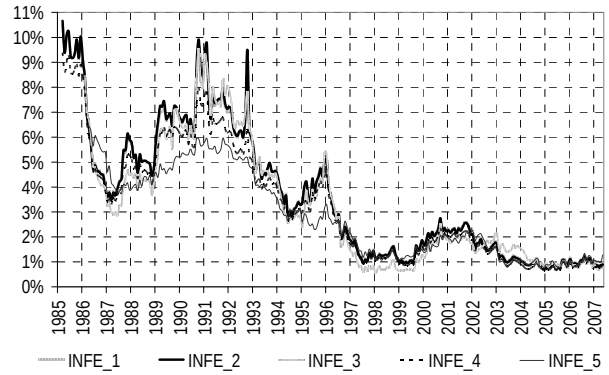
Hungary



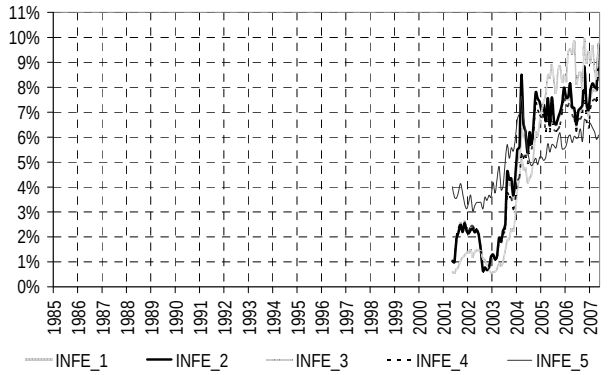
Ireland



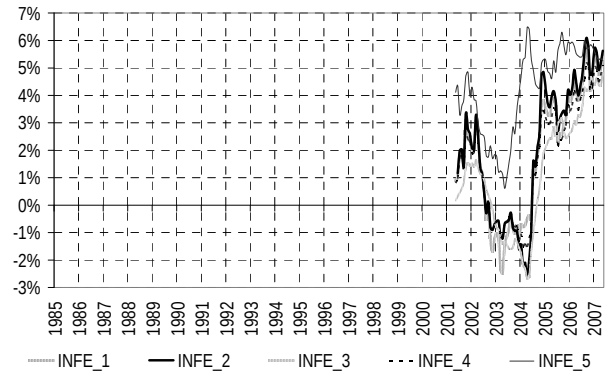
Italy



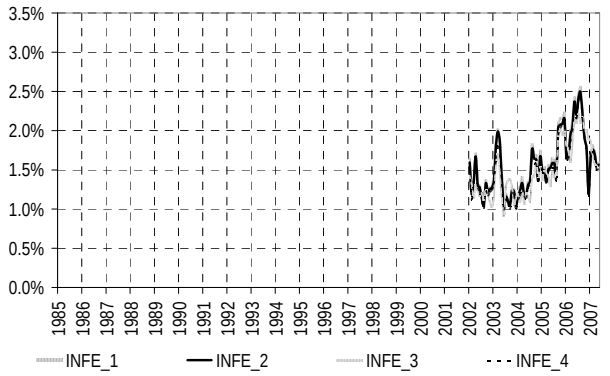
Latvia



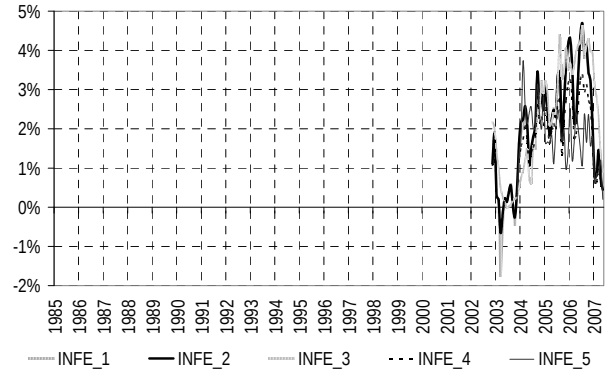
Lithuania



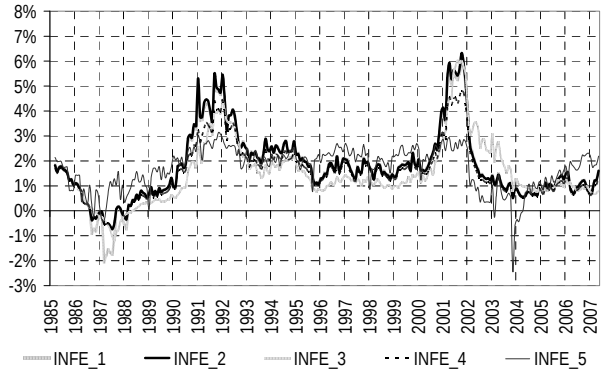
Luxembourg



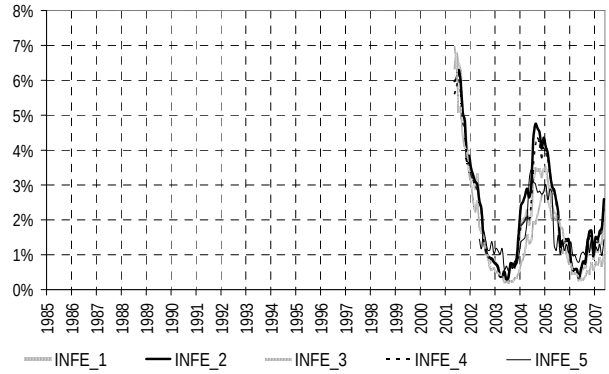
Malta



Netherlands



Poland



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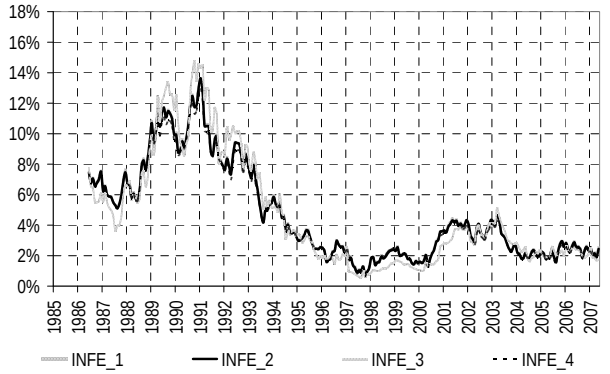
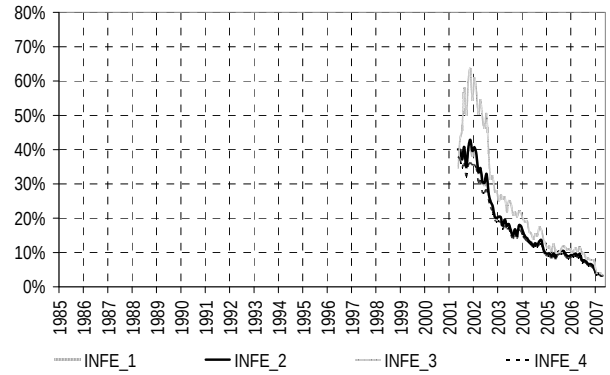
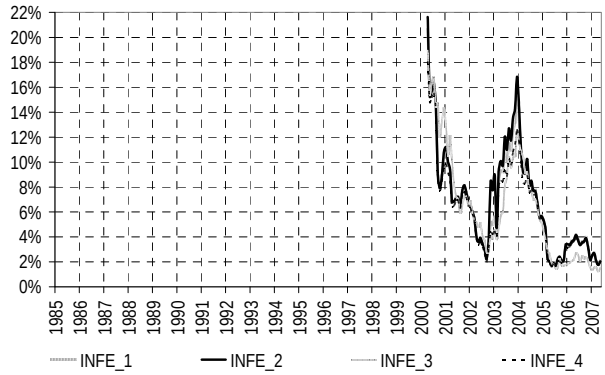


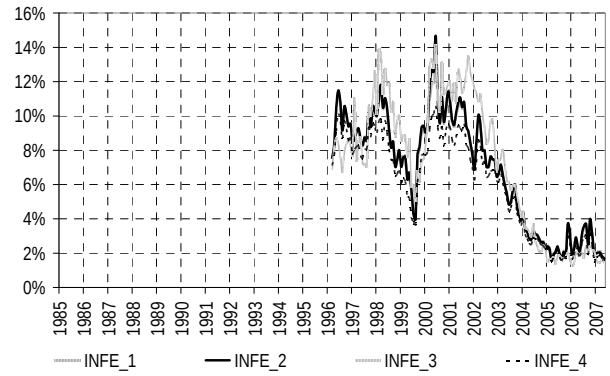
Romania



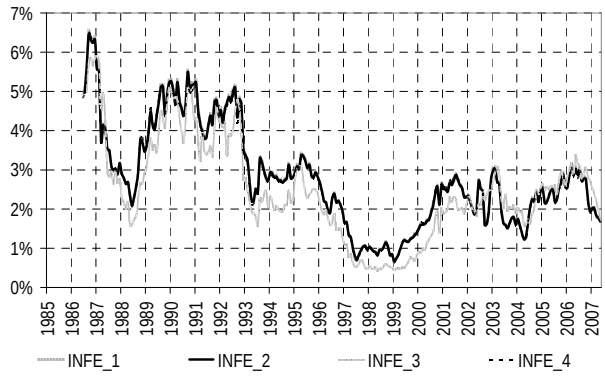
Slovakia



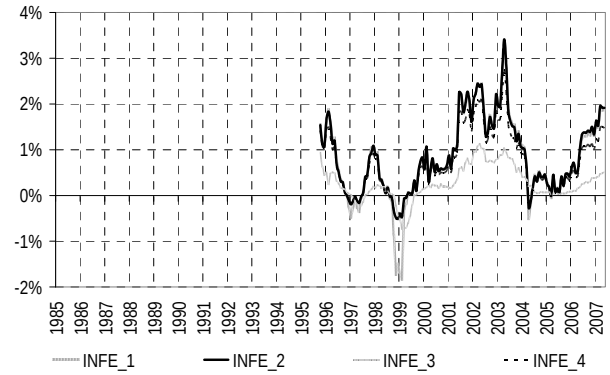
Slovenia



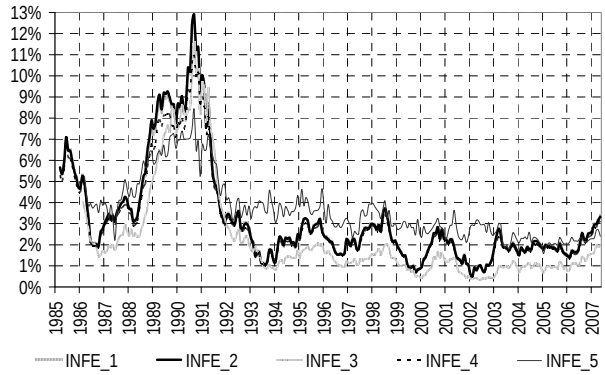
Spain



Sweden



United Kingdom



Source: Author's calculations on the basis of EC and IFS data.

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Quantification of qualitative data: the case of the Central Bank of Armenia

Martin Galstyan[1] and Vahe Movsisyan[2]

Overview

The effect of non-financial organisations' and consumers' attitudes on economic activity is a subject of great interest to both policymakers and economic forecasters. The Business Tendency and Consumer Surveys of the Organisation for Economic Co-operation and Development (OECD) are important sources of information about household opinion and non-financial organisations' expectations concerning current economic conditions and future developments.

The information collected in such surveys is mainly qualitative because respondents are asked to assign qualities, rather than quantities, to the variables of interest. For example, in a business tendency survey, respondents are asked to assign qualities to the value of their order books, such as "higher than normal", "normal" or "below normal".

It is generally much easier for respondents to give qualitative rather than quantitative information. As a result, the questionnaires can be completed quickly and results of the surveys can be published earlier than the results of traditional statistical surveys. This is one of the main advantages of qualitative surveys.

Thus, before computing the final indices, it is necessary to quantify the qualitative data collected, and it is very important to select the right quantification methods.

Quantification of qualitative data

Quantitative analysis is the numeric representation and manipulation of qualitative observations for the purpose of describing and explaining the event that those observations reflect.

The analysis of how economic agents form their expectations about economic variables has been treated as one crucial issue in explaining many important economic trends.

While there is a vast literature on this topic, no consensus has been achieved among researchers on how to quantify the expectation survey data.

There are at least four main approaches to converting the results of qualitative surveys to standard quantitative variables.

The first method is some variant of the probabilistic approach. The principle behind this approach is that the respondents reply that the value of the reference variable x can be described by a certain statement (eg x stays stable) if it lies between two known thresholds

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(eg ± 5 per cent around its initial value). Thus, by assuming that the functional form of the underlying probability distribution of opinions and expectations about x is known, the average value of x can be expressed as a function of the given thresholds. A measure of heterogeneity of opinions and operators' uncertainty can also be derived within the same analytical framework.

The second approach is based on regression techniques aimed at estimating the value of x underlying each qualitative answer. This method requires the regression of a standard quantitative measure of x against the time series of percentage of people who gave each qualitative answer.

The third method regards the percentages of each qualitative answer as a function of a common "latent measure" of x observed by respondents. The usual multivariate techniques can help in estimating the dynamics or the sectoral variations (but not the absolute level) of the latent factor affecting the opinions and expectations expressed by the interviewed operators.

The time series of percentages of answers collected in qualitative surveys are closely correlated. In the first place, this fact implies that the latent variable approach is possibly sound and reliable. However, it also suggests that even very sophisticated methods, based on complicated transformations of original percentages, tend to produce indicators that follow the common trend and cycles that can be easily deduced by any time series of percentages, or a simple combination thereof. This explains and justifies the widespread use of the "balance" between the percentages of "optimistic" and "pessimistic" answers.

The fourth method is the calculation of diffusion and composite indices. This method is a summary measure designed to facilitate the analysis and forecast of business cycles combining the behaviour of a group of economic indicators which represent different economic activities such as production and employment.

Diffusion indices aggregate the directions of change of a selected series to detect a business cycle phase, while composite indices aggregate the percentage changes of a selected series to detect the volume of a business cycle.

The empirical verification of performance of the various methods is mixed. Generally, no one procedure outperforms another, even if some authors have pointed out the sharp inefficiency of balance statistics and others have noted that dynamic regression models are generally superior. Table 1 provides a swift comparison of different approaches.

Table 1

Quantification methods

Method	Main assumptions	Advantages	Drawbacks
Probabilistic	• The functional form of opinions about the relevant variable *x* is known. • Respondents reply "*x* did (will) remain stable" if *x* lies between two given thresholds. Additional assumptions are required in a polychotomous case.	• The results depend only on the observed percentages of answers and only to a minor extent on the assumptions about the probability distribution of the variables and the thresholds assumed by respondents.	• The time series of results may be very volatile if some special combinations of answers occur. • Other information on *x* is completely neglected, even when it is available. • The treatment of polychotomous questions may be complicated.

Table 1 (cont)

Quantification methods

Method	Main assumptions	Advantages	Drawbacks
Regression	• Respondents also attach to each qualitative answer a reference value of *x*. • Reference values can be estimated by using regression models.	• It is very general, regardless of the wording of questions and the number of answers authorised. • Integration into standard econometric models is straightforward.	• A reference quantitative time series is needed. • Estimation can be flawed by multicollinearity and numerical convergence problems.
Latent factor	• A single common "latent factor" drives each percentage of answers.	• It is very general. • In principle, no extraneous information is needed. However, they can be exploited as well. • The same quantified indicator may be used in both preliminary analysis and econometric modelling.	• Very short time series of answers cannot be treated.
Diffusion and composite indices	• Diffusion indices measure one half of the respondents reporting "no change" and all respondents reporting • "positive" answers. The reason why a group of indicators combined into a composite indicator should be more reliable over a period of time than any of its individual components is related to the nature and causes of business cycles.	• Easy to compute • The performance of individual indicators will then depend on the causes behind a specific cycle. Some indicators will perform better in one cycle and others in a different cycle. It is therefore necessary to have signals for many possible causes of cyclical changes, and to use all potential indicators as a group.	• These indices are more volatile than indices constructed with the methods listed above.

Of the methods described, we use a diffusion and composite indices method for construction of the consumer confidence index (CCI), the economic activity index (EAI) and the business climate index (BCI).

Purposes and tasks of the surveys

In response to the widespread belief that consumers' opinions and expectations influence the direction of the economy, a growing number of studies have set out to analyse the relationship between consumer attitudes and economic variables.

Taking this into consideration, the estimation of household expectations regarding the economy, as an ultimate private sector driver of market economies, is an important factor in the organisation and implementation of macroeconomic policies.

For observation of household perspectives on the current economic situation and estimation of their expectations regarding future shifts in the economy, the Statistics Department of the Central Bank of Armenia (CBA) has conducted quarterly consumer confidence surveys since the first quarter of 2005. The main purpose of the surveys is to estimate consumer behaviour in the light of their expectations of current and future economic conditions, and to calculate the CCI.

In order to achieve these goals, the following tasks are performed:

- Analysis of household opinions regarding the overall economic situation (current and future)
- Analysis of household opinions regarding their material security (current and future)
- Calculation of indices of current and future conditions.

The Statistics Department of the CBA also conducts business tendency surveys, also known as economic activity and business climate surveys. The main purpose of these surveys is to ask managers of non-financial organisation about the current status of their business and their plans and expectations for the near future. These surveys provide information that is valuable to the respondents themselves and to economic policymakers and analysts. Although they do not provide precise information on levels of output, sales, investment or employment, they can be used to predict changes in these aggregates, and for that reason, they are particularly useful for analysing the business cycle.

Survey methodology

Consumer confidence survey

The survey is conducted in the second month of each quarter, with time-independent samples of households, and covers all Armenian households.

In order to facilitate the analysis of the evolution of phenomena over time, starting with the next survey, a part of the sample will comprise households interviewed in previous surveys (panel households). Panel households will represent about 40 per cent of the sample.

Data are collected from households by means of telephone interviews. The survey sample size ranges from 1,700 to 2,000. The sampling of survey has stratified one stage sample design without replacement:

The whole universe was divided into administrative subdivisions called strata. The city of Yerevan was divided into communities (strata) and its regions into districts.

The sample units are selected randomly from each stratum. The sample size of each stratum is proportional to its population.

Survey questions are drafted with the aim of eliciting useful information without imposing an undue burden on respondents. The questions are generally qualitative and have a three-point scale of response (increase, stable, decrease). Quantitative questions are also included, but generally confined to demographic aspects of households. The questionnaires also contain a question about household income, but because of the sensitivity of this question, it is suggested that households situate their income within one of the given ranges.

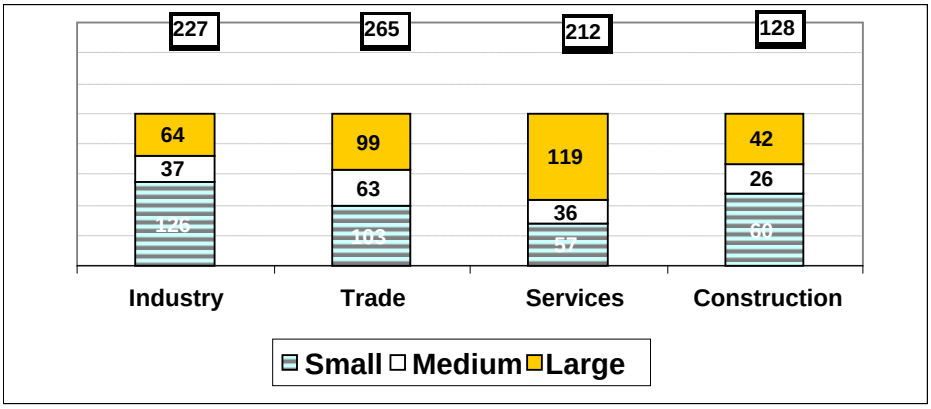
Economic activity and business climate surveys

As indicated, the main purpose of the quarterly EAIs and BCIs is to analyse the expectations and perspectives of economic agents concerning each branch of the economy (industry, construction, trade and services).

For the economic activity and business climate surveys, the sample of non-financial organisations is constituted by a non-probability sampling method: cutting off the tail. The sample comprises the largest organisations that account for at least 80 per cent of the gross profit of a particular branch or segment of the economy. Thus, for the first quarter of 2009, the survey sample consists of 832 companies (Figure 1).

Figure 1

Structure of non-financial organisations sample



The survey is conducted by telephone, letter and facsimile.

Furthermore, as the four surveyed branches account for the largest share of Armenia's GDP (Figure 2), it is also important to analyse the correlation between the EAI, BCI and value added of the respective branches.

Figure 2

Weights of four surveyed branches in GDP

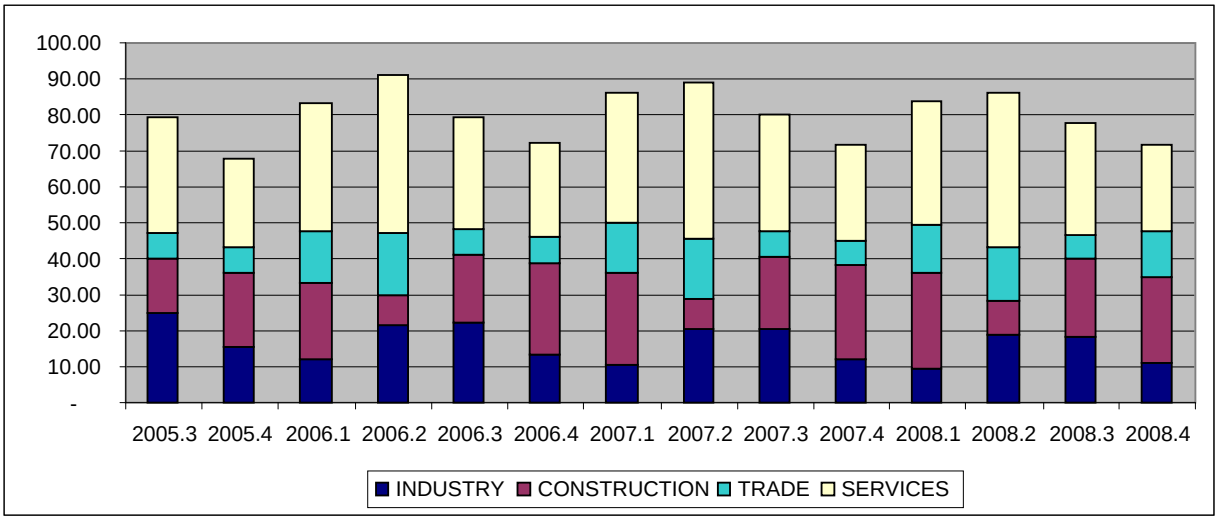


Figure 2 shows that the four branches together account for about 80 per cent of GDP.

Tables 2 and 3 describe all the steps in implementing the diffusion and composite indices method for construction of the consumer confidence, economic activity and business environment indices.

Table 2

CCI construction

Phase 1	**Balance of current conditions for each community**	$BA^{current}{}_i = \sum_{j=1}^{3} (Answer^{current}{}_{pos} + \frac{1}{2} Answer^{current}{}_{neu})$ $BA^{current}{}_i$ – balance of current conditions for i-th community $Answer^{current}{}_{pos}$ – positive answers to each *current* question $Answer^{current}{}_{neu}$ – neutral answers to each *current* question
	Balance of future conditions for each community	$BA^{future}{}_i = \sum_{j=1}^{3} (Answer^{future}{}_{pos} + \frac{1}{2} Answer^{future}{}_{neu})$ $BA^{future}{}_i$ – balance of current conditions for i-th community $Answer^{future}{}_{pos}$ – positive answers to each *future* question $Answer^{future}{}_{neu}$ – neutral answers to each *future* question
Phase 2	**Total balances for each community**	$BA_i = \frac{1}{2}\left(BA^{current}{}_i + BA^{future}{}_i\right)$ BA_i – average balance of answers to all questions for i-th community
Phase 3	**Weighted balance of all households**	$WBA = \sum_i W_i^{pop} BA_i$ WBA – weighted balance of answers for all households W_i^{pop} – weight of population in i-th community
Phase 4	**Index computation (CCI)**	$Index = \frac{WBA_1}{WBA_0} \cdot 100$ 1 and 0 refer to current and base period, respectively.

Table 3

Three-step weighted method of EAI and BCI construction

Phase 1	**Balance of answers**	$$BA_{ijq} = \sum_{k=1}^{p} W_{EmplK}\left(Answer_{pos} + \frac{1}{2} Answer_{neu}\right)$$ BA_{ijq} – balance of j-th segment of i-th branch for q-th question W_{EmplK} – weight of k-th organisation's employees in all organisations of that segment $Answer_{pos}$ – positive answers to each question $Answer_{neu}$ – neutral answers to each question
Phase 2	**Balance of answers for branch**	$$WBA_{iq} = \sum_{j=1}^{n} BA_{ij} \cdot RW_{ij}$$ WBA_{iq} – weighted balance of i-th branch questions for q-th question RW_{ij} – weight of profit of the j-th segment in i-th branch
Phase 3	**Average balance of answers**	$$WBA_{iAverage} = \frac{\sum_{q=1}^{4} WBA_{iq}}{4}$$ $WBA_{iAverage}$ – average balance of answers to all questions included in i-th branch
Phase 4	**Balances of answers for the overall economy**	$$TBA = \sum_{i=1}^{4} WBA_{iAverage} \cdot VA_i$$ TBA – weighted balance of answers for the overall economy VA_i – weight of i-th branch value in cumulative value of all four branches
Phase 5	**Index computation (EAI, BCI)**	$$Index = \frac{TBA_1}{TBA_0} \cdot 100$$ 1 and 0 refer to current and base period, respectively.

To investigate the possible relationships between economic activity and business climate questions, we need to analyse the correlations between the branches' variables (questions) and the value added for each branch.

Correlation matrices are presented in the appendices.

We have to underline that here, in correlation analysis, the variables concerning the future expectations of respondents are taken with a "+ 1" lag: for example, in industry, the expectation of respondents (taken at quarter t) regarding the demand for their products for

the $t+1$-th quarter is correlated with the actual growth of industry value added for the $t+1$-th quarter.

As we can see, in both industry and construction, almost all individual economic activity questions have strong positive correlations with the quarterly growth rate for that branch.

In trade, only one question (VolumeC) is significantly correlated (0.719) with the growth of trade value added.

From Table 4 it is obvious that in industry, construction and trade, the branch economic activity analysis better describes the appropriate branch of the economy than business climate analysis. In particular, in construction, the coefficient of correlation between the weighted balances of economic activity questions and the construction growth rate equals 0.842 (it is significant at the 0.01 level).

Table 4

Correlation matrix of EA and BC weighted balances of answers (WBA) and growth of branches

	EA WBA	BC WBA
Industry growth	0.719**	0.360
Construction growth	0.842**	0.540*
Trade growth	0.668**	0.240
Services growth	0.476	0.480

** The correlation is significant at the 0.01 level (2-tailed). * The correlation is significant at the 0.05 level (2-tailed).

Conclusion

To summarise the analysis, we can conclude that the household and corporate sector surveys conducted by the CBA since 2005 are important sources of information that describes the main sectors of the national economy. The indices, calculated by the diffusion and composite index method, particularly the economic activity indices of industry, construction and trade, can be used as leading growth indicators for the corresponding sectors' value added. This shows that the selected quantification method (diffusion and composite index method) works well for the intended purposes.

We should mention that we have short time series of composite indices (data for 14 quarters), and this can lead to overestimating the reliability of the results.

In the future, with enlargement of the survey database, it will be possible to obtain more reliable estimates of indicators that can be used for preliminary forecasting of the development of the Armenian economy.

Appendix 1:
Correlation matrix (industry)

	Balance of economic activity questions				**Balance of business environment questions**				**Balance of other questions**		
	VolumeC	VolumeF	StockF	DemandF	RisksC	RisksF	SubindC	SubindF	PriceC	WageF	EmployeeF
VolumeC	1										
VolumeF	0.777**	1									
StockF	0.575*	0.578*	1								
DemandF	0.807**	0.905**	0.633*	1							
RisksC	0.45	0.37	0.755**	0.39	1						
RisksF	0.30	0.13	0.543*	0.23	0.657**	1					
SubindC	0.592*	0.34	0.527*	0.37	0.679**	0.606*	1				
SubindF	0.585*	0.51	0.526*	0.680**	0.677**	0.521*	0.657**	1			
PriceC	0.44	0.48	0.730**	0.48	0.634*	0.48	0.33	0.604*	1		
WageF	0.555*	0.26	0.34	0.24	0.519*	0.605*	0.846**	0.51	0.27	1	
EmployeeF	0.606*	0.33	0.634*	0.50	0.597*	0.682**	0.781**	0.700**	0.43	0.782**	1
Ind growth	**0.753****	**0.726****	**0.23**	**0.647***	**0.10**	**–0.18**	**0.49**	**0.53**	**0.30**	**0.38**	**0.25**

** The correlation is significant at the 0.01 level (2-tailed). * The correlation is significant at the 0.05 level (2-tailed).

Appendix 2:
Correlation matrix (construction)

	Balance of economic activity questions			**Balance of business environment questions**				**Balance of other questions**		
	VolumeC	VolumeF	DemandF	RisksC	RisksF	SubindC	SubindF	PriceC	WageF	EmployeeF
VolumeC	1									
VolumeF	0.870**	1								
DemandF	0.843**	0.931**	1							
RisksC	–0.436	–0.270	–0.212	1						
RisksF	0.068	0.281	0.058	–0.179	1					
SubindC	0.565*	0.555*	0.450	–0.044	–0.072	1				
SubindF	0.611*	0.779**	0.787**	–0.125	0.361	0.294	1			
PriceC	0.446	0.760**	0.646**	–0.039	0.390	0.412	0.604*	1		
WageF	0.678**	0.826**	0.896**	–0.005	–0.072	0.320	0.758**	0.624*	1	
EmployeeF	0.764**	0.926**	0.952**	–0.232	0.145	0.409	0.781**	0.760**	0.879**	1
Const growth	**0.764****	**0.833****	**0.785****	**–0.464**	**0.443**	**0.044**	**0.800****	**0.515**	**0.622***	**0.819****

** The correlation is significant at the 0.01 level (2-tailed). * The correlation is significant at the 0.05 level (2-tailed).

Appendix 3:
Correlation matrix (trade)

	Balance of economic activity questions			**Balance of business environment questions**				**Balance of other questions**		
	VolumeC	VolumeF	DemandF	RisksC	RisksF	SubindC	SubindF	PriceC	WageF	EmployeeF
VolumeC	1									
VolumeF	0.380	1								
DemandF	0.584*	0.727**	1							
RisksC	0.024	0.160	0.025	1						
RisksF	0.354	0.059	–0.009	0.617*	1					
SubindC	0.650**	0.523*	0.634*	0.415	0.348	1				
SubindF	0.154	0.673**	0.619*	0.237	–0.040	0.363	1			
PriceC	0.059	0.375	0.038	0.330	–0.058	0.063	0.290	1		
WageF	0.114	0.111	0.340	–0.505	–0.381	0.091	0.267	0.065	1	
EmployeeF	0.374	0.123	0.617*	–0.139	–0.157	0.518*	0.260	–0.105	0.629*	1
Trade growth	**0.719****	**0.358**	**0.233**	**–0.215**	**0.500**	**0.413**	**–0.011**	**–0.031**	**0.274**	**–0.043**

** The correlation is significant at the 0.01 level (2-tailed). * The correlation is significant at the 0.05 level (2-tailed).

Appendix 4:
Correlation matrix (services)

	Balance of economic activity questions			**Balance of business environment questions**				**Balance of other questions**		
	VolumeC	VolumeF	DemandF	RisksC	RisksF	SubindC	SubindF	PriceC	WageF	EmployeeF
VolumeC	1									
VolumeF	0.661**	1								
DemandF	0.732**	0.865**	1							
RisksC	0.553*	0.527*	0.532*	1						
RisksF	–0.041	–0.079	0.145	0.032	1					
SubindC	0.546*	0.394	0.628*	0.527*	0.410	1				
SubindF	0.343	0.627*	0.554*	0.082	0.234	0.386	1			
PriceC	0.492	0.437	0.384	0.467	0.394	0.413	0.441	1		
WageF	–0.107	0.228	–0.046	0.210	–0.379	0.144	–0.080	–0.136	1	
EmployeeF	0.042	0.013	–0.132	0.053	0.314	–0.313	0.067	0.262	–0.223	1
Serv growth	**0.384**	**0.412**	**0.467**	**–0.239**	**0.319**	**0.110**	**0.594***	**0.381**	**–0.516**	**0.090**

** The correlation is significant at the 0.01 level (2-tailed). * The correlation is significant at the 0.05 level (2-tailed)

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Appendix 5:
Abbreviations of variables

VolumeC	Volume change (current)
VolumeF	Volume change (future)
StockF	Stock change (future)
DemandF	Demand change (future)
RisksC	Risks change (current)
RisksF	Risks change (future)
SubindC	Economic situation of segment (current)
SubindF	Economic situation of segment (future)
PriceC	Price change (current)
WageF	Average wage change (future)
EmployeeF	Employees change (future)
Ind growth	Quarterly growth rate of industry value added
Const growth	Quarterly growth rate of construction value added
Trade growth	Quarterly growth rate of trade value added
Serv growth	Quarterly growth rate of service value added

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Invited Paper Meeting 70

The size and impact of statistical revisions

Papers:

Statistical revisions – a European perspective

Gabriel Quirós, Julia Catz, Wim Haine and Nuno Silva,
European Central Bank

Forecasting industrial production: the role of information and methods

Guido Bulligan, Bank of Italy, Roberto Golinelli, University of Bologna,
and Giuseppe Parigi, Bank of Italy

Statistical revisions – a European perspective

Gabriel Quirós, Julia Catz, Wim Haine and Nuno Silva[1, 2]

1. Introduction

Timeliness and reliability are important quality criteria for official statistics, which are the foundation for analyses and policymaking. The need for early information implies that first estimates for most economic statistics are generally based on fewer, or less complete, data sources than later estimates, and may therefore be subject to revisions, leading to more reliable results. Producers of statistics face the challenge of optimising the provision of both timely and reliable estimates. Different types of revisions can be distinguished. Regular revisions are the result of incorporating more, but less timely, quarterly or annual basic information, including – for infra-annual data – updated seasonal and working-day adjustment parameters. Major revisions undertaken at intervals of approximately five years reflect improved multi-annual source data and methodological improvements. An additional dimension of revisions exists when different geographical layers contribute to the production of aggregate statistics, for example when country results are used to compile euro area aggregates. As a key user and producer of statistics, the ECB has a strong interest in revision policies and in analysing the reliability of first estimates. This paper presents an overview of the ongoing work in the Euro Area Accounts and Economic Data Division of the ECB's Directorate-General Statistics. The reliability of euro area statistics is addressed from different perspectives. Section 2 presents an analysis of the reliability of GDP flash estimates and the possible trade-off with timeliness in the euro area, while Section 3 illustrates the administrative use of revision analyses for the case of government finance statistics. Section 4 addresses the importance of harmonised release and revision policies for the Principal European Economic Indicators (PEEIs).[3] Section 5 discusses the main challenges for the implementation of a consistent revision policy for the euro area accounts, and a conclusion is provided in Section 6.

2. GDP flash estimates: trade-off between timeliness and reliability?

An effective assessment of the economic situation not only requires that first estimates of quarterly GDP volume growth are reliable, but also that they become available in a timely manner. In recent years, the timeliness of first releases of GDP growth has improved significantly – by around 25 days – with the introduction of GDP flash estimates. Since revisions are, in general, the result of incorporating new information which becomes available

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[2] The views expressed in this paper are those of the authors and do not necessarily reflect the views of the European Central Bank. Comments by Werner Bier and Marta Rodriguez-Vives are gratefully acknowledged, as is the collective work by the staff of the Euro Area Accounts and Economic Data Division.

[3] The Principal European Economic Indicators (PEEIs) are a set of key euro area and EU statistics agreed by the ECOFIN Council in February 2003 and reviewed and updated in 2008. They were developed from the September 2000 Action Plan on Economic and Monetary Union Statistical Requirements established by the European Commission (Eurostat) in close cooperation with the ECB.

after each successive release, this section addresses the question of whether the improvement in timeliness has come at the expense of reliability.

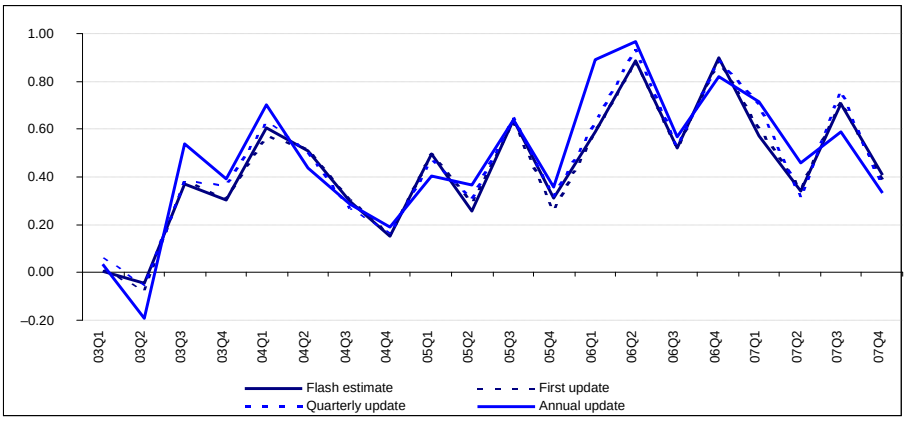
GDP flash estimates, released 45 days after the end of the reference quarter, constituted an important improvement over the first estimates of euro area GDP volume growth which were previously published with a delay of 70 days. The euro area GDP flash estimate has become a widely recognised indicator with a country coverage that now extends to 95% of euro area GDP. In order to assess its reliability, the flash estimate for any given quarter is compared with three selected subsequent releases. These involve: (i) the *first full release* for the same quarter, which is published about two weeks later; (ii) a further estimate (the *quarterly update*), which becomes available about three months later and can be assumed to include all quarterly source data;[4] and (iii) the estimate (the *annual update*), which is published in the fourth quarter of the following year when quarterly data have typically been aligned with the latest annual information.

A first glance at the development of quarter-on-quarter euro area GDP growth between Q1 2003[5] and Q4 2007 illustrates that the flash estimate contains only minor revisions when compared with the first full release and quarterly update (see Chart 1). Most of the revisions are accounted for by the annual update, which reflects the increased availability of data sources, including those at annual frequency. This is confirmed by a more detailed analysis of the flash estimate's performance in capturing turning points. In comparison with the different benchmarks, the flash estimates have been successful in indicating the direction, and even the pace, of euro area GDP growth.

Chart 1

Euro area quarter-on-quarter GDP growth, seasonally and working-day adjusted

% change



Source: Eurostat.

At the national level, GDP flash estimates also show only small revisions when compared with the first and quarterly updates. In comparison with the annual update, the flash estimates' success rate in indicating the direction of economic growth ranges from 85% for

[4] The higher frequency information (including monthly survey data and short-term statistics such as the industrial production index) and/or modelling assumptions on which GDP flash estimates are often based are generally replaced by more (complete) actual data sources with successive GDP releases for a given quarter.

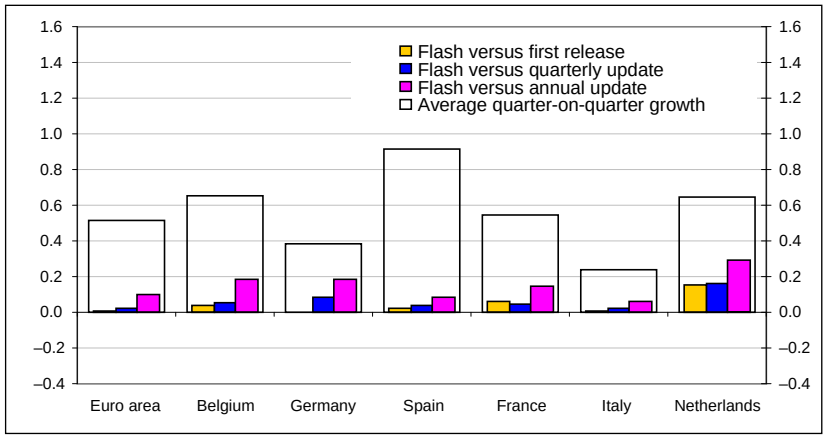
[5] On 15 May 2003, Eurostat published, for the first time, a flash estimate of euro area GDP growth referring to developments in the first quarter of 2003.

the Netherlands to 100% for Belgium and Italy, whereas the acceleration or deceleration of growth was correctly indicated from 69% of the time for Belgium to 100% for Italy. The reliability of the flash estimate is further evidenced by the results for other commonly used revision indicators.[6] At the euro area level, both the bias and the average size of revisions are close to zero. For individual countries, the average size of revisions is largest when considering the annual update, which reflects an increased availability of more complete basic information. Revisions range from around 0.1 percentage points (pp) for Spain, France and Italy to over 0.2 pp for Belgium and Germany and 0.3 pp for the Netherlands. These results are shown in Chart 2 in relation to the average quarterly growth rate in the period considered. There is no evidence of a significant bias.

Chart 2

Average size of revisions

Percentage points



Source: ECB calculations based on Eurostat data.

Two key findings can be distilled from this analysis. First, euro area results are more reliable than individual country results. This is because revisions at the disaggregate country level tend to be uncorrelated and at least partially offset at the aggregate euro area level. The second key finding is that the description of economic developments provided by the flash estimate does not significantly differ from the one provided by the first full release published around two weeks later. Despite the delay, the new basic information that becomes available does not generally require a significant revision of the earlier published flash estimate. Improvements in timeliness, as in the case of the release of flash estimates 45 days after the end of the reference quarter, do not necessarily come at the expense of lower reliability. This favourable assessment may be due to the careful preparation, by Eurostat and the national statistical institutes (NSIs), which may have introduced improvements in the methods and available sources that underlie the GDP flash estimates. These findings are also relevant for the current discussions on the feasibility of publishing the flash estimate of euro area GDP growth 30 days after the end of the reference quarter, which would better address ECB policymaking needs and bring the timeliness in line with international standards such as the "advance" GDP estimate for the United States.[7]

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6 The bias is calculated as the arithmetic mean of revisions, whereas the average size of revisions is calculated as the arithmetic mean of absolute revisions (ie disregarding the sign).

7 According to the US Bureau of Economic Analysis' news releases, the advance estimate of quarterly GDP growth has – over the period 1983–2005 – successfully indicated the direction of change in GDP growth 98%

3. The role of revisions in the administrative use of government finance statistics

The Stability and Growth Pact (SGP) is an agreement by EU member states on the conduct of their fiscal policy with the aim of facilitating and maintaining Economic and Monetary Union. According to the Treaty establishing the European Community, the government deficit should not be higher than 3% of GDP and the government debt should either be below 60% of GDP or decreasing towards 60% of GDP. It is of vital importance to the credibility of budgetary surveillance in Europe that the reliable compilation and timely reporting of deficit and debt statistics is ensured. One way of assessing their reliability is by monitoring the data revisions.

Deficit and debt statistics are notified twice a year (spring and autumn) by EU member states to the European Commission (Eurostat, the Statistical Office of the European Union). The government deficit and debt figures for year t-1 are first released in the spring of year t. At the same time, the results for years t-4, t-3 and t-2 may be revised. The statistics for all four previous years may be further revised in the autumn.

The Regulation[8] that legally obliges EU member states to report their deficit and debt figures to Eurostat emphasises the role of revision analysis in the monitoring of data quality by stipulating that member states must inform Eurostat of any major revision of their government deficit and debt statistics. Moreover, major revisions must be properly documented. In any case, revisions which result in the reference values of deficit (3% of GDP) and debt (60% of GDP) being exceeded, or revisions which mean that a member state's data no longer exceed the reference values, must be reported and properly documented.

Annual government finance statistics are also reported twice a year by the National Central Banks (NCBs) of the European Union to the ECB. The legal act[9] that obliges euro area NCBs to report such data to the ECB (non-euro area NCBs report on a voluntary basis) also contains an obligation to report the reasons for revisions of deficit and debt figures. All revisions of at least 0.3% of GDP for changes to deficit/surplus figures and of at least 0.5% of GDP for changes to debt figures must be explained.

In its biannual press release on government deficit and debt, Eurostat publishes the explanations for the most important revisions of deficit and debt in comparison to its previous press release. The ECB reports on the revisions of the deficit and debt data for euro area countries in a yearly data quality report, which is sent to the Governing Council of the ECB. The revisions under scrutiny in the data quality report are not so much the revisions compared to the previous data quality report, but the revisions compared to the first release of the deficit and debt ratios.

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of the time, whereas it correctly indicated whether GDP was accelerating or decelerating 75% of the time. In comparison with the preliminary estimate, released one month later, the average size and volatility of revisions are 0.1 pp. There is no evidence of a significant bias. The average quarter-on-quarter growth in the period 1983–2005 is 0.8%.

8 Council Regulation No 2103/2005 of 12 December 2005 amending Regulation (EC) No 3605/93 as regards the quality of statistical data in the context of the excessive deficit procedure, Official Journal L337, 22.12.2005, p 1.

9 Guideline of the European Central Bank of 17 February 2005 on the statistical reporting requirements of the European Central Bank and the procedures for exchanging statistical information within the European System of Central Banks in the field of government finance statistics, Official Journal L109, 29.4.2005, p 81, as amended.

Table 1 below provides an overview of several revision indicators for euro area countries for the period 2004–2007. The indicators were calculated by comparing the last release (in autumn 2008) of the deficit- or debt-to-GDP ratio with their first release. The indicators show the average size of the revisions,[10] the tendency of the deficit or debt to deteriorate as time passes[11] and the volatility of the numbers.

Table 1

Revision indicators for 2004–2007

As a % of GDP	Government deficit			Government debt		
	Average absolute revision	Upward revision ratio	Standard deviation	Average absolute revision	Upward revision ratio	Standard deviation
Austria	0.90	0.50	1.52	0.45	0.50	0.55
Belgium	0.80	0.75	1.31	1.20	0.00	0.14
Cyprus	0.15	0.00	0.13	0.98	0.00	0.61
Finland	0.20	0.00	0.14	0.40	0.50	0.54
France	0.05	0.00	0.06	0.42	0.00	0.19
Germany	0.13	0.50	0.17	0.23	0.50	0.26
Greece	0.73	1.00	0.50	7.40	0.25	5.25
Ireland	0.25	0.25	0.35	0.40	0.00	0.18
Italy	0.50	0.50	0.66	0.68	0.50	0.99
Luxembourg	0.85	0.25	0.86	0.43	0.25	0.61
Malta	0.33	0.00	0.24	2.70	0.00	1.80
Netherlands	0.23	0.25	0.42	1.50	0.25	1.48
Portugal	0.15	0.50	0.24	0.98	0.00	1.76
Slovakia	0.38	0.25	0.48	0.70	0.00	1.01
Slovenia	0.38	0.25	0.39	1.53	0.00	0.74
Spain	0.08	0.25	0.13	0.80	0.00	1.27
Average	0.38	0.33	0.47	1.30	0.17	1.09

If a country's revision indicators are all above average, it does not necessarily imply that there is currently a data quality issue. Revisions of fiscal data may be due to improved data sources or improved methods of calculating accrued rather than cash amounts. Certain revisions may also be due to decisions by Eurostat on the recording of borderline transactions on which the available methodological guidance was previously unclear. The debt-to-GDP ratio is especially vulnerable to revisions in nominal GDP. In its October 2008

[10] As stated in footnote 3 above, the average size of revisions is calculated as the arithmetic mean of absolute revisions (ie disregarding the sign).

[11] This is a directional indicator that calculates the ratio between the number of upward revisions of government deficit/debt and the number of observations. It shows the likelihood of a worsening of the deficit/debt when it is revised. If the upward revision ratio equals 1, all revisions have worsened the deficit.

press release on government deficit and debt, Eurostat had no reservations on the quality of the data for euro area countries.

4. Harmonised release and revision policies for the Principal European Economic Indicators (PEEIs)

The additional geographical dimension of euro area statistics, which are compiled on the basis of country data, requires particular attention from both the producers and the users of such data. At present, the release and revision practices of Eurostat and the NSIs are not fully coordinated. This implies that revisions of national data, reflecting improved information or methodological changes, are incorporated on an ongoing basis in the euro area aggregates which are published according to a European release calendar. Frequent revisions not only entail costs for producers, but also lead to unstable estimates which are difficult to interpret. Therefore, the issue of harmonisation beyond statistical concepts and methods has become increasingly important.

In recent years, there has been progress in the establishment of a harmonised release policy, notably for GDP flash estimates, thanks to the coordination efforts by Eurostat and the NSIs. This initiative should be strengthened and extended to other statistical domains. A promising development relates to the field of national accounts for which Eurostat and the ECB are developing a harmonised release and revision policy, which includes a proposal to cluster releases at 30, 60 and 90 days after the end of the reference quarter, as well as a proposal on the timing and the extent of backward revisions. This will be further discussed in the next section. It should also be emphasised that the coordination of revisions is not limited to regular revisions, but also includes the implementation of major revisions and improved methods. The need for this is clearly illustrated by the absence of any coordination of the most recent introduction of five-yearly benchmark revisions and methodological improvements such as the chain-linked volume measures and the new treatment of Financial Intermediation Services Indirectly Measured (FISIM) in national accounts. These changes were implemented by NSIs in a staggered way over a two-year period (2005–2006), complicating the compilation and analysis of euro area national accounts. To avoid similar changeover problems, Eurostat – strongly supported by the ECB – is carefully planning the coordination of the introduction of the revised economic activity classification, NACE rev 2, across and within the different statistical domains. Finally, it is clear that an adequate communication strategy is a key component of any release and revision policy.

5. Towards a consistent revision policy for the euro area accounts

The ECB and Eurostat have been publishing quarterly euro area accounts (EAA) by institutional sector since June 2007. This dataset, currently disseminated at around T + 120 days after the reference quarter, draws on European System of National and Regional Accounts (ESA)/System of National Accounts (SNA) methodological rules to provide a comprehensive overview of the economic process – from production to financial transactions and balance sheets of the various economic agents – which is fully integrated and broadly coherent. The EAA take the euro area as a single economic territory, which has several implications from a compilation viewpoint, namely, the need to ensure that only the transactions of the various member states with countries outside the euro area are registered in the euro area rest of the world (RoW) account.

To strike the right balance between reliability and time series stability, which would ultimately benefit both users and producers, the ECB and Eurostat have been working on the definition of a harmonised and consistent revision policy for the EAA since late 2007. This is pursued

in line with the ESCB Statistical Committee (STC) and ECOFIN Council requirements, and supported by the Committee on Monetary, Financial and Balance of Payments Statistics (CMFB).

In view of its cross-sectional nature, the EAA draws on a large set of data sources, at both the national and European levels, namely, national financial and non-financial accounts and euro area government finance statistics, balance of payments/international investment position and money and banking statistics. In this context, defining such a revision policy for the EAA not only requires coordination between European and national aggregates – as defined for all other PEEIs in the previous section – but also between national accounts and other statistical domains at both the national and European levels. This coordination exercise has two dimensions: the timing of the release and the depth or length of the revisions.

First, countries (ie at the national level) would need to make an effort to reconcile revision practices across statistical domains. Second, an attempt should be made to align revisions among countries for each statistical domain (timing of revisions). Finally, at the euro area level, coordination should be sought between statistical domains to ensure a logical release schedule. In short, the successful definition and implementation of a revision policy for such a complex statistical product as the EAA requires a broadly coordinated release policy for the major statistical domains at the national and European levels. However, it is recognised that the optimal bottom-up approach would not be achieved without the definition of a revision practice for the final product (ie the EAA) that could be taken as a reference for the underlying datasets.

In this context, as explained above, it is envisaged that the release calendar for euro area national accounts would evolve towards a cluster of three releases: (i) 30 days – advanced estimates (flash estimates) covering GDP, possibly employment and ideally few major expenditure components; (ii) 60 days – preliminary estimates of GDP, main expenditure, output and income components; flash estimates of balance of payments; and (iii) 90 days – final estimates based on a more complete set of basic information and additionally including so-called “early estimates” for integrated EAA. This approach would confine the releases for a specific quarter to the following quarter and would imply a logical compilation sequence since some parts are instrumental to the compilation of others.

Another important dimension of a revision policy concerns the depth or length of regular revisions, which requires striking the right balance between the advantage of incorporating new information and the disadvantage of frequently changing past figures. The aim is to restrict the extent of regular revisions to a limited number of past quarters, eg the quarters of the current and previous year. More extensive backward revisions of quarterly data (going back four years, for example) would be required when regular annual revisions are introduced. Major benchmark revisions should be introduced at around five-yearly intervals and be coordinated in advance between countries and statistical domains.

6. Conclusion

The ECB, being a key user and producer of statistics, has a strong interest in information on the reliability of first estimates as well as in revision practices, in particular with regard to euro area aggregate data. This paper has considered the reliability of euro area statistics from different perspectives. The flash estimates of GDP growth in the euro area were found to be reliable. Revisions to euro area aggregate GDP have generally been smaller (with a bias and average size of revisions close to zero) than revisions to individual country data. Another important finding is that improvements in timeliness – brought about by the introduction of GDP flash estimates – do not necessarily come at the expense of lower reliability. These findings are particularly important as official statistics need to be both reliable and timely. They are also of relevance for the current discussions on the feasibility of publishing the flash

estimate of euro area GDP growth 30 days after the end of the reference quarter, which would better address ECB policymaking needs and bring the timeliness into line with best practices.

The reliable compilation and timely reporting of deficit and debt statistics are of vital importance to the credibility of budgetary surveillance in the European Union. Both Eurostat and the ECB therefore monitor the revisions in these statistics. Revisions of fiscal data may be due to improved data sources. Certain revisions may also be due to decisions by Eurostat on the recording of borderline transactions on which the available methodological guidance was previously unclear.

The cross-sectional nature of the EAA raises particular challenges for the definition of a harmonised and consistent revision policy. This requires extensive coordination between European and national release and revision policies – as being sought for all PEEIs – but also between national accounts and other statistical domains, both at the national and European levels. In this context, "early estimates" for integrated EAA would be compiled at 90 days, as part of a logical compilation sequence of national accounts releases. Moreover, the right balance between the advantage of incorporating new information and the disadvantage of frequently revising past data needs to be struck. This includes the correct definition of the revision's depth at quarterly and annual frequencies, as well as the a priori coordination of so-called benchmark revisions.

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Forecasting industrial production: the role of information and methods

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1. Introduction

One of the main tasks of the economy watcher is to extract reliable signals from high-frequency indicators to provide the decision-maker with an early picture of the short-term economic situation. The index of industrial production (IPI) is probably the most important and widely analysed high-frequency indicator, given the relevance of manufacturing activity as a driver of the whole business cycle. This can be seen by the extensive comments and reactions of business analysts as soon as the IPI is published. Indeed, the IPI is a crucial variable in the forecasting process of the short-term evolution of GDP in most countries (see Golinelli and Parigi (2007) for an application to the G7 countries).

However, the IPI itself is characterised by a significant publication delay, which limits its usefulness and motivates the great efforts to compute reliable and updated forecasts. The efforts of statistical institutes to shorten the delay of the first release imply a greater degree of revision of the early estimates, which leads to the usual problem of assessing the ability of alternative forecasting methods using real-time data (see, for example, Croushore and Stark (2001, 2002), Diebold and Rudebusch (1991)).

The aim of this paper is to explore the real-time performance of alternative ways of forecasting the monthly dynamics of the Italian IPI, ie different "forecasting methods, which include the models as well as the estimation procedures and the possible choices of estimation windows" (Giacomini and White (2006), p 1549).

Our forecasting methods are defined through combinations of the following three sets of options. First, the degree of model complexity (ie. the amount of information exploited). If randomness is the main feature of the indicator's information content, simpler models may be more suitable. On the other hand, complex models are preferable in order to reduce the noise stemming from the partial information of each indicator. In this case, two options are available: (i) disaggregate models, which entail forecasting errors that might compensate at a more aggregate level (see, for example, Hendry and Hubrich (2007)); and (ii) factor-based models, where a few predictors summarise the information content of a large number of indicators (the so-called "common factors" of the information set; see Stock and Watson (2006)).

Second, the estimation method. We apply both the ordinary least squares (OLS) and, given the disaggregate nature of the models (see point (i) above), the seemingly unrelated regression (SUR) procedures in order to increase the efficiency of parameter estimates by accounting for possible simultaneity of the random shocks to different equations. In the context of factor-based models (see point (ii) above), the choice is between static and dynamic principal components and different ways of selecting the appropriate number of factors.

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Third, the length of the estimation window. If too wide a window is chosen it may affect the precision of the estimates (and, therefore, of the forecasts) because of the likely occurrence of breaks (see, for example, Stock and Watson (1996), Clements and Hendry (2002)). As there is no a priori indication of the appropriate length of the estimation window, we consider three cases: a window of seven years (chosen according to the average length of the Italian industrial cycle); a shorter window of four years; and a longer one of more than 10 years.

The relevance of data revisions (see Kozicki (2002) for a discussion) is assessed by comparing the results of our analysis with both real-time and the latest available data.

2. Alternative modelling approaches exploiting information sets of different sizes

The problem of extracting reliable signals from high-frequency indicators is not new. Klein and Sojo (1989) suggest two alternative ways of classifying the literature.

According to the "selected indicator model" (SM) approach, the monthly IPI (either aggregate or disaggregate) is regressed on some dynamic terms and a number of pre-selected indicators which are characterised by the same frequency. Out-of-sample SM forecasts are obtained by filling right-hand side explanatory indicators with their values (if known), or with extrapolations where necessary. In the case of the disaggregate SM, the IPI forecasts are obtained by aggregating (in alternative ways) the predictions for each sub-sector.

The "unstructured empirical indicator model" approach can be developed in two ways. First, each of the n indicators in the dataset is used in an autoregressive distributed lag regression (ARDL) and the IPI forecast is obtained from the average of the n forecasts (in our case, $n = 110$). Alternatively, the IPI forecast is computed through the principal components of the n indicators in the dataset (the approximate factor-based model (FM)). This allows not only the information content of the single variables to be exploited but also their covariance, without incurring the "curse of dimensionality" as seen in unrestricted vector autoregressive models (see Stock and Watson (2006) for an updated survey).[4]

The specification of the SM is very similar to that of the bridge model (BM) used to forecast (quarterly) GDP with indicators which are generally available at a higher frequency: the choice of the most suitable indicators depends on several statistical testing procedures as well as on the skill and experience of the researcher (on this point, see Golinelli and Parigi (2007)). In the FM approach, the indicators are, instead, automatically reweighted so that greater weight is given to those variables that are most important in determining the common movements of the whole information set.[5] In other words, the SM approach allows greater flexibility in the specification strategy at the expense of lower automation (see Golinelli and Parigi (2008) for early attempts to automate BM specifications). However, both the SM and the FM require a number of modelling settings (regarding the estimation method or the sample size) which, in turn, imply alternative choices with different effects on the predictive ability.

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[4] Though originally used to extrapolate cyclical conditions (see Zarnowitz (1992), Altissimo et al (2001)), the FM may also be used to forecast single variables such as GDP or the inflation rate (see Marcellino et al (2003), Cristadoro et al (2005, 2008), Altissimo et al (2007), Schumacher and Breitung (2008), Giannone et al (2008), Angelini et al (2008), Barhoumi et al (2008)).

[5] The claim of neutrality and generality of the FM is questioned by Boivin and Ng (2005, 2006), who stress the relevance of assessing the model forecasting ability of both the size/composition of the dataset and the way in which the factor-based forecasts are formulated.

Table 1

The models used in this paper

	A Univariate models
ARIMA	Univariate ARIMA model
	B Dynamic single-equation models with few indicators
ESM	Early single-equation model based on electricity consumption, temperature and trend
USM	Updated single-equation model (with only a few more indicators than the ESM)
FSM	Final single-equation model (with additional indicators with respect to the USM)
	C Dynamic multiple-equation models disaggregated in sub-sectors[1]
ASGR	Aggregation of sectoral annual growth rates
ASLWE	Aggregation of sectoral levels excluding the energy sector
ASWL	Aggregation of sectoral levels using the official weights of the statistical agency
	D Unstructured empirical indicator approaches
FA-ARDL	Average of bivariate autoregressive distributed lag model forecasts[2]
SW-D	Direct h-step (multi-step) forecasts of the static factor model
SW-S	Sequential one-step forecasts of the static factor model
FHLR-F	Generalised dynamic factor model with fixed rule to determine the factor number
FHLR-O	Generalised dynamic factor model with optimal criteria to determine the factor number

[1] The sectoral forecasts of these models are aggregated to obtain the IPI. [2] Each ARDL forecasting model uses the information from only one indicator of the whole dataset.

The models used in this paper are listed in Table 1: the SM in points B and C and the ARDL/FM in point D. They are reported according to the historical development of the Italian IPI short-term forecasting analysis, which is characterised chiefly by the use of an increasing number of indicators: from the early selected indicator model (ESM) (single equations with only a few specifically selected indicators, such as electricity consumption, temperature and trend, possibly non linear) to the updated selected indicator model (USM) and, more recently, the final selected indicator model (FSM). With large datasets of timely information, the IPI modelling issue may also be tackled at a more disaggregate level, by specifying equations for different manufacturing sub-sectors, such as those producing consumption, equipment, intermediate and energy goods (sectoral SM). The aggregate IPI predictions are then obtained with three different "aggregator" functions: ASGR, ASLWE and ASWL (Table 1, point C). An even larger number of (timely) time series are exploited when forecasting via the unstructured empirical indicator approach (Table 1, point D), where neither accounting nor economic relationships are postulated between the indicators and the variable to be forecast.

Each SM was obtained by applying the general-to-specific modelling approach to monthly levels of raw data[6] over the period up to January 2003. Besides the motivations of Wallis'

[6] The choice of levels instead of logarithms follows from the results in Marchetti and Parigi (2000) and has been confirmed by pre-processing with the program TRAMO as in Osborn et al (1999). Quantitative variables are mechanically adjusted only for trading day variations: if x_r is the raw variable, the adjustment is given by $x_a = x_r \, td_{base} / td_t$, where td_{base} is the average monthly number of trading days in the base year (2000 in our

seminal work (1974), we have decided to use raw data because they are directly available and avoid filtering problems that may be exacerbated in real-time datasets.[7] The resulting SMs contain a number of unusual data transformations and restrictions, which are suggested by searches over the historical period up to January 2003 and are not influenced by subsequent events.[8]

The forecast error of alternative models can be decomposed into: (i) idiosyncratic elements (such as future random shocks and data revisions) that cannot be forecast; (ii) the misspecification bias, which may be reduced with complex models (ie with many parameters); and (iii) the difference between population and estimated parameters, which is related to the number of parameters to be estimated and the length of the estimation sample. The last two cases are characterised by a double trade-off: (a) complex versus simple models; and (b) long versus short estimation samples. On the one hand, a low number of degrees of freedom due to too many parameters or too few data (or both) may affect the precision of estimates and forecasts; on the other, long samples may be associated with the presence of heterogeneity and structural change.

The models in Table 1 approximate the conditional expectation function with alternative mixes of the trade-offs discussed above. With regard to the simple/complex trade-off, we consider the univariate ARIMA model (Table 1, point A) as a benchmark, the alternative single-equation SM for the aggregate IPI (with only a few indicators, see Table 1, point B), the multiple-equation disaggregate SM (with a large number of indicators, see Table 1, point C) and the unstructured empirical indicator approach based on a very large dataset of indicators (Table 1, point D). The SM parameters are estimated with OLS and SUR techniques.[9] In the case of the FM, we use both static (Stock and Watson (2002a, 2002b)) and dynamic (Forni et al (2000, 2005)) representation estimates. The issue of the length of the estimation sample is dealt with by using rolling estimates with different windows.

The forecast errors obtained from the different forecasting methods, ie the combinations of different models with alternative estimators over rolling samples of different sizes, are compared by using the Giacomini and White test (GW) (2006). Its null hypothesis implies that alternative forecasting methods are equally accurate at the forecast target date using the available information set at the time the forecast is computed.[10] The GW test is suitable for our analysis because it is valid under very general data assumptions (including non-constant data-generating processes, which are common in the context of forecasting with indicators) and for both nested and non-nested models (eg the single-equation SM clearly nests with the ARIMA specifications) estimated with different techniques over different samples, and with both revised and unrevised data.[11]

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case) and td_t is the number of trading days in month t (see Bodo and Signorini (1987) and the appendix in Bodo et al (1991) for more details).

7 With monthly US series, Ghysels et al (2002), find that monetary policy rules based on raw data have more predictive power than those based on seasonally adjusted data. Swanson and van Djik (2007) note that the seasonal adjustment process (highly nonlinear) weakens the linkage between first available and final data.

8 It is worth observing that the SMs in this paper are different from those currently used at the Bank of Italy to forecast the IPI, since the latter are finely tuned over a more recent period 2001–07 (a sample can be made available on request).

9 The SUR estimates are not reported because they performed worse when compared to the OLS estimates.

10 Under the null hypothesis, the GW test is distributed as a χ^2 with q degrees of freedom, where q is the dimension of the test function. With q = 1, as in our paper, only a constant is considered; with q > 1, other variables are used in order to help distinguish between the forecast performance of the two methods.

11 Other similar tests, such as Diebold and Mariano (1995), are not normally distributed for nested models (see West (1996)) and in the presence of data revisions (on this, see Clark and McCracken (2008)).

3. Main results

Table 2 reports the comparison of SM and FM forecasts. Five alternative forecasting methods are shown for each prediction horizon: the ARIMA model; the average of the single-equation SM; the average of the multiple-equation SM; the average of the FM; and the overall average of the SM and FM models. All forecasts are computed with the latest available data, given the unavailability of a real-time dataset for some indicators (specifically two-digit Ateco data for the IPI). The first two columns report the RMSEs and their ratios with respect to the ARIMA model.

The picture is quite clear-cut: short-term information always matters. Both the SM and the FM models always significantly outperform the ARIMA model, suggesting that the short-term indicator signal dominates the noise, independently from the different methods used to extract it. In this context, however, the SM model significantly outperforms the FM model in terms of efficiency: the researcher can increase the amount of signal extracted from the available indicators and improve up to 30–40% the factor-based RMSE model. Though FM models are appealing because they can cope with many variables and capture the business cycle component of the target variable, it appears that they somehow fail to fully anticipate the highly idiosyncratic component which is characteristic of short-term dynamics.

Table 2 also reports the Fair and Shiller (FS) (1990) t-statistics for the null hypothesis that the forecast of the model in the row contains no information relevant to future IPI forecasts not already contained in the model in the column (ie the model in the row is encompassed by the model in the column). According to this test, ARIMA forecasts are generally encompassed by all models based on indicators: the FS t-statistics in the ARIMA row are never significant, contrary to those in the ARIMA column. The parsimonious use of indicators leads SMs to outperform all other forecasting approaches, as their FS t-statistics always reject the null hypothesis against all other forecasts. Among alternative SMs, the multiple-equation approach performs best in terms of the FS test: the parsimonious (ie with restrictions) exploitation of 30 indicators allows the IPI predictions to contain all relevant information.

Overall, the findings in Table 2 lend support to the superiority of the SM approach in terms of forecasting performance. This seems at odds with the results reported in similar recent papers by Angelini et al (2008) and Barhoumi et al (2008), which show that FMs outperform bridge models (BM) in predicting the euro area GDP short-term evolution (only at aggregate level in the former paper, also by country in the latter). The exercises performed in those papers are, however, fairly different from the one presented here. Barhoumi et al define the BM as a large number of bivariate regressions whose forecasts are averaged in a similar way to what we have defined as ARDL forecasts, and which we have proved perform less well.

Overall, “horse races” and comparisons of different forecasting methods lead to a better understanding of the advantages and disadvantages of the alternative approaches. BM/SM models generally provide very precise forecasts which are also very easy to interpret. Indicators that appear to be unrelated or only loosely linked to the target variable are ignored. This has two positive implications. First, SM/BM predictions can “tell the story” of the forecast on the basis of the evolution of the explanatory indicators. This is a very important feature in periods characterised by deep and rapid changes, when it is not only necessary to quantify the relevance of specific events, but also to understand their origin (recent advances in this topic in the field of FM are shown in Banbura and Runstler (2007)). Second, SM/BM datasets are smaller and less costly to update. The claim that all relevant information is used in FMs because nothing is a priori discarded implies that their datasets are very large and include indicators from many sources, with very different characteristics and quality standards.

Table 2

Comparison of alternative forecasting approaches

				Fair and Shiller (1990) test outcomes[3]				
One month ahead	**RMSE**[1]	**Ratio**[2]		**ARIMA**	**SM single**	**SM multiple**	**FM (SHIFT)**	**Avg (excl ARIMA)**
ARIMA	1.39	1.000		–	0.27	0.15	1.49	0.83
SM single-equation	0.57	0.408	***	7.04	–	1.30	7.33	5.15
SM multiple-equation	0.53	0.381	***	8.79	3.23	–	9.52	6.10
FM (SHIFT)	0.91	0.658	**	2.04	–0.56	–0.32	–	–7.80
Average (excl ARIMA)	0.71	0.510	***	3.65	–0.03	–0.12	10.30	–
Two months ahead								
ARIMA	1.88	1.000		–	1.08	0.93	1.39	1.18
SM single-equation	1.10	0.582	***	3.65	–	–0.74	2.48	1.54
SM multiple-equation	0.99	0.524	***	5.67	2.76	–	4.12	3.14
FM (SHIFT)	1.30	0.689	**	1.48	–0.01	–0.48	–	–2.42
Average (excl ARIMA)	1.14	0.604	**	2.60	0.31	–0.56	3.30	–
Three months ahead								
ARIMA	2.09	1.000		–	0.72	0.46	1.09	0.96
SM single-equation	1.45	0.691	**	2.77	–	–1.41	2.23	1.48
SM multiple-equation	1.24	0.595	***	4.23	3.28	–	3.44	2.93
FM (SHIFT)	1.58	0.754	*	1.37	–0.13	–0.79	–	–2.21
Average (excl ARIMA)	1.41	0.674	**	2.15	0.19	–0.94	2.82	–

[1] Root mean squared forecasting error of the seasonally adjusted forecast growth rates with respect to the previous month. [2] Ratios of the RMSE with respect to the ARIMA model (*, ** and *** reject at 10%, 5% and 1% the null of the GW test for equal predictive ability). [3] t-statistics of the estimates of β_R and β_C parameters in the regression using White (1980) standard errors: $\frac{y_t - y_{t-h}}{y_{t-h}} = \alpha + \beta_R \frac{\hat{y}_{R,t} - y_{t-h}}{y_{t-h}} + \beta_C \frac{\hat{y}_{C,t} - y_{t-h}}{y_{t-h}}$, where $\hat{y}_{R,t}$ and $\hat{y}_{C,t}$ are the forecasts of the two models being compared (and respectively listed along the rows and the columns), and h is the forecast horizon (h = one, two, three months ahead). The null hypothesis is that the forecast of model R (in the row) contains no information relevant to the IPI forecast not in model C (in the column). The results are robust to the use of Newey-West t-statistics.

However, the construction of SMs/BMs is more difficult and arbitrary and requires a number of subjective choices – entailing crucial trade-offs – about the model specification and the size of the estimation sample. We have shown that the IPI forecasts from multiple-equation models are often significantly better than those from single-equation models, especially at longer forecast horizons, suggesting the likely presence of some leading indicators in the information set used by multiple equations. Contrary to the FM, the SM forecasting performance appears to be more dependent on the size of the estimation sample, confirming the results in the literature about the greater stability of FM forecasts.

Both the SM and FM approaches appear to be complementary, as the strengths of one correspond to the weaknesses of the other. Factor-forecasting performance is less efficient

because it cannot pre-select the "best" indicators from large datasets and is less interpretable. However, this weakness reduces the risk of omitting important predictors, allows new information to be exploited as soon as it becomes available, prevents uncertainty about the modeller's skill/experience and delivers forecasts that are less prone to regime-shift biases. Thus, the challenge for future research is to find out how the pros and cons of the two approaches may be fruitfully merged in forecasting practice.

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Invited Paper Meeting 71

Statistics of institutional investors

Papers:	A perspective on the South African flow of funds compilation – theory and analysis Barend de Beer, Nonhlanhla Nhlapo and Zeph Nhleko, South African Reserve Bank
	Broadening the institutional coverage of financial statistics in the euro area Antonio Matas Mir, Jani Matilainen, Paolo Poloni, Rafael Quevedo and Barbara Zupancic, European Central Bank
	Nominees, registries and settlement systems: gathering securities statistics for soundness and efficiency purposes Ian J Nield, Reserve Bank of New Zealand
	Institutional investors in the euro area accounts Robert Gadsby and Celestino Girón, European Central Bank
Discussant:	Chihiro Sakuraba, Bank of Japan

A perspective on the South African flow of funds compilation – theory and analysis

Barend de Beer,[1] Nonhlanhla Nhlapo[2] and Zeph Nhleko[3]

1. Introduction

The National Financial Account (NFA), also known as flow of funds (FoF), is a financial analysis system that shows the ***uses*** of savings and other ***sources*** of funds as well as borrowings of funds by institutions to finance real or financial investment through financial instruments. It represents the systematic recording of financial transactions between different sectors of the economy, with the aim of assisting policymakers in assessing the financial position of the national economy as well as subsectors of the economy. The NFA is an extension of the national income and production accounts, as it provides information on financial flows in addition to real economic activity. The South African Reserve Bank (SARB) is the official compiler of South Africa's NFA.

South Africa has a complex financial system[4] that consists of several institutional sectors. For the purposes of compiling the FoF, economic activity and transactions between resident and non-resident units must be recorded. The rest of the world is defined as the foreign institutional sector while resident institutional units are grouped into the private sector and the public sector. The private sector consists of institutional units not controlled or owned by institutional units in the general government sector. The public sector consists of institutional units in the general government sector and corporate institutional units in the financial and non-financial sectors owned or controlled by units in the general government sector. The public sector therefore consists of the public financial business enterprises, public non-financial business enterprises and the general government.

This paper seeks to analyse how intersectoral FoF lending/borrowing positions have developed since 1992 – focusing on cash, credit, fixed interest securities and shares as the main funding instruments. The ultimate aim is to better understand the financing of South Africa's current account deficit using the intersectoral FoF approach. Intersectoral relationships are analysed among five major sectors, namely, foreign, monetary authority, financial intermediaries, government, non-financial corporations and household. The paper begins by defining the theoretical framework of FoF. A brief outline of FoF compilation in South Africa (the balance sheet approach) and in other countries follows. Finally, relations and developments among various sectors are analysed using major instruments before drawing conclusions.

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[4] "Financial system" refers to the financial institutions, processes, rules and regulations forming the South African financial sector.

2. FoF theoretical framework

The South African FoF framework presents the data in two dimensional matrices where rows (*x*) represent transactions and columns (*y*) represent sectors. Net increases (positive values) or decreases (negative values) are shown at each cell (*xy*) to represent flows in transaction *x* by sector *y* at a specific point in time. Most countries use this format, differing only in the number of transactions and/or sectors presented.

The FoF framework used by the SARB is similar to the one suggested by the International Monetary Fund in the System of National Accounts (SNA) and Monetary and Financial Statistics Manual (MFSM). The main difference is that the SARB analyses its data using the balance sheet approach as opposed to the transaction approach. The balance sheet approach calculates flows based on changes in balance sheet positions of institutions, while the transaction approach calculates flows based on detailed transaction data.

The data are presented in terms of ***sources*** and ***uses*** of funds. These data pieces are seldom equal, hence the need to process individual data pieces during compilation. Since June 2009 the SARB has published the quarterly FoF tables in its Quarterly Bulletin every quarter with a lag of two quarters, and the full preceding year is published every June. Only the flow data as opposed to stock data are currently published.

The FoF consists of five main economic sectors (labelled A–E below), which are subdivided into 22 institutional groupings or 11 sectors (labelled 1–11 below) of the economy. It covers 32 non-financial and financial transaction items. Source data formats include hard copies, spreadsheets, time series data and electronic reporting systems. The following is a detailed breakdown of the FoF structure in South Africa:

A. *1.* **Foreign sector**

B. **Financial intermediaries**

2. *Monetary authority*

2.1 South African Reserve Bank

2.2 Corporation for Public Deposits

3. *Other monetary institutions (banks)*

3.1 Land bank

3.2 Private banks

3.3 Mutual and post office savings banks

4. *Public Investment Corporation (PIC)*

5. *Insurers and retirement funds*

5.1 Long-term insurers

5.2 Short-term insurers

5.3 Public pension funds

5.4 Private pension funds

6. *Other financial institutions*

6.1 Trust companies

6.2 Unit trust

6.3 Finance companies

6.4 Participation bond schemes

6.5 Public sector financial intermediaries

C. General government

7. Central and provincial governments

7.1 Central and provincial governments

7.2 Social Security funds

8. Local governments

D. Non-financial business enterprises

9. Public sector

10. Private sector – derived

E. *11.* **Households – derived**

3. FoF compilation in South Africa and abroad

A contra-entry accounting method is used to record transactions. Each of the 22 institutions is first balanced within itself before the two closely related processing steps (discussed below) are performed. This compilation procedure is not highly followed around the world (see case studies below). The balanced individual institutions are consolidated into 11 sectors. The data are then transferred manually to a final processing spreadsheet. The final processing spreadsheet is a semi-automatic macro-driven tool for aligning transactions and making alterations to figures that may have been wrongly recorded in the database from source files. The two FoF processing steps are discussed below.

Step 1 of the processing involves making sure that corresponding sectors have the same sources and uses by using the macro-driven spreadsheet. In order to balance the data between any two sectors for any transaction, the following information should be taken into account (the tables need not balance to zero during this phase):

> *Which of the compared sectors is actively involved, as part of its main business activity, in the transaction in question?*
>
> *How much is the deviation of each sector's data piece from the guide figures as published in the SARB* Quarterly Bulletin *balance sheets? (A guide document with specific item-by-item notes and reminders is used during the data processing phases.)*
>
> *Since it is impossible to have a perfectly balancing economy due to many factors including timing in reporting and general errors, the data may need to be adjusted using financial market performance trends, source data integrity of the sectors and economic intuition of the compiler(s).*

Step 2 of the processing involves incorporating savings and investment data into the final spreadsheet. While step 1 deals with the financial sector data or bottom-up calculation of the net lending/borrowing position, step 2 deals with the real sector data or top-down calculation of the net lending/borrowing position. The detailed data processed in step 1 must therefore agree with the new data brought in during step 2. There are always some minor adjustments made in the balancing items. In the South African case the error has historically been

corrected in the financial sector data (step 1 data)[5]. The tables must balance to zero after step 2 has been completed.

The two kinds of problems that are encountered during the processing of the FoF are natural drawbacks and artificial drawbacks. Natural drawbacks are inherent problems that may not be detected or may only be picked up late in the processing stage. These problems may reveal that the data used are incomplete or incorrect, eg related to accuracy of data and reporting timing. Artificial drawbacks are problems that may be resolved and/or reduced before or during processing. If resolved, these problems may translate into improved final published information and may enhance data coverage as well as asset revaluation.

South Africa benefited from the experiences of other countries (particularly first-world countries) and improved the compilation of its own flow tables, as these countries have been publishing their flows for many decades. Case studies from the United Kingdom (UK), Sweden, Canada and Portugal are briefly examined below, outlining how they have been compiling their flows over time.

In the case of the United Kingdom, the Office of National Statistics (ONS) prepares the flows. Its FoF unit specializes in coordinating the data received. Sources of data include the Bank of England, *Annual inquiry on foreign direct investment and other financial institutions*. There is an act that compels institutions to submit information to the ONS.

The structure of the tables corresponds to the structure of the source data forms. Stock data levels and flow data levels are shown in separate tables. The flows are compiled and presented in a roll-up format in a tailor-made database system called WinCSDB. Data and calculations can be done and viewed online. During compilation, missing data points are derived. Several meetings involving all parties concerned are held to reconcile data and to investigate large data movements. A possible drawback in the UK system is that data collection and FoF compilation are done by different parties. This may lead to data being wrongly adjusted during the “cleaning up” process.

In the case of Sweden, the sources of data provided to the Statistika Centralbyrån (SCB) are mostly supervisory institutions, eg the Tax Board, National Debt Office, etc. The data collection unit is separate from the data processing unit. Non-responding institutions are kept constant. Some industries are sampled while others are surveyed fully. Institutions are compelled by law to submit information and may even lose their licences if they refuse to do so. Although calculations on the data can be updated if desired, the system used is relatively inflexible and it may take some time to update data.

Data processing takes place in Excel. All data queries are done via Access. PAX (PC-Axis) is used to check trends in the data. Several meetings involving all parties concerned are held to confirm the data. Revaluations are done to shares, bonds and all assets linked to shares. Although discrepancies between the financial and the real sectors are not corrected, the national accounts data are accepted as official. Residuals or balancing items are calculated only in the yearly tables and not quarterly. Again a possible drawback in this system is the separation of FoF compilers and data collectors. Furthermore, keeping forms constant may lead to incorrect statistics.

In the case of Canada, sources of data for Statistics Canada include the financial and non-financial private corporation sector, the public institution division (public enterprise and government) and the income and expenditure accounts (quarterly and annual samples). The FoF unit specialises in coordinating the data received. Although some data are sampled, most of the surveys are universal. Legislation compels institutions to submit information. The

[5] This is not set in stone – the error can be corrected on either side of the compilation.

data are presented in annual and quarterly tables and data updates are done easily and quickly.

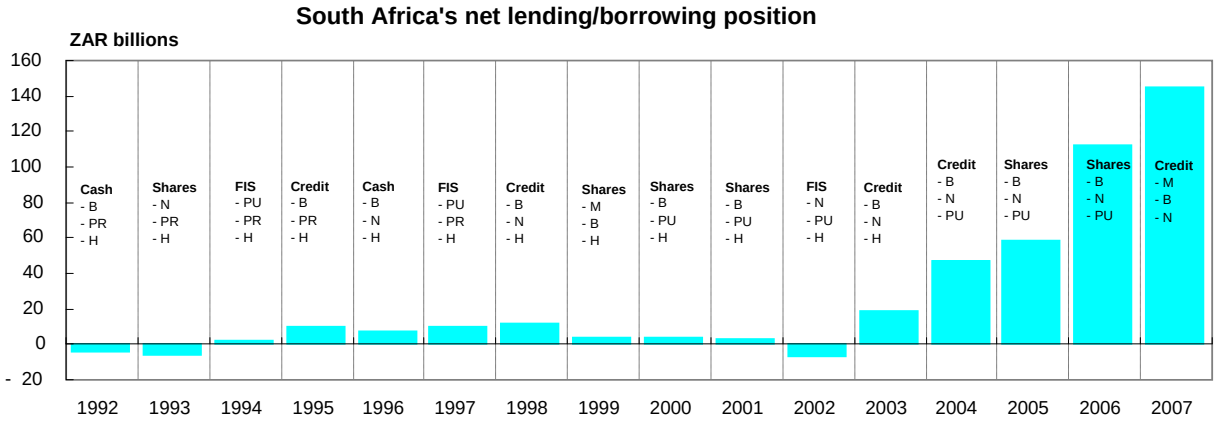
Data processing takes place in a system called FAME. The balancing of sectors in the master database depends on the credibility of data sources. Some data are accepted without any changes, while others are brought into line with previous trends. Several meetings involving all parties concerned are held to confirm the data and adjustments can be made on either the real or the financial side of the data (which is more in line with FoF compilation principles). Stock-to-stock figures are calculated or derived if they do not exist. A drawback is that stock-to-stock analysis may be difficult if detailed transactions are not available.

In the case of Portugal, the national financial accounts are compiled by the Bank of Portugal. The FoF unit specializes in coordinating the data received. There are several legislative arrangements and understandings with other institutions, such as the National Statistical Office (Instituto Nacional de Estatística – INE), that are in place to assist in compelling respondents to submit information. The in-house security-by-security database enhances the sector identification process significantly. Data processing takes place in a system developed in-house called Mascot. Estimating counterparty information is an important aspect of the compilation. The data are presented in monthly, quarterly and annual tables and are published at the level of five main economic sectors. A drawback is that estimated data require constant revisions.

4. Intersectoral relationships in the South African FoF

Between 1992 and 2007, South Africa had only three surplus current account positions. This is not too surprising, given the developing state of the country and its future infrastructural requirements. The nature of financial and macroeconomic reforms since the 1990s entailed measures aimed at reducing the budget deficit, gradual relaxation of exchange controls and increased global participation by institutional investors as well as enhanced market entry of foreign banks in South Africa. These and other similar developments gave rise to South Africa's current account deficits. There was a brief interruption in 2002 owing to financial outflows, probably as a result of the 11 September 2001 crisis. However, deficits have widened further since 2003 as net foreign liabilities have increased.

Figure 1



Legend: FIS = fixed-interest securities (see section 4.3); F = foreign; M = monetary authority; B = banking; N = non-banking financials (B and N form financial intermediaries); G = government; PU = public non-financial enterprises; PR = private non-financial enterprises (PU and PR form non-financial business enterprises); H = households.

Throughout the period covered in Figure 1, the developments in the net lending/borrowing position have been driven by robust issuance of shares by public non-financial enterprises and strong credit extension by banks. Naturally, non-bank financials played an important intermediation role in this process.

The following sections investigate the role of cash, credit, fixed-interest securities and shares in financing the country's mostly net borrowing position. This role is analysed across the main sectors in the economy, namely, foreign, monetary authority, financial intermediaries, government, non-financial corporations and households.

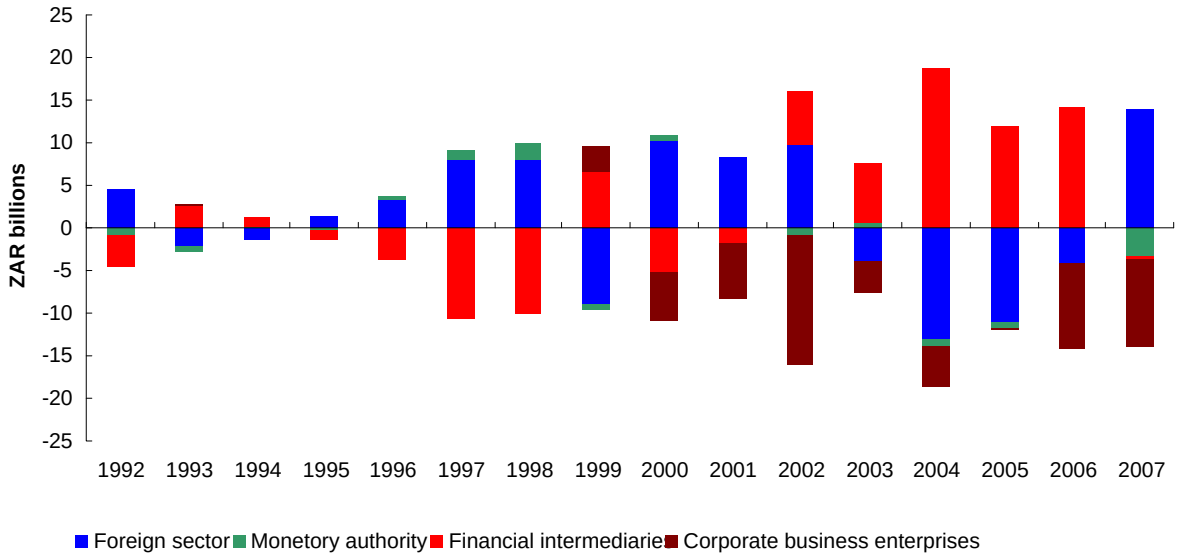
4.1 Cash

Cash plays an integral part in the smooth functioning of any economy. It is a basic building block of any financial system. For the purposes of this analysis, cash is made up of the following subcategories:

- Cash and demand deposits
- Short/medium-term deposits
- Long-term deposits
- Deposits with other financial institutions.

Figure 2

Total net borrowing/lending – cash



As depicted in Figure 2, the main sectors that participated in the use of this instrument were the foreign sector, financial intermediaries and private non-financial enterprises. From 1992 to 2007 the foreign sector recorded net inflows of cash for seven out of the 16 years. This net inflow to the foreign sector was reversed in 2007, partly reflecting the increased activity in the operations of South African banks and non-financial corporations since 2002. This was in line with the increased globalisation of business operations in which South African entities fully participated during this period.

Deposit activities often form the foundation of cross-border investment strategies – direct or portfolio – and this increase across the four sectors since 2000 supports the evidence of an expanding emerging economy, both within and outside the borders of the Republic. Since the turn of the century, emerging economies like South Africa have reported record economic growth rates as world demand increased and productive assets were mobilised in these economies to meet this demand. A key component of such an expanding economic period is sustainable and sufficient levels of liquidity. The FoF data on cash supports this view, reflecting increased liquidity levels both between domestic sectors and the foreign sector and among domestic sectors. Once the international credit crunch period is over, the intersectoral FoF data will probably show a different picture following the drying-up of liquidity and the infrastructure expansion problems that followed. Early indications are that this is partly revealed in the 2008 FoFanalysis, and more is expected in the 2009 FoF data.

4.2 Credit

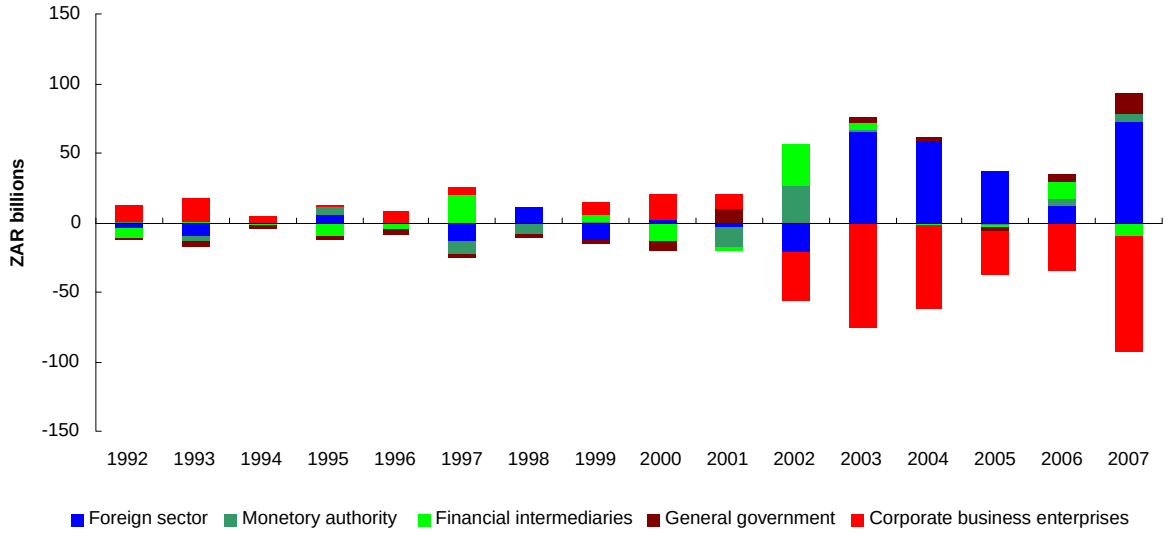
The extension of various forms of credit to facilitate real and financial transactions is the second major building block in the modern capitalist economy. For the FoF analysis, credit is made up of the following subcategories:

- Bank loans and advances
- Trade credit and short term loans
- Long-term loans
- Mortgage loans.

Within the intersectoral FoF analyses, this instrument category forms an integral part in understanding how the major domestic sectors of the economy and the foreign sector finance their positions. Since 2000, the South African economy has been expanding at a fast pace and participating fully in the high rate of global integration. As domestic savings and investment were not sufficient to support this level of expansion, the foreign sector played an instrumental role in facilitating the exceptional growth that was witnessed. Figure 3 supports this view.

Figure 3

Total net borrowing/lending – credit



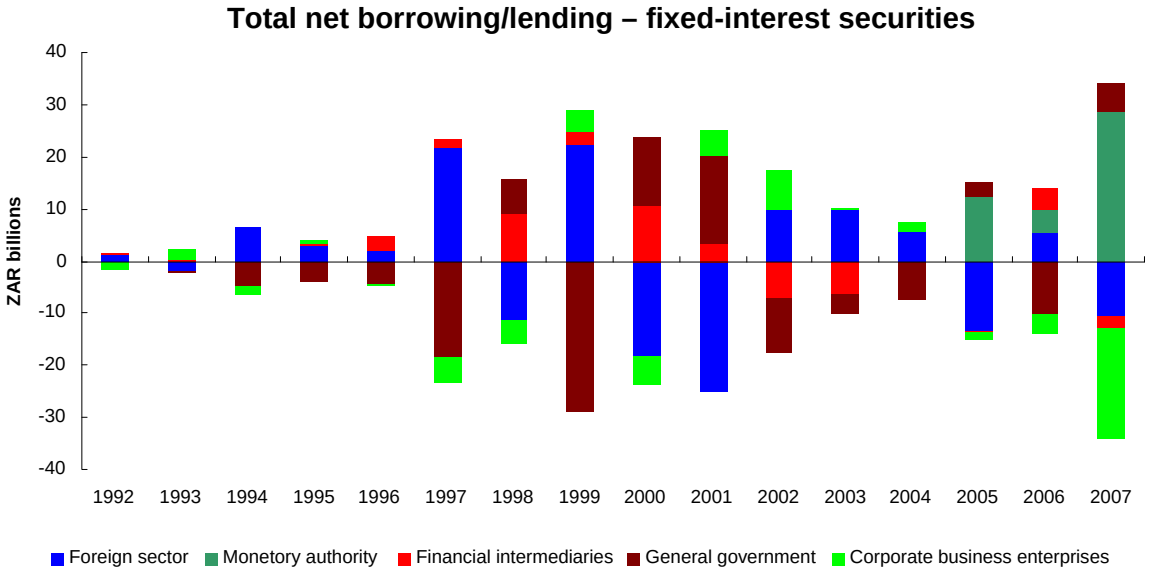
Since 2005, the foreign sector contributed ZAR 246 billion worth of net inflows to the South African economy in the form of credit to the domestic sectors. A significant portion of these

inflows were in the form of trade credit provided to South African non-financial corporations to facilitate their expanding operations. A significant portion of this was extended by large multinational enterprises to their South African subsidiaries as part of a drive to increase their global footprint via decentralised production and operation facilities. Another important component of this drive was increased global merger and acquisition activity where multinational corporations actively restructured their portfolio of companies to suit their core focus areas. Credit extension plays an integral part in such a process and numerous South African companies participated in this process, both as targeted companies and as acquirers. A good example of this is the drive of private equity funds to establish, grow and restructure their portfolio of South African companies since 2003, intensively utilising some form of credit across various sectors of the economy.

4.3 Fixed-interest securities

Fixed-interest securities are defined as investments which pay a fixed rate of interest and include investments in government or institutional bonds, treasury bills and other loan stock and preference share instruments. Following macroeconomic policy adjustments and the political transition in 1994, investment opportunities prevailed in South Africa and economic agents diversified their portfolios over various asset classes. At a time when globalisation was gaining momentum in the early 1990s, foreign direct investment improved in South Africa. Between 1992 and 1999, the general government and non-financial business enterprises recorded a net borrowing position of ZAR 74 billion, which was mainly incurred by issuing fixed-interest securities.

Figure 4



The main instrument used to finance the deficit position of South Africa in 1994 and 1997 was the issuance of long- and short-term government bonds by general government, while non-financial business enterprises issued bills and reduced debt. From 1992 to 1997 foreign investment inflows into fixed-interest securities amounted to ZAR 35 billion, supporting the average domestic economic growth of 2.1 per cent between 1992 and 1997.

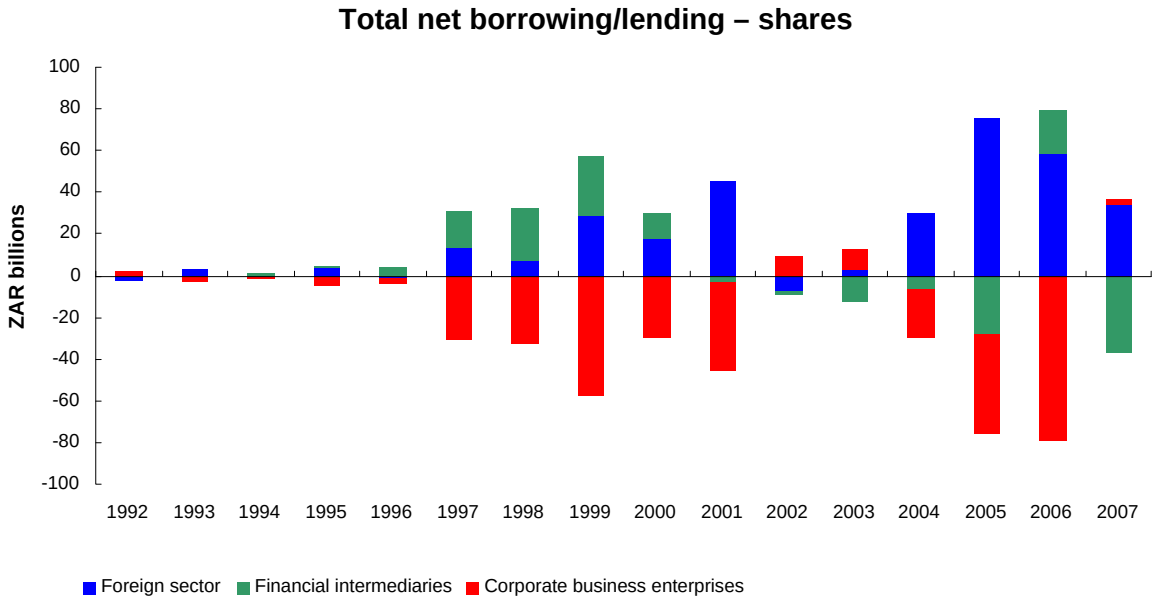
Similarly, following the introduction of the inflation targeting framework in 2001, recovery in the exchange rate and brief periods of declining inflation and interest rates, the demand for domestic fixed-interest securities by the foreign, monetary and financial intermediaries

sectors remained buoyant in line with declining bond yields. From 2000 to 2007, the foreign, monetary and financial intermediaries sectors purchased fixed-interest instruments in the amount of ZAR 31 billion, ZAR 45 billion and ZAR 18 billion, respectively. Overall, the net acquisition of fixed-interest instruments by the foreign, monetary and financial intermediaries sectors accounted for 0.6 per cent of GDP. The main issuers were the general government and non-financial business enterprises.

4.4 Shares

Shares are defined as risky asset investments that generate income through dividend payments as determined by the stock price and include ordinary shares. The foreign and financial intermediaries sectors provided the main source of funding for South Africa through their acquisition of shares issued by non-financial business enterprises.

Figure 5



The domestic non-financial business enterprise sector used a window of opportunity provided by access to international financial markets to obtain funding by issuing shares. The bulk of the share issue was acquired by the foreign and financial intermediaries sectors, providing funds in the amount of ZAR 320 billion and ZAR 110 billion, respectively, over the period 1992–2007 and representing 2.1 per cent and 0.7 per cent of GDP. Notwithstanding the emerging market crisis in 1998, the foreign sector played a vital role in equity investment in South Africa, as global financial markets deepened and economic growth gradually improved.

The non-financial business enterprise sector's issuance of shares amounting to ZAR 353 billion, or 2.4 per cent of GDP between 1992 and 2007, makes it a significant net borrower of funds in South Africa. During the period 1992–2007, portfolio capital flowed into South Africa in line with significant increases in share market turnover associated with buoyant commodity prices and stronger international markets. However, the foreign sectors' role in equity funding decreased by 41.7 per cent from 2006 to 2007, mainly as a result of the financial crisis in developed financial markets. Subprime mortgage lending in the United States imposed capacity constraints and prohibited access to credit markets, and as share prices fell, foreign investor behaviour changed. Economic agents reallocated their financing surpluses towards relatively less risky asset classes such as cash and bonds.

5. Conclusion

The compilation of the South African FoF matrices is a complex exercise, but it has benefited from the experiences of other countries and has improved over time. The intersectoral FoF approach was used to analyse the net lending/borrowing positions of the main sectors in South Africa, thereby offering a perspective on the financing of the current account position. Of the four main instruments analysed, namely, cash, credit extension, fixed-interest securities and shares, the issuance of shares by non-financial business enterprises and credit extension by financial intermediaries have been strong drivers of the net lending/borrowing positions of domestic sectors, and this has largely mirrored the current account position of the balance of payments in South Africa.

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Broadening the institutional coverage of financial statistics in the euro area[1]

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Rafael Quevedo[5] and Barbara Zupancic[6]

Introduction

The European System of Central Banks (ESCB) requires statistics on various types of financial institutions to carry out its tasks. These statistics need to be harmonised and available for the euro area as a whole, and in many cases also for each of the currently 16 countries which constitute the euro area. There are two alternative approaches to achieve this. First, the European Central Bank (ECB) has primary responsibility at the European level for collecting statistical information from monetary and financial institutions (MFIs) and other financial intermediaries, except insurance corporations and pension funds (OFIs), and the ECB has been empowered to issue regulations which set out statistical reporting requirements directly addressed to the reporting agents in the euro area belonging to these two sectors.[7] Second, data may already be available at the national central banks (NCBs), and the ECB may request that these data be transmitted to it. This procedure is commonly referred to as a "short-term approach", and it involves only a limited degree of harmonisation, given that the underlying data may be collected according to different standards in the different euro area member States. It may be applied to any statistics, eg on the insurance corporations and pension funds (ICPF) subsector.

The monetary policy strategy of the ECB assigns a prominent role to monetary analysis. For this reason, high-quality, harmonised and timely balance sheet statistics on MFIs were essential to the ECB from the inception of the euro area. As a result, the first ECB statistical regulation was issued in 1998,[8] which allowed for a compilation of harmonised MFI balance sheet statistics across the euro area.

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7 As laid out in Council Regulation (EC) No 2533/98 of 23 November 1998 concerning the collection of statistical information by the ECB (cf whereas 7 and Art 2.2.(a)).

8 Regulation ECB/1998/16 of the European Central Bank concerning the consolidated balance sheet of the monetary financial institutions sector; it was later amended and recast as ECB/2001/13, and then again as ECB/2008/32.

Statistics on financial intermediaries other than MFIs are important for monetary as well as economic and financial analysis. This sector, especially investment funds (IFs) and ICPFs, has grown substantially over the past two decades in terms of financial assets.[9] Furthermore, these institutions manage their asset portfolios increasingly more actively. As a consequence, frequent and timely statistics on their balance sheets and changes therein have become more relevant for monetary analysis and other tasks of the ESCB, also in view of increasingly complex financial markets, with steadily growing interlinkages between the various financial intermediaries. In addition, the growing awareness of the financial implications of longevity as well as the general move towards funded pension schemes are likely to substantially increase the importance of the ICPF subsector for ECB analysis.

In this context, the ECB has been working on three sets of statistics: IFs, ICPFs and financial vehicle corporations (FVCs), plus related MFI loan securitisations. This paper describes the work carried out to develop these statistics. The focus on these intermediaries represents their importance at the euro area level; Chart 1 presents the sizes of different subsectors of financial intermediaries in the euro area.

Chart 1

Total assets of euro area financial intermediaries as at Q1 2009

	Total	Monetary financial institutions	Insurance corporations and pension funds[1]	Other financial intermediaries[2]	
				Total[1]	Of which: Investment funds
Total assets (EUR bn)	47,279	31,821	5,947	9,511	4,097
As a percentage of total	100	67	13	20	9

[1] Total financial assets. [2] This category includes, for example, securitisation vehicles, financial corporations engaged in lending, and securities and derivatives dealers.

Source: ECB.

1. Investment fund statistics

1.1 Short-term approach until 2009

The ECB has published quarterly euro area aggregated IF statistics since January 2003. These statistics exclude money market funds, which are included in the MFI sector. Data transmission by the NCBs to the ECB has been done on the basis of available data at the national level[10] – the statistics are thus not harmonised across the euro area and, while NCBs aim to provide comparable breakdowns, the data may still deviate from the required definitions. This section briefly describes the main features of these statistics.

[9] See also E Gonnard et al (2008).

[10] In accordance with the requirements established in Annex XVIII of Guideline ECB/2003/2, as amended.

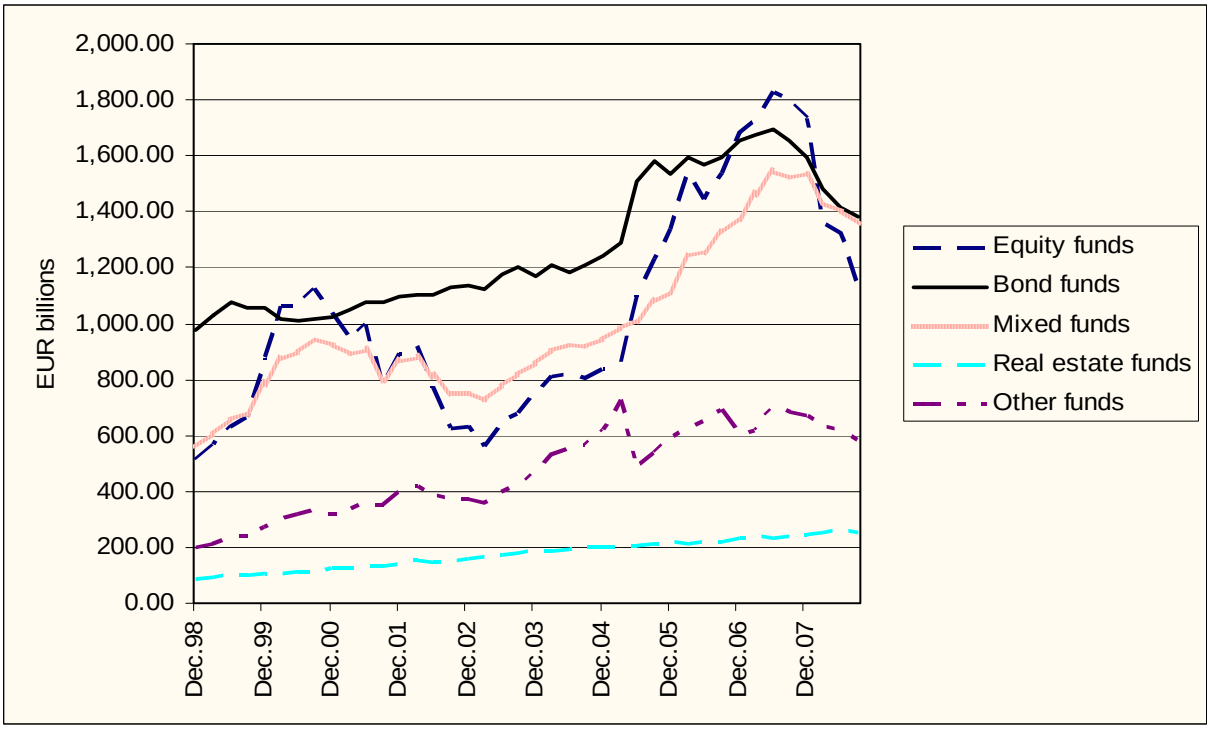
The ECB has compiled euro area aggregates for the main items of the balance sheet of (a) total IFs, (b) IFs broken down by investment policy and (c) IFs broken down by type of investor. Chart 2 below presents the total assets of euro area IFs broken down by investment policy.

The data have been published with a time lag of approximately three and a half months, and refer primarily to end-quarter stocks. As from July 2008, the ECB has published transactions of total IF shares/units issued by all IFs. No further disaggregated euro area transactions statistics have been published owing to limited and heterogeneous data. Given the importance of transaction data for economic analysis, this was seen as a major drawback of these statistics. In addition, only a few breakdowns have been published: an instrument breakdown, including holdings of debt securities split between maturities of up to one year and over one year. Euro area aggregates have also been published for the geographical breakdown of the holdings of IFs, but substantial estimations were required. Assets and liabilities broken down by counterpart sectors have not been available.

The figures compiled for euro area IFs may underestimate the actual total assets of IFs, as the data coverage may not be complete in all countries. Also, the instrument/maturity coverage and valuation methods in the national input data may differ from the ECB's reporting instructions.

Chart 2

Total assets of euro area investment funds broken down by investment policy



Source: ECB.

1.2 Harmonised IF statistics from 2009

In order to overcome the shortcomings of the short-term approach described in the previous section, the ESCB started to design a steady-state approach for IF statistics. The preparatory

work began in 2004, when a so-called merits and costs exercise[11] was launched. After completing this exercise, the statistical framework was formalised by way of two legal acts: an ECB regulation[12] addressed directly to the reporting agents, and amendments to an ECB guideline,[13] which is addressed to the NCBs. Both of these legal acts were published in August 2007.

The statistics reported in accordance with the legal framework allow the compilation of harmonised euro area statistics on all kinds of IFs resident in the euro area that comply with the statistical definition provided in the regulation. The ECB will publish a list of all resident IFs subject to the reporting requirements. The IF sector is also further broken down into several subsectors, one of which is hedge funds. For this purpose a statistical definition for hedge funds is included in the guideline. These new statistics will thus provide reliable regular output that allows for monitoring the developments in the euro area IF industry, including the hedge funds incorporated in the euro area.

The main shortcomings of the statistics compiled under the short-term approach have been overcome. The regulation requires the harmonised collection of breakdowns of assets and liabilities of IFs by geographical counterpart, sector, maturity and currency, similar to the current MFI balance sheet statistics. Both stock and transaction data are required on a quarterly basis, with key statistics also becoming available on a monthly basis. The time lag for the availability of the statistics has been significantly reduced, to 28 working days after the reference period.

An important feature of the statistics under the regulation, which has significantly helped to reduce the costs for reporting agents, is the option provided to the IFs, subject to the prior approval of the relevant NCB, to report their securities portfolios on a security-by-security basis instead of on an aggregated basis. NCBs then compile the necessary aggregates with the help of the common ESCB securities reference database (Centralised Securities Database) or compatible local securities databases. Other elements of flexibility are also laid down in the regulation so as to further reduce the set-up and regular costs without compromising quality (eg a reduced reporting frequency for IFs that value their assets less than once per quarter, and the collection of securities positions either with or without accrued interest).

The first reporting of data took place in February 2009, with December 2008 as the first reference period. As for all ESCB statistics, the collection of the data from the reporting agents is carried out by the NCBs, which in turn provide the aggregated statistical information to the ECB, which derives the euro area aggregates. The inaugural publication of the new IF statistics is expected to take place in late 2009, following a thorough quality control and analysis of this new dataset.

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[11] In this exercise, ESCB users of statistics were asked to indicate the features they would require for the new IF statistics, while statisticians at the NCBs, in close cooperation with the reporting agents, assessed the costs of reporting various features. In a final step, the merits and costs were matched; this led to a set of reporting requirements for which the merits outweigh the associated costs.

[12] Regulation (EC) No 958/2007 of the European Central Bank of 27 July 2007 concerning statistics on the assets and liabilities of investment funds (ECB/2007/8).

[13] Guideline of the European Central Bank of 1 August 2007 on monetary, financial institutions and markets statistics (recast) (ECB/2007/9).

2. Insurance corporations and pension funds statistics

The ICPF sector has grown substantially grown over the last decade and represents the second largest financial corporations subsector in the euro area in terms of financial assets. ECB users expressed a high-priority need for the compilation of timely and detailed quarterly ICPF balance sheet statistics with a view to enhancing the monetary and economic analyses that serve as an input to monetary policy decisions. For example, statistics for the ICPF sector would allow the analysis of household portfolio shifts between ICPFs, OFIs and MFIs, including the impact that such shifts may have on developments in money and credit aggregates and including the impact on economic activity through wealth effects.

The ESCB started work towards new ICPF statistics under a "short-term approach", ie enhancing the compilation of these statistics without setting a new data collection from reporting agents. The work by the ESCB focuses on exploring, improving and using existing statistical sources without increasing the reporting burden for the ICPF sector. As a follow-up, a dedicated ESCB task force was established in November 2007. Its main focus was to produce best national estimates to contribute to euro area flash estimates on ICPF with a timeliness of T+85 calendar days after the end of the reference quarter.

Accordingly, the ESCB designed a reporting scheme for the transmission of data and metadata. This scheme has been used in the regular quarterly transmissions by NCBs to the ECB. The data transmitted to the ECB ensured a reasonable euro area coverage for at least a subset of series on outstanding amounts, while only a few data on transactions are available. For monetary analysis, breakdowns were included by sector and residency of the counterparts of ICPF assets and liabilities. These breakdowns support the analysis, as, for instance, changes in household portfolio allocations towards a greater investment in ICPFs instead of short-term bank deposits can have an important impact on monetary developments. The importance of ICPFs to households has grown in recent years, with the share of insurance technical reserves in total household sector financial assets increasing from 21 per cent in 1995 to 30 per cent in 2008.

In almost all euro area countries, sector information for ICPF counterparties can be provided (although in most countries this information is available only for domestic counterparties). A split by residency between domestic and foreign counterparties is feasible at the national level. However, in general it is not possible to distinguish between other euro area residents and residents of countries outside the euro area, although a few countries can provide such a split. Moreover, in order to enhance the monetary analysis, the ICPF reporting scheme provides maturity breakdowns for deposits, securities and loans that correspond to those in the MFI balance sheet statistics. Indeed, it is expected that a higher volume of retirement savings, due to ageing populations and increased private funding of national pension systems, will raise the demand for financial assets and especially those with longer duration relative to short-term savings instruments and residential real estate. The reporting scheme is available also by type of entities (ie insurance corporations and pension funds). As these may have different investment policies and money-holding behaviours, this split allows for a more comprehensive analysis of the effects of portfolio allocation. Finally, for economic analysis, the breakdown of ICPF technical reserves by type of plan (eg defined-benefit and defined-contribution plans in the case of pension funds) enables a better estimate of the propensity to consume out of different categories of financial wealth.

The ESCB also discussed the data sources and estimation techniques used by countries for national ICPF data. Supervisory sources are widely used, and usually provide solo accounts (ie not only consolidated accounts), but other sources, such as direct reporting and counterpart information (MFI balance sheet data, balance of payments/international investment position statistics, custodian data or direct reporting of securities holdings), are also relevant. However, given the lack of detail and/or timeliness of these sources, or their annual frequency, most NCBs have to use statistical techniques and estimates to achieve the frequency, timeliness and breakdown required for the new ICPF reporting scheme. While

room for further substantial statistical improvements is limited by data availability (which is peculiar to the approach chosen), several NCBs have initiated some changes that will improve the basis for ICPF statistics, eg by better linking to available supervisory sources or using data available from industry associations. Owing to the importance of supervisory sources for the compilation of ICPF statistics, the ECB is in close contact with the Committee of European Insurance and Occupational Pension Supervisors (CEIOPS), which is currently developing harmonised supervisory reporting and disclosure schemes. Although quarterly reporting/disclosure is not mandatory, many national supervisory authorities will request or are already requesting, at least in part, quarterly information covering major balance sheet items and insurance technical reserves.

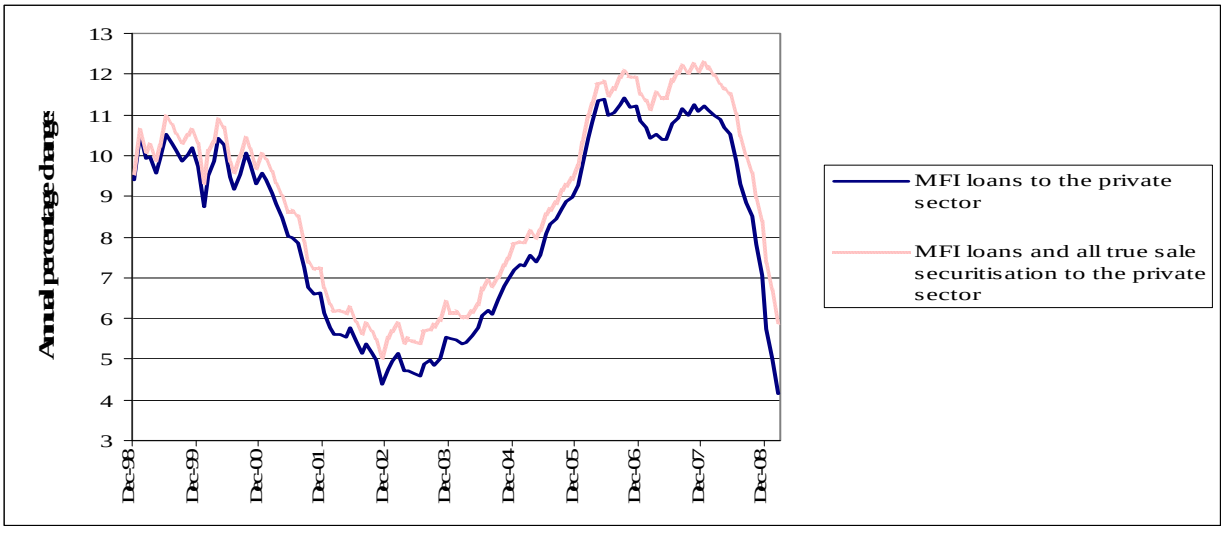
The first regular transmission of ICPF data took place in June 2008. A workshop is planned in the last quarter of 2009 to assess the implementation at that stage and the progress in terms of timeliness, availability and quality of the national data and the derived euro area aggregates.

3. Securitisation statistics

Statistical work has been undertaken to develop statistics on securitisation and, more generally, to measure credit risk transfer (CRT) within and outside the euro area. Initially, the main reason driving the development of this statistical work was the need to improve monetary policy analysis. Loan securitisation usually takes place by means of a sale or similar operation which implies de-recognition in many accounting frameworks. Given that these transactions do not result from the supply and demand of loans, they create a distortion in the loan series. Chart 3 shows how the available securitisation data should be factored into the analysis of credit developments, in particular in certain periods (eg 2003 and 2007–2008).

Chart 3

Impact of true-sale securitisation on loans to the private sector



Source: ECB.

More recently, in particular in response to the current financial crisis, statistical data on securitisation were deemed even more relevant also in order to improve the financial stability analysis and, in particular, to measure cross-border and cross-sector transfers of credit risk.

Two rather distinct CRT developments and measurement issues can be identified. First, credit risk is transferred by making the underlying loan negotiable in the form of securities, often issued by securitisation vehicles. Second, credit risk itself may be transferred using credit derivatives. Mixed solutions have also been used, eg securitisation vehicles issuing securities collateralised by credit derivatives.

In order to measure CRT undertaken via the issuance of securities, the statistical development work has focused on harmonised statistics on banks' securitisation and loan sales, integrated with balance sheet statistics on securitisation vehicles (called FVCs in the ESCB statistics). The related statistical requirements have been laid down in two recent ECB regulations;[14] here the focus is on macroeconomic and monetary analysis and the residency criterion is based on the host country of the individual entities surveyed.

Banks, which form the main part of the MFI sector, will report monthly and quarterly information (net flows and, if acting as servicers, also stocks), on traditional loan securitisations through an FVC and on loan sales, with a breakdown by maturity, purpose, residency/sector of debtors, and residency of the FVCs. Moreover, MFIs will report data on holdings of securities issued by FVCs as well as further details to ensure consistency of the reporting of securitisation with different accounting standards. This information will provide users with a measure of the share of loans for which credit risk has been transferred, ie net of the FVC securities that have been purchased. However, the risk dimension of the purchased FVC securities will not be available in these statistics, and hence, they will not suffice for a broad picture of credit risk transfer.

In parallel, complete information on the balance sheets and transactions of FVCs will become available at a quarterly frequency, covering the portfolio of securitised loans broken down by residency/sector of the originator and residency/sector of debtors, as well as a breakdown of their holdings of securities by maturity and sector/residency of issuers. Within the instrument breakdown, gross positions and transactions in financial derivatives will be identified, as well as debt securities issued, broken down by maturity, and deposits. Moreover, FVCs involved in true sale and synthetic securitisations will be separately identified.

The two sets of statistics (MFI securitisation data and FVC balance sheet statistics) are integrated. A particular effort has been made to ensure that the same information is not reported twice, ie by the originating bank and by the FVC which securitises the loans. Moreover, a significant degree of flexibility has been given to national central banks (NCBs) regarding the data sources needed to compile FVC balance sheet statistics. In practice some NCBs will compile the statistics on the basis of existing (supervisory or public) data sources, whereby predefined data quality standards will be met.

Some limited information on securitisation originated within the euro area by entities other than banks will also be available. On the holding side, the collection of new harmonised statistics on assets and liabilities of IFs (including hedge funds)[15] will be based on security-by-security reporting, so that it will be possible to access their holdings of structured securities issued by banks and FVCs.

The harmonised statistics on securitisation will become available in 2010, and some interim statistics have been compiled using existing (commercial, supervisory) sources, thus making it possible to meet some users' immediate information needs, including the need for micro

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[14] Regulation (EC) No 24/2009 of the European Central Bank of 19 December 2008 concerning statistics on the assets and liabilities of financial vehicle corporations engaged in securitisation transactions (ECB/2008/30) and Regulation (EC) No 25/2009 of the European Central Bank of 19 December 2008 concerning the balance sheet of the monetary financial institutions sector (recast) (ECB/2008/32).

[15] See section 1 above.

data on securities issuance.[16] Work has also begun on identifying the sector and residency of holders of securities arising from securitisation deals as part of a broader endeavour to identify holders of securities, but this work is expected to take some time to complete.

References

Gonnard, E, E J Kim and I Ynesta (2008): "Recent trends in institutional investors statistics", *Financial Market Trends*, Organisation for Economic Co-operation and Development, vol 2008/2, no 95, December.

Poloni, P and J Reynaud (2009): "How to measure credit risk transfer in the EU", *IFC Bulletin,* no 31, Basel, July.

[16] See P Poloni and J Reynaud (2008).

Annex:
Examples of reporting tables (not complete requirements)

Investment funds

Table 1

Stocks

Data required to be provided on a quarterly basis

	A. Domestic (total)									B. Other participating Member States (total)									C. RoW (total)				D. Not allocated
		MFIs	Non-MFIs - Total	General Gov't	Other residents						MFIs	Non-MFIs - Total	General Gov't	Other residents						of which non-participating Member States	of which US	of which Japan	
					Total	Other financial intermediaries + financial auxiliaries (S.123+S.124)	Insurance corporations and pension funds (S.125)	Non-financial corporations (S.11)	Households + non-profit institutions serving households (S.14+S.15)					Total	Other financial intermediaries + financial auxiliaries (S.123+S.124)	Insurance corporations and pension funds (S.125)	Non-financial corporations (S.11)	Households + non-profit institutions serving households (S.14+S.15)					
	[a]	[b]	[c]	[d]	[e]	[f]	[g]	[h]	[i]	[j]	[k]	[l]	[m]	[n]	[o]	[p]	[q]	[r]	[s]	[t]	[u]	[v]	[w]
ASSETS																							
1 Deposit and loan claims		■		■		■	■	■	■		■		■		■	■	■	■	■				
2 Securities other than shares																							
2e. Euro																							
up to 1 year		▒									▒												
over 1 year and up to 2 years		▒									▒												
over 2 years		▒									▒												
2z. Foreign currencies																							
up to 1 year		▒									▒												
over 1 year and up to 2 years		▒									▒												
over 2 years		▒									▒												
2t. Total currencies																							
up to 1 year				▒		▒	▒	▒	▒				▒		▒	▒	▒	▒	▒	▒	▒	▒	
over 1 year and up to 2 years				▒		▒	▒	▒	▒				▒		▒	▒	▒	▒	▒	▒	▒	▒	
over 2 years				▒		▒	▒	▒	▒				▒		▒	▒	▒	▒	▒	▒	▒	▒	
3 Shares and other equity		▒	▒			▒	▒	▒			▒	▒			▒	▒	▒		▒	▒	▒	▒	
of which quoted shares, excluding IF and MMF shares/units		▒				▒	▒	▒			▒				▒	▒	▒		▒	▒	▒	▒	
of which IF and MMF shares/units		▒	▒								▒	▒							▒	▒	▒	▒	
4 Financial derivatives																							■
5 Non-financial assets (including fixed assets)	■									■									■				
6 Remaining assets																							■
LIABILITIES																							
7 Loans and deposits received																							■
8 IF shares / units[1]		■		■		■	■	■	■		■		■		■	■	■	■	■				
9 Financial derivatives																							■
10 Remaining liabilities																							■

IFs following the aggregated approach report all cells, including black and grey.

IFs following the combined approach report: (i) the black cells; (ii) the information requested in Table 2 for those securities that are collected on an s-b-s basis; and (iii) the grey cells for those securities that are not collected on an s-b-s basis.

[1] If the reporting agent is not in a position to identify directly the residency and sector of the holder, it reports the relevant data on the basis of available information. In the case of 'bearer shares', the information may be collected from MFIs or OFIs, other than investment funds (as specified in Article 2(2) and paragraph 3 in Part 2 of Annex I to this Regulation).

Financial vehicle corporations

Table 1: Outstanding amounts and transactions

	A. Domestic										B. Other participating Member States										C. RoW	D. Total
	Total	MFIs	Non-MFIs - Total	General Gov't	Other residents						Total	MFIs	Non-MFIs - Total	General Gov't	Other residents							
					Total	Other financial intermediaries + financial auxiliaries (S.123+S.124)	o/w FVCs	Insurance corporations and pension funds (S.125)	Non-financial corporations (S.11)	Households + non-profit institutions serving households (S.14+S.15)					Total	Other financial intermediaries + financial auxiliaries (S.123+S.124)	o/w FVCs	Insurance corporations and pension funds (S.125)	Non-financial corporations (S.11)	Households + non-profit institutions serving households (S.14+S.15)		
	[a]	[b]	[c]	[d]	[e]	[f]	[g]	[h]	[i]	[j]	[k]	[l]	[m]	[n]	[o]	[p]	[q]	[r]	[s]	[t]	[u]	[v]
ASSETS																						
1 Deposits and loan claims		■					■					■					■					■
2 Securitised loans																						■
2a euro area MFI as originator				■		■		■		■				■		■		■		■		■
up to 1 year									■										■			
over 1 year and up to 5 years									■										■			
over 5 years									■										■			
2b euro area General Government as originator																						■
2c euro area OFI and ICPF as originator																						■
2d euro area NFC as originator																						■
2e non-euro area originator																						■
3 Securities other than shares (1)																						
up to 1 year		■	■				■					■	■				■				■	
over 1 year and up to 2 years		■	■				■					■	■				■				■	
over 2 years		■	■				■					■	■				■				■	
4 Other securitised assets																						■
4a of which euro area General Government as originator																						■
4b of which euro area NFC as originator																						■
5 Shares and other equity							■										■					■
6 Financial derivatives																						■
7 Fixed assets																						■
8 Remaining assets																						■
LIABILITIES																						
9 Loans and deposits received							■										■					■
10 Debt securities issued (1)																						
up to 1 year																						■
over 1 year and up to 2 years																						■
over 2 years																						■
11 Capital and reserves																						■
12 Financial derivatives																						■
13 Remaining liabilities																						■

(1) In accordance with Article 4(2), NCBs may choose to collect these items on a security-by-security basis.

Insurance corporations and pension funds

Assets - outstanding amounts at end of period and transactions during period

	Total	Domestic									Non-residents											Not allocated
					Non-MFIs							Other MUMS										
							Other residents									Non-MFIs					Rest of the world	
																Other residents						
		Total domestic	MFIs	Total non-MFIs	General government	Total	Other fin. interm.	ICPF	Non-fin. corporations	Households	Total non-residents	Total other MUMS[1]	MFIs	Total non-MFIs	General government	Total	Other fin. interm.	ICPF	Non-fin. corporations	Households		
		S.1	S.121+S.122		S.13		S.123+S.124	S.125	S.11	S.14+S.15	S.2		S.121+S.122		S.13		S.123+S.124	S.125	S.11	S.14+S.15		
Total financial assets																						
Currency	#																					
Deposits			#																			
Up to 1 year			*																			
Over 1 year and up to 2 years			*																			
Over 2 years			*																			
Securities other than shares excl. financial derivatives																						
Up to 1 year			X		X		X	X	X				X		X		X	X	X			
Over 1 year and up to 2 years			X		X		X	X	X				X		X		X	X	X			
Over 2 years																						
Financial derivatives																						
Loans					X #		X #	X #	X #	X #					X #		X #	X #	X #	X #	#	
Up to 1 year					#		#	#	#	#					#		#	#	#	#	#	
Over 1 year and up to 5 years																						
Over 5 years																						
Shares and other equity																						
Quoted shares																						
Unquoted shares and other equity																						
Mutual funds shares/units																						
Of which: money market fund shares			X *										X									
Prepayments of insurance premiums																						
Other accounts receivable/payable	#																					
Total non-financial assets																						

Notes to Tables 2a and 2b:
– The cells marked with the asterisk * show data available from other datasets (BSI and SEC).
– The cells marked with the symbol # show the MUFA data requirements, also taking into account the counterpart sector requirements that are mandatory from April 2008.
– The cells marked with X show items which in the long-term should become available at T+50 calendar days.

[1] Monetary Union Member States.

Nominees, registries and settlement systems: gathering securities statistics for soundness and efficiency purposes

Ian J Nield[1]

Introduction

In the past decade financial authorities have paid more attention to "financial stability". Many central banks now publish regular reviews on the state of their respective financial systems. The impetus for this was financial instability in a number of regions around the world in 1997–98. At about the same time there was the Federal Reserve's management of a potentially global system-threatening event with the collapse of Long Term Capital Management in 1998.

This paper provides a brief overview of the use of data from settlement systems that can assist a financial authority in its monitoring of the financial system. Three case studies are appended to the paper:

(i) a historical overview of the development of the non-resident holdings survey in New Zealand;

(ii) the use of payment system data to help in discerning liquidity stress; and

(iii) an example of the use of settlement system statistics during the current period of financial stress.

Financial system plumbing – settlement systems, registries, custodians and nominees

The financial system, even in a relatively small economy such as New Zealand, is complex, with many and diverse linkages through institutions, financial intermediaries and individuals. A part of this system is composed of elements which facilitate transactions and the holding of securities. Generically, the systems which settle securities and cash transactions are called settlement systems.[2] It is through these systems that the majority (by value) of all transactions flow in economies with even a modest amount of development.

The settlement systems form the core "plumbing" of the financial system – they are a critical component of any financial system. In many jurisdictions around the world, the wholesale financial markets rely on this plumbing. In the past two decades, settlement systems and the custody and registry networks around them have become highly efficient and nearly riskless. To the initiators of transactions, settlement systems have become almost invisible.

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[1] Reserve Bank of New Zealand.

[2] See the selected glossary at the end of this paper for definitions of terms. See also CPSS-IOSCO (2001), which provides useful background information (www.iosco.org/library/pubdocs/pdf/IOSCOPD123.pdf).

What information is in these systems?

The information held by the settlement system's service participants (ie the system operators, custodians/nominees and registries) can provide an almost complete picture of what is happening in the financial system.

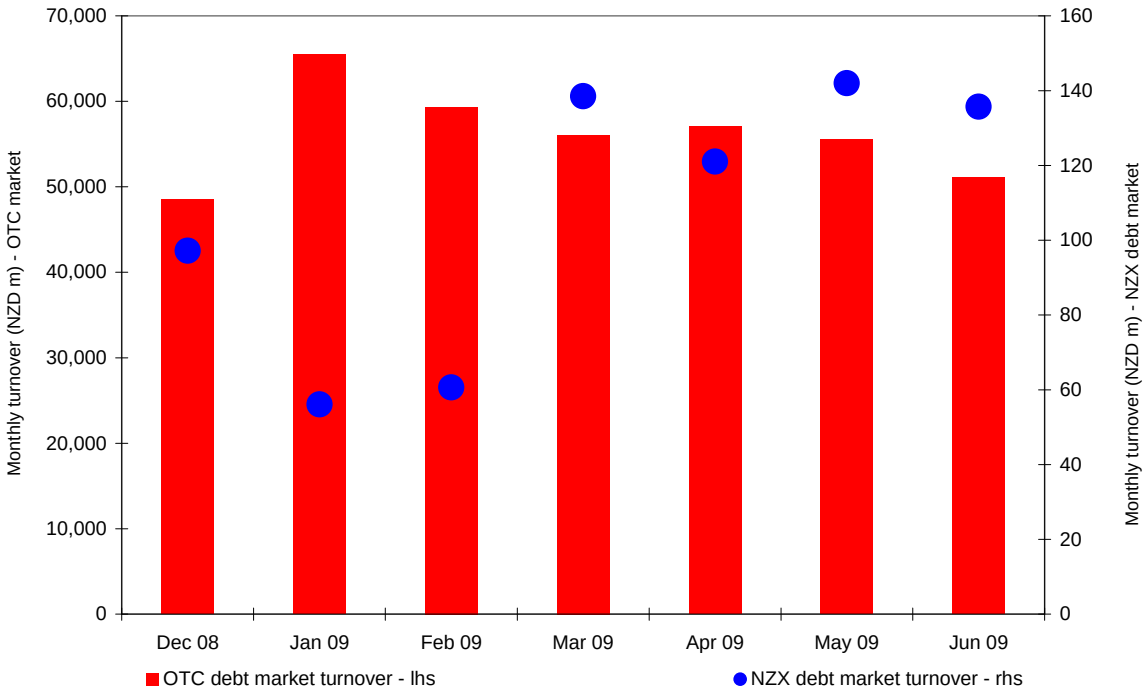
Information held in these systems includes (but is not necessarily limited to):

- new issuance;
- which parties have traded;
- the amount and price of each trade;
- the type of transaction – outright purchase/sale or a repurchase or loan;
- levels of holdings of securities; and
- the domicile of the holder of the securities.

As custodians act on behalf of parties, many of which are offshore, they can provide ownership information (primarily the domicile of the holder) which would otherwise not necessarily be within the jurisdiction of authorities. However, one problem faced by many authorities is the lack of disclosure available from depositories beyond the custodians, especially when those depositories are outside their jurisdiction.

Figure 1

Debt securities turnover in the listed and over-the-counter markets in New Zealand



Sources: Reserve Bank of New Zealand; NZX.

The availability of the information outlined above depends very much on the development of information systems in the market and the various financial market disclosure requirements. In New Zealand, much of this information is not readily available. In part this is because it has not been recognised as being a useful source of information for system participants. It is now recognised that for over-the-counter (OTC) trades these systems are a rich source of

information. This is especially important in New Zealand where debt securities are primarily traded in the OTC market.

As can be seen in Figure 1, in New Zealand the vast majority of debt security trades are transacted in the OTC market. As such, the information on trading in this market is not readily available to market participants.

The wholesale market trades all settle in Austraclear New Zealand (Austraclear[3]), a delivery-versus-payment electronic settlement system. Within Austraclear is a depository, the New Zealand Central Securities Depository (NZCSD), which holds the securities on behalf of Austraclear members. It is estimated[4] that NZCSD holds nearly all the wholesale market's securities.

With the dominance of Austraclear and the wholesale market, information on transactions held in the Austraclear system can provide a fairly complete picture of the prevailing trading environment in financial securities. Austraclear is not unique in New Zealand in being able to supply authorities with this information, but the authorities may not have the legal power to request it. Similarly, authorities in other countries may not have adequate powers to request such information. Settlement system operators may be reluctant to provide information for a number of reasons, not least of which is the cost of reporting. In today's environment, the reporting burden is ameliorated by the automated nature of the systems.

For over two decades the Reserve Bank surveyed custodians and registries for ownership information, primarily to ascertain the domiciles of the beneficiary holders. This was a particularly burdensome survey. The reporting load was significantly reduced by moving to a unit record reporting method as detailed in the first case study appended to this paper. To improve the quality of the reporting, the Reserve Bank also included the Austraclear depository as part of the survey to assure the integrity of the aggregated data from each respondent.

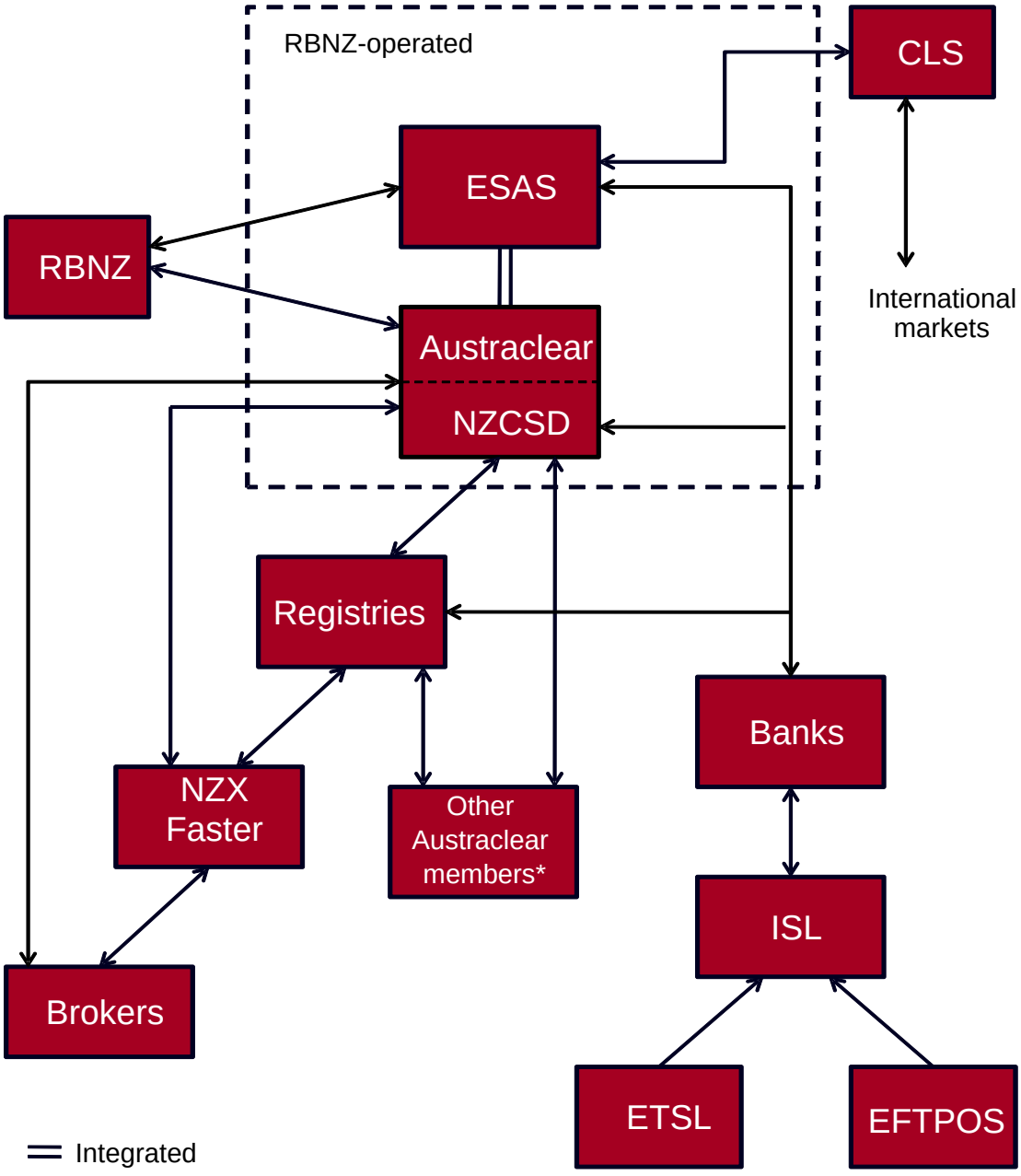
In the course of work to improve the quality of data from the ownership survey. it was realised that the information in Austraclear could provide a significant improvement in the transparency of New Zealand's capital markets. As noted, in New Zealand most debt market securities do not trade on an exchange, but do settle in Austraclear. By making at least summaries of the trading available, the understanding of the state of the debt market would be enhanced for both system regulatory agencies and market participants. This approach would be helpful in other markets where much of the trading takes place over the counter and is settled in centralised settlement systems. Currently, work is under way in the Reserve Bank to publish this type of information.

[3] Since 26 June 2010, Austraclear New Zealand has been renamed NZClear.

[4] Austraclear estimate.

Figure 2

Schematic diagram of the payment and settlement system in New Zealand as at July 2009



CLS – Continuous Linked Settlement Bank, the global system for settlement of foreign exchange transactions

EFTPOS – EFTPOS New Zealand Limited

ETSL – Electronic Transaction Services Limited**

ETSL, EFTPOS – the two commercial bank operated EFTPOS clearing switches

ISL – Interchange and Settlement Limited, a netting and clearing system for commercial bank cheques, EFTPOS, automatic payments and direct credits

NZCSD – New Zealand Central Securities Depository

NZX Faster – the settlement platform operated by the NZX, New Zealand's stock exchange

* Other Austraclear members include exchanges (eg the SFE), nominees, and corporates.

** ETSL was de-registered and replaced by Paymark Limited in September 2009.

From a financial system monitoring perspective, the information that settlement systems can potentially provide has often been reserved for market anecdote. How institutions trade in a stress situation can reveal certain preferences: for example, with whom they trade, the type of security used in repurchase transactions and the price at which they are prepared to trade. All of this information is available in settlement systems and can assist authorities in deciding how to act.

The third case study appended to this paper illustrates how the Reserve Bank of New Zealand was able to enhance its monitoring of the domestic bank bill market in August 2007 by using settlement system data. In this case, the issuance information was of prime concern.

Provided that they have the powers, authorities in other jurisdictions can readily make use of the information held in their settlement systems to supplement other information and data sources that they currently use. Such information can be provided in a timely manner, even in real time, and has the potential to provide important insights in a variety of situations.

Case study I – the non-resident holdings survey

Over time, central banks around the world have gradually increased their ability to collect information which they believe to be pertinent to their role. The Reserve Bank of New Zealand is no exception. The original 1934 Act did not provide the Bank with any particular powers to collect data. It was not until the 1964 Act was amended in 1973 that some data collection powers were granted to the Bank. These powers have been gradually extended since then. At present the Bank has fairly comprehensive collection powers to enable it to carry out its functions.

A survey of non-resident holdings of New Zealand government securities was first taken in March 1985. The survey has been conducted on a monthly basis since then and has undergone a number of changes both in the information collected and in its use. The current survey collects information on nearly all New Zealand registered securities on a case-by-case basis and is complemented by data held in other systems operated by the Reserve Bank.

The early years

In 1984 the concept of surveying the non-resident holders of New Zealand government securities was part of an effort to assist the Bank in estimating the timing of capital flows. The Bank was the registrar for government securities, so determining the ownership structure of direct holdings of securities was straightforward. The Bank understood that holders would not only be directly named in the registry, but also held in nominee structures. So from the beginning the Bank knew that it had to survey the various nominee firms.

The first survey asked two questions of respondents: first, the amount invested by clients in New Zealand government securities over the previous three months; second, the amount held by offshore investors and the maturity dates of the holdings. In subsequent surveys, only the second question was asked.

Although the first survey was conducted in 1985, it was not until January 1988 that the data were first made publicly available. Since then, the results have been published on a monthly basis around the middle of the month following the survey date.

In the early years, the information was processed mainly on a manual or at best a semi-automated basis. It was not until the advent of Excel-based spreadsheet collection and

automated reading of data in 1998 that the bulk of the processing became more or less automated at the Reserve Bank. Unfortunately, many respondents were still completing the survey manually.

By the early 1990s the survey was being used to assist with balance of payments statistics. There were discussions as to which government agency (the Reserve Bank or the Department of Statistics[5]) was best suited to collect the data. It was decided that the survey should remain with the Reserve Bank, but this necessitated a few changes to the survey, in particular, broadening the survey from government securities to other government and private sector debt securities and the inclusion of the income earned during the period. Respondents were asked about these extensions in mid-1992. The survey was broadened from the December 1992 return, but did not include the yield questions, as a number of respondents were not able to comply with the request.

Between 1984 and 1992, financial markets had evolved considerably in New Zealand, as had the international appeal of the New Zealand Government's domestic securities. One aspect of the market which had been overlooked was the "repurchase" market. During 1993 the Bank started to deliberate about collecting repurchase data and a formal proposal was put forward in January 1994. From the end of March 1994 the survey collected the repurchase information.

It was not until 1995 that the Reserve Bank started to collect more detailed information on the residency of the ownership of the securities. It was at this time that those involved in the survey realised that this information, though useful, would be limited due to an inability to survey beyond the main international depositories.[6]

The new millennium – our purpose, the costs and the benefits

With changes in the needs of the Reserve Bank, and of Statistics New Zealand, it was desirable to make a number of alterations to the survey. This led to a review of the way the data were obtained and processed.

An initial review merely redesigned the spreadsheet template. When respondents were surveyed about the use of the proposed template, it was clear that there were issues both with the respondents and with the internal mechanisms for processing it. The review's overall mandate was changed in accordance with the following criteria:

- Information
  - Quality
  - Granularity
  - Depth and breadth
- Timeliness
- Flexibility

[5] In 1994 the Department of Statistics was renamed "Statistics New Zealand – Tataurana Aotearoa".

[6] Although the Reserve Bank surveys nominee and custodian firms, if these firms themselves hold the securities through another depository, such as Clearstream or Euroclear, it is not possible to determine the residency of the ultimate beneficiary. Thus, for many securities, the dominant offshore holder appears to reside in Belgium or Luxembourg.

- Compliance
- Synergies

As its starting point, the revised review had a broader perspective on the purpose of the survey and how it fitted with other functions of the Reserve Bank. In particular, the Reserve Bank is the operator of the primary wholesale settlements system and the central depository. For example, while historically there had been no way of checking the accuracy of respondents' data, the broader view opened up the possibility of significantly improving the integrity of the survey.

It became clear that over time there was likely to be an increasing demand for more refined categories of analysis, for example, the classification of the originator of the securities in the market and a general broadening of scope to include securities that had not been previously surveyed. The initial review had resulted in a spreadsheet template that was far too burdensome for respondents to complete – especially as it had been indicated that there might be more frequent changes to it.

The end result was a recommendation to migrate from the existing template to a system in which respondents send a file of more or less raw data, comprising the security identifier, the face amount held (ie a currency value for debt and a number of shares for equities), the country of domicile of the holder and a flag indicating whether it is an outright holding or is held under a repurchase agreement. Nearly all respondents were able to make modest adjustments to their main reporting systems in order to generate the data files with relative ease. Unfortunately, it was easier for the respondents than for the Reserve Bank. It took some 18 months to develop the internal applications to process the files and integrate the data into the Bank's statistical systems.[7]

The implementation difficulties at the Reserve Bank did, however, result in a major reduction in the compliance burden for respondents and improve the timeliness of the survey. Previously, the survey was published towards the end of the month; it is now released around the middle of the month – a lag of two weeks from the time the data are collected.

Because the survey uses raw data, it has been possible to expand it to cover all registered securities in New Zealand. Although at present equity market data are not analysed, the intention is to do so as resources become available.

As a corollary, it has been possible to use the information from the various registries to provide robust estimates of the size of the various securities markets. Similarly, the greater availability of raw data which can be manipulated has been of use in other areas of the Reserve Bank, such as financial markets and prudential supervision.

Case study II – stress in the payment system

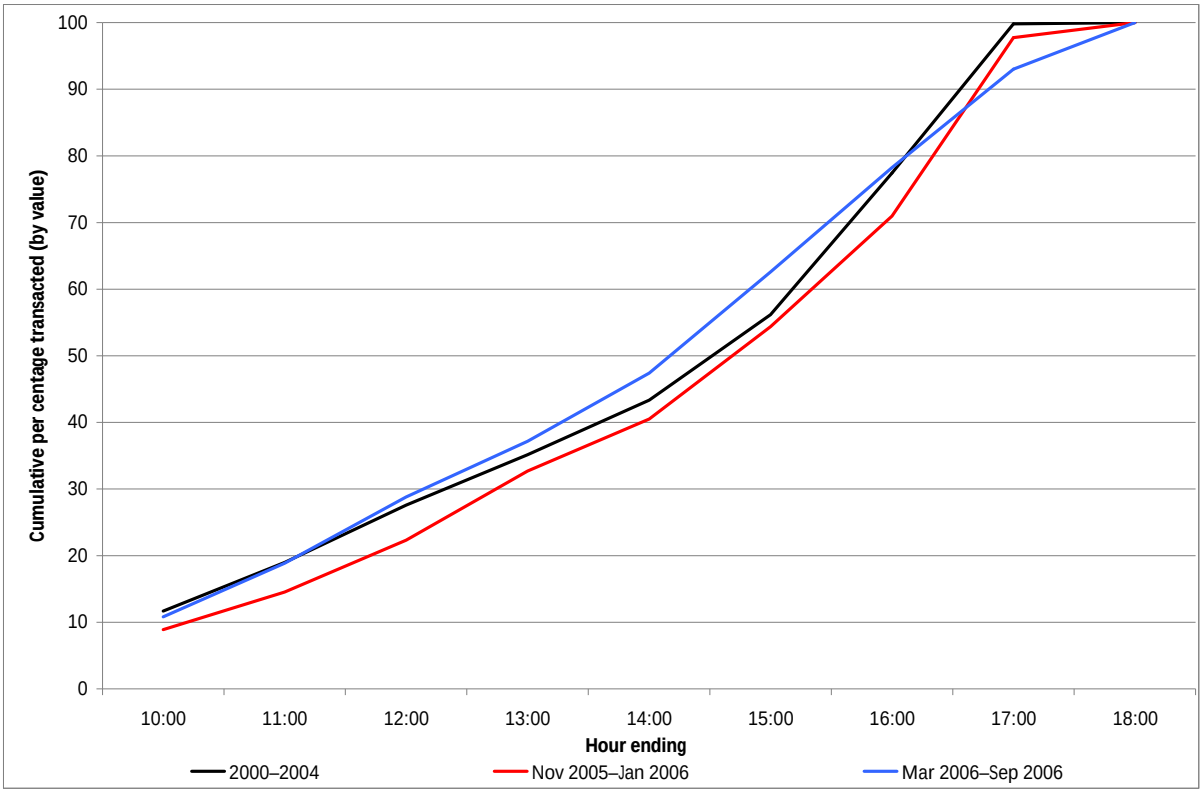
In 2005 the Reserve Bank of New Zealand embarked on a project to review the way liquidity was provided to the banking system. As part of this project a study was made of the way payments are made during the banking day. The study demonstrated that as liquidity conditions became tighter, payments slowed through the system during the day.

Figure CS2.1 below depicts the percentage of the volume transacted at the end of each hour up to 6 pm each day for three periods. The reference period is the five years ending in

[7] The project highlighted structural issues with regard to the main statistical repository system and resulted in development of a new statistical system.

December 2004. During 2005, while the Reserve Bank was deliberating on what changes needed to be made, liquidity conditions gradually worsened. The worst period was from November 2005 to January 2006. At the end of January 2006 it was decided to make an initial adjustment to the system and the target level of settlement cash left in the payment system was increased from $25 million to $2 billion in two stages. The third period in Figure CS2.1 covers the time from the initial adjustment to the end of September 2006.

Figure CS2.1



As can be seen, there was a significant improvement in the progress of payments through the system once liquidity constraints were eased in the system. Overall, payments were made earlier in the day, with the median payment occurring about an hour earlier. The impact of the introduction of the New Zealand dollar into the CLS can be seen in the slightly lower volumes occurring for the third period (red line) in the last hour or so of the day.

It is also instructive to see the impact of the recent stresses in the global financial system on the payment system.

Figure CS2.2

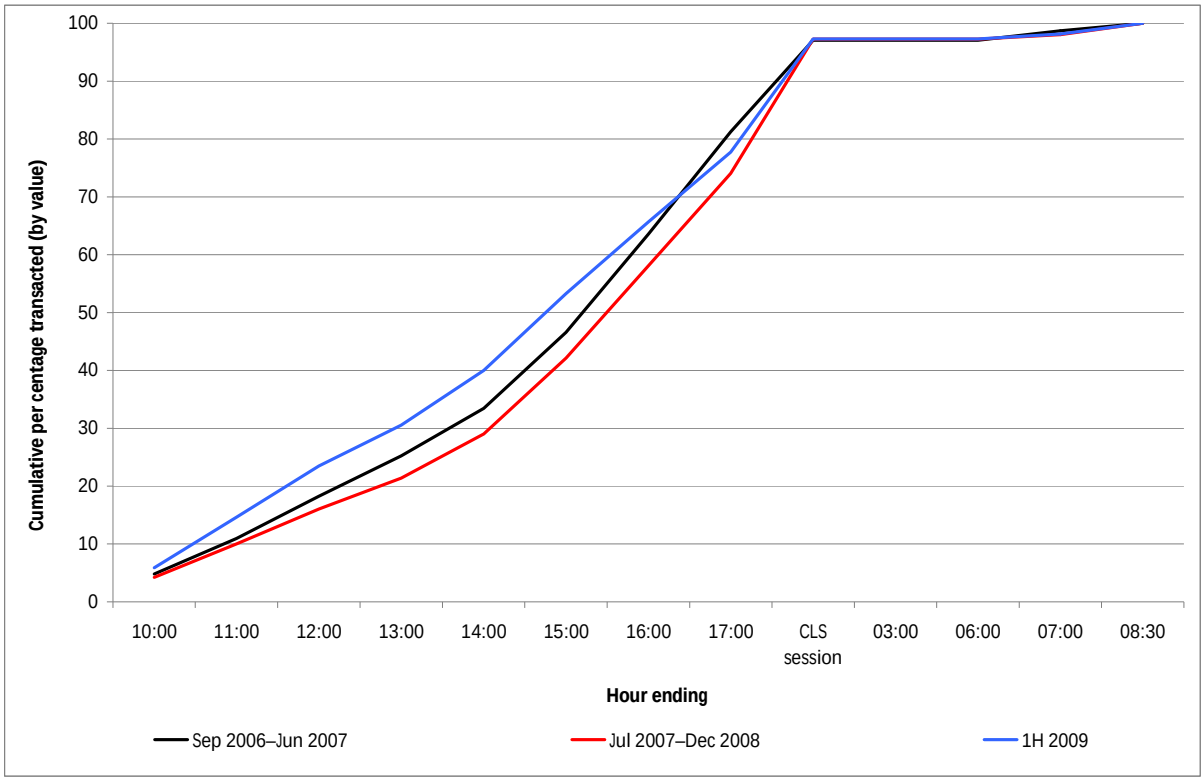


Figure CS2.2 follows the form of Figure CS2.1 and depicts payment system behaviour for three periods in the past three years, ie:

- A pre-stress period following the implementation of the Reserve Bank's liquidity management reforms, from September 2006 to June 2007;
- The stress period – from July 2007 to the end of December 2008;
- And the first half of 2009, when there have been few stress events.

During the most stressed period there was a shift to delaying payments into the CLS session. It would appear that banks with large payments to make on behalf of overseas banks delayed payments until they had received the funds as opposed to providing intraday credit to the offshore parties.

In the stressed period about 23 per cent of the payments were made during the CLS session, as opposed to 16 per cent previously and about 20 per cent in the first half of 2009.

This type of behaviour in the payment system probably demonstrates the concern of the banks about the potential risks due to the deterioration in the credit quality of many overseas banks.

Case study III – August 2007

In August 2007 the first major wave of the 2007–09 global financial crisis was felt in New Zealand as short-term money markets were disrupted by offshore events. Other than the events in overseas markets, initial indications in New Zealand were the sudden rise in the overnight deposit rate and anecdotes of possible disruption in the domestic bank bill market.

Figure CS3.1

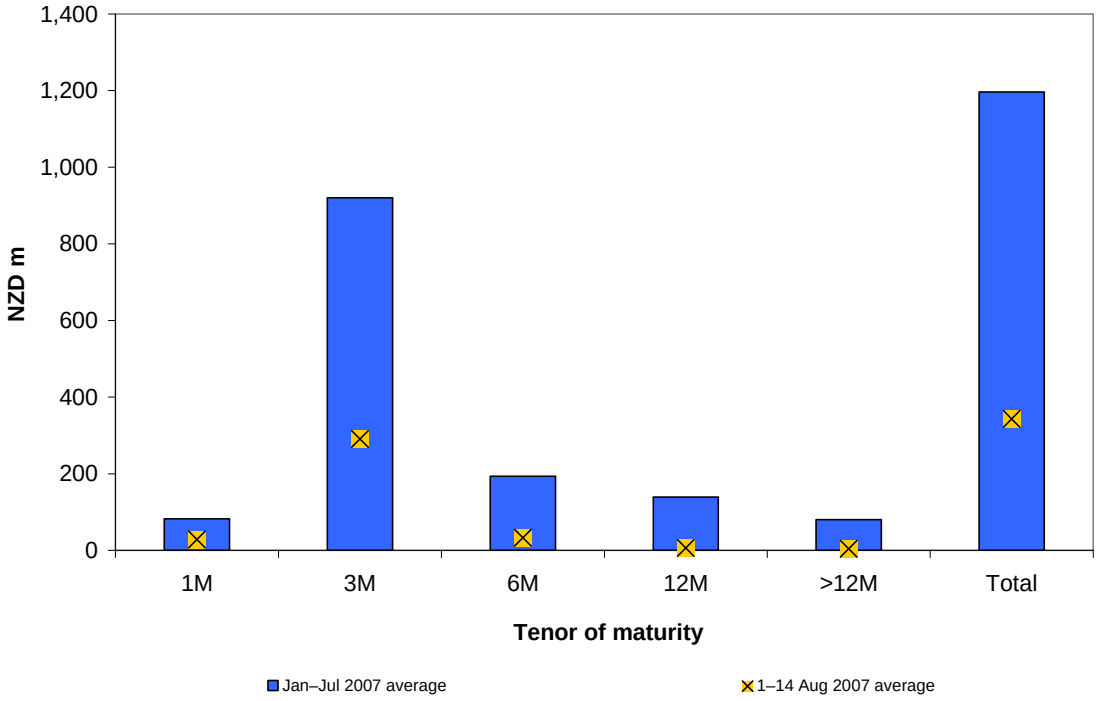


Figure CS3.1 depicts the monthly average issuance data from one of the registries for a pre-crisis period and during the crisis. As can be seen, there was a significant drop in the issuance of securities in the first two weeks of August 2007.

These data from the settlement system were used to verify market anecdote and assist the Governor in deciding to reallow bank bills to be discounted at the Reserve Bank. Following the announcement of this decision, the bank bill market rapidly reverted to more normal behaviour.

Selected glossary[8]

Clearing	The process of transferring securities on the settlement date.
CLS	Continuous Linked Settlement Bank – the entity created by the private sector to eliminate settlement risk in foreign exchange transactions (see Figure 2).
Custodian	An entity that keeps securities safe for its customers. A custodian often provides other services, including clearing and settlement and cash management.
Central securities depository (CSD)	An institution for holding securities that enables securities transactions to be processed by means of book entries. Physical securities may be immobilised by the depository or securities may be dematerialised (so that they exist only as electronic records).
Delivery versus payment	A link between securities transfers and fund transfers that ensures that delivery occurs if, and only if, payment is made.
Issuer	The entity that is obligated on a security or financial instrument.
Nominee	An entity named by another to act on its behalf and commonly used in a securities transaction to obtain registration and legal ownership of a security. A custodian may act as a nominee.
Registration/registry	Registration occurs once the details of the ownership of the securities are entered in the register, the records of the issuer pertaining to the issue. The *registry* function is often carried out by an official registrar/transfer agent rather than the issuer.
Securities settlement system	The complete set of institutional arrangements for confirmation, clearance and settlement of securities trades and safekeeping of securities.
Settlement	The completion of a transaction through the final transfer of securities and funds between the purchaser and the seller.

Reference

Committee on Payment and Settlement Systems-Technical Committee of the International Organization of Securities Commissions (CPSS-IOSCO) (2001): *Recommendations for securities settlement systems*, Basel, November.

[8] Based in part on the definitions adopted by the CPSS-IOSCO (2001).

Institutional investors in the euro area accounts

Robert Gadsby and Celestino Girón[1]

1. Introduction

The euro area accounts (EAA) present a comprehensive overview of all economic transactions, financial flows and balance sheets in the euro area by institutional sector. The European Central Bank (ECB) and the Statistical Office of the European Communities (Eurostat) have been compiling and publishing the accounts since June 2007 on a quarterly basis following the methodological framework of the 1993 System of National Accounts (SNA 93) and the 1995 European System of Accounts (ESA 95). Balance sheets and transactions of institutional investors are covered in the EAA.

The EAA rely mostly on statistics already collected and compiled for other purposes. The main value added of the accounts consists in assembling such data in a coherent framework to facilitate global analysis. Interlinkages between economic and financial developments and between institutional sectors are revealed in the EAA with clarity not attainable by the simple use of the individual statistics. By way of example, this paper illustrates the analytical use of the EAA in relation to institutional investors by proposing an alternative measure of household portfolios in which third-party institutional investors are consolidated out.

This note is organised as follows. Section 2 shows the sources and methods for integrating institutional investors into the EAA. Sections 3 and 4 motivate and discuss the proposed exercise focusing on household portfolios, while Section 5 presents the results for the euro area. Finally, Section 6 draws some conclusions.

2. Institutional investors in the EAA

The methodological framework of ESA 95 groups institutional investors into three institutional categories: “insurance corporations and pension funds”, “financial intermediaries other than insurance corporations and pension funds” and “monetary financial institutions”. The latter two sectors cover investment funds and other collective investment institutions.

In the EAA, insurance corporations and pension funds (ICPFs) are shown together as a single subsector as required by the ESA 95 standards. No further breakdown into insurance corporations and pension funds separately and by kind of insurance business and/or social insurance scheme is available. In particular, no distinction is made between defined benefit and defined contribution social insurance schemes or between “with-profits” and other life insurance policies, a distinction that, as shown below, is central to the household portfolio analysis introduced here.

Furthermore, other financial intermediaries (OFIs) are shown together with financial auxiliaries (in the OFI sector) and with no additional breakdown. This means that the balance sheet elements of institutional investors are mingled with those of financial auxiliaries, along with those of other intermediaries, such as financial holding companies and special purpose

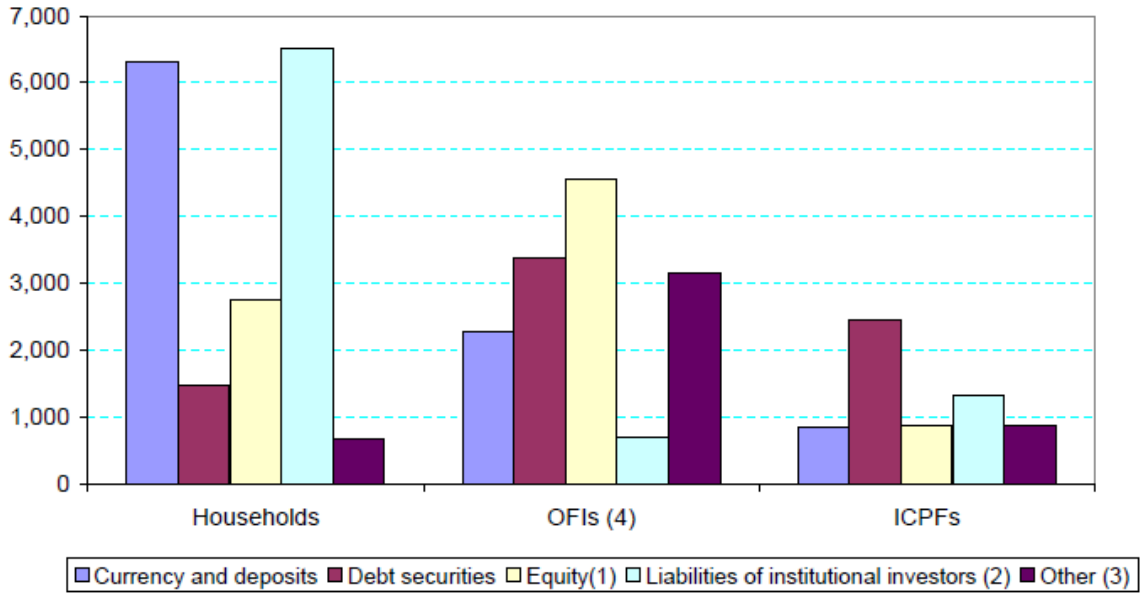
[1] Directorate General Statistics. The views expressed herein are those of the authors and do not necessarily reflect the views of the ECB.

vehicles or conduits. This is not a relevant drawback as the latter institutions do not take sizeable financial positions on their own behalf (only around 2 per cent of the total balance sheet of the combined sector). Overall, investment funds represent more than 40 per cent of the total assets of the combined OFI sector.

Chart 1

Assets of households and institutional investors in the EAA

Stock data at the end of the third quarter of 2009, in EUR bn



(1) Quoted shares, unquoted shares and other equity. (2) Mutual fund shares and net equity of households in pension fund reserves and life insurance. (3) Loans, other insurance technical reserves and other accounts receivable. (4) Including money market funds, but also other financial intermediaries other than investment funds and ICPFs.

The monetary financial institutions (MFI) sector comprises institutions whose liabilities are part of the monetary aggregate definition that the ECB uses for monetary policy purposes. It consists mainly of commercial banks and savings institutions, but also includes investment funds whose main portfolio consists of money market paper (money market funds). Although the EAA do not show these institutions separately in any of the various publication channels, it is possible to single out their assets and liabilities using information available in the ECB statistical databases.

The ESA 95 divides the balance sheet into analytical categories corresponding to the following concepts: cash and deposits, debt securities (further split into those with maturities of less than one year and more than one year), financial derivatives, loans (also split with the same maturity breakdown as debt securities), quoted shares, unquoted shares, other equity, mutual fund shares, insurance technical reserves[2] (further split into households' net worth in social insurance schemes and other reserves) and other accounts receivable and payable. The same split is available in the EAA except for the combined presentation of unquoted shares and other equity and of financial derivatives and other accounts receivable and

[2] Technical provisions of insurance corporations and pension funds against policyholders or beneficiaries.

payable. The absence of such details is due to deficiencies in the raw data used to compile the accounts.

The pool of information available to the ECB for compiling the EAA in relation to institutional investors will be enhanced in the coming months. Since early 2009, a statistical regulation has been in place that requires the investment funds resident in the European Union to report on their balance sheet and financial flows on a quarterly basis.

At the same time, the ECB has started to implement a short-term approach for insurance statistics that will cover balance sheets for the relevant institutions with a quarterly frequency as well. A distinction will be available between unit-linked and not unit-linked life insurance policies, and between defined-benefit and defined-contribution pension funds, for the corresponding insurance technical reserve liabilities.

Both datasets will make it possible to identify the counterpart sector, thereby allowing the compilation of who-to-whom matrices[3] permitting a better analysis of the flow of funds and intersectoral linkages. Furthermore, the data will be available within 90 days after the end of the reference quarter. This will fulfil the timeliness requirements for advancing the compilation of the EAA from the current 120-day time lag, a project on which both Eurostat and the ECB have embarked to better serve the needs of monetary and other conjunctural analysis.

3. Household wealth, portfolio allocation and financial risk exposures: the role of institutional investors

Institutional investors play a crucial role in contributing to a more efficient allocation of savings to investment opportunities. They represent a channel for household savings to flow to borrowers in addition to traditional banking intermediation. Their growing importance in the global financial system has enabled the removal of financing constraints worldwide and so broadened the sources of funds for final real investment.

Apart from this effect on the overall efficiency of financial markets – and related to it – institutional investors enable households to conduct more sophisticated portfolio management, albeit indirectly. In most cases, institutional investors play the role of asset managers, with the underlying risks of the financing instruments in which the funds are placed being transferred almost entirely to the policyholder or shareholder. This is a distinctive feature compared to traditional intermediation, in which banking institutions act as risk buffers vis-à-vis the depositaries. Investment in institutional investors' financial liabilities can then be seen as a way for households to indirectly invest in the assets in which those institutions place the funds raised (eg shares and other equity, debt securities, deposits and other assets).

Households then diversify the allocation of their wealth across financing instruments, counterpart sectors, sectors of activity and geographical areas with the help of the expert management provided by the institutional investor products. However, for the same reason, households are exposed to the market and credit risks – and even liquidity risks – inherent in such instruments.

Such exposure has become evident after the recent developments following the global financial turmoil that started in the summer of 2007. It has been revealed, for instance, that

[3] Matrices showing holdings of or transactions with a financial instrument by institutional sector, broken down by the counterpart sectors that either issued the instrument or transacted with the sector.

while investing in mezzanine tranches is a common practice for insurance companies, a number of investment funds were subject to sizeable credit risk transfers by acquiring mezzanine and even equity tranches of ABS/CDOs.[4] This heavily increased their exposure to the default of the underlying assets, typically residential mortgage-backed securities. The investment shareholders or insurance policyholders eventually took the associated losses following the subprime market meltdown. The total losses incurred were even larger than the corresponding losses on the securities held by ABS/CDOs because such vehicles used CDS[5] to synthetically take on even more mortgage risk than was actually issued. In short, households acquired risk exposure to a degree and with a level of sophistication not attainable without the involvement of institutional investors.

Based on this reasoning, it is proposed here to make an alternative presentation of household financial wealth that looks through the institutional investor layer to unveil the underlying portfolio structure and exposure to financial risks: investments in institutional investors' liabilities would be replaced by the assets in which these institutions invest. Similarly, financial transactions in institutional investors' liabilities could be replaced by the corresponding asset transactions to consolidate out these institutions for the flow-of-funds analysis.

The EAA – and in general any national accounting framework – is the appropriate place for an exercise of this nature. First, consistent and comparable balance sheets for all the sectors involved are available following the same definitions and classifications. This ensures a sound consolidation exercise. Second, the balance sheet items are valued following the same valuation rules that include mark to market valuation for tradable instruments, on both the assets and the liabilities side. Apart from helping to make the consolidated presentation feasible, this also adds economic interpretability to the outcome, as the balance sheet entries closely reflect the market valuation of the risk exposures. Finally, more advanced national accounting frameworks include who-to-whom matrices showing sector-to-sector debtor-creditor relationships, thus enabling a complete mapping of sectoral interlinkages and shock propagation channels.

This presentation is inspired by the IMF balance sheet approach for surveillance.[6] That analytical framework examines stock variables in the balance sheets of the sectors in the economy, focusing on the risks created by maturity and currency mismatches and leverage. The framework draws attention to the vulnerabilities created by debts between sectors and it helps explain how imbalances in one sector spill over into other sectors. Consolidating out the institutional investors highlights the vulnerabilities of the household sector and the various contagion channels to which it is exposed.

The statements above must, however, be qualified. Consolidating out liabilities against household holdings is in principle meaningful for any institutional grouping, not only for institutional investors. After all, households are the ultimate owners of all businesses and hence the ultimate bearers of all underlying risks. However, the exclusive focus here on

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4 Asset-backed securities/collateralised debt obligations: CDOs investing in ABS. ABS are financial securities backed by loans, including mortgages, or other receivables. CDOs are liabilities which are backed by a single pool of assets where the associated risks are "structured" by means of various kinds of sub-debts, often referred to as "tranches" or "slices", representing various degrees of risk exposure. "Mezzanine" and "equity" tranches refer to riskier tranches compared to "senior" tranches.

5 Credit default swaps: in these contracts, a protection buyer pays a regular premium to a protection seller in return for a payment (the credit protection premium) in the event of a loan default. CDS are used to create synthetic exposures to risks without having to fund the principal of the underlying contracts and, in that sense, increase leverage.

6 See Mark Allen, Christoph Rosenberg, Christian Keller, Brad Setser and Nouriel Roubini, "A balance sheet approach to financial crisis", International Monetary Fund Working Paper no 02/210, 1 December 2002.

institutional investors is based on the corresponding risk transfer being almost direct and potentially subject to immediately realised losses. Such strong risk transfer is in principle not present in bank liabilities.

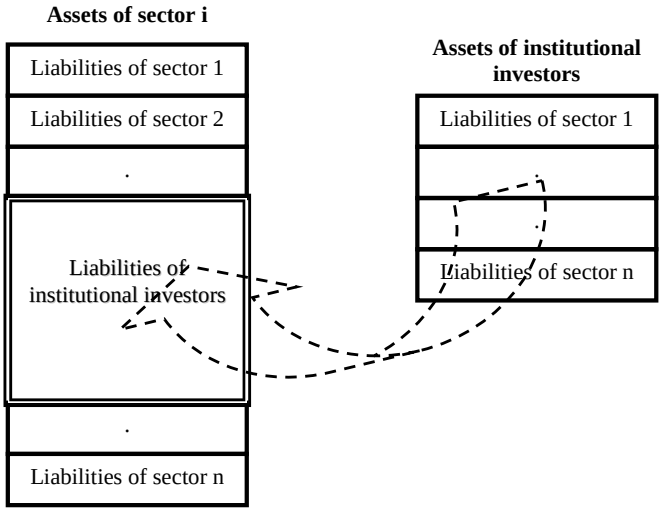
It follows that the consolidation exercise is only appropriate for liabilities where the above premise holds, ie that the bearer of the liability is directly exposed to the risks acquired by the corresponding institutional investor. This excludes from our exercise defined-benefit social insurance schemes and non-unit linked life insurance policies, as well as all types of investments in which there is guaranteed capital.

4. Consolidating out institutional investors: an alternative household portfolio presentation

Figure 1 provides a graphical impression of the methodology proposed. Liabilities of institutional investors that serve as channels for risk exposures are replaced by such risks in the portfolio of the corresponding holding sectors.

Figure 1

Consolidation of institutional investors' liabilities



In the case of households, this means that assets representing unit-linked insurance policies, defined-contribution pension funds and investment fund shares are to be replaced by the corresponding assets earmarked for such liabilities.

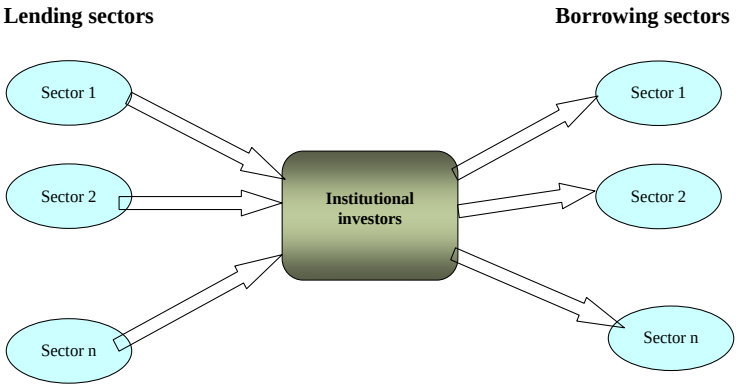
It must be noted that for this replacement to fully yield the results sought, the assets earmarked for the liabilities held by each sector should ideally be identifiable, so that the risk pass-through effect is correctly allocated across sectors. This level of detail – one that splits up the balance sheet of institutional investors, resident and non-resident, into subgroups according to the holder of the corresponding liabilities – can be denominated as a "who-to-whom square" and is not likely to be available. Instead, an approximation can be done by distributing the total assets of the relevant institutional investor on a pro rata basis across the various holders of the corresponding liabilities.

Furthermore, assets of non-resident institutional investors should be available and allocated to the corresponding resident sectors. It is again unlikely that a statistical data source covering such information would be available, as the balance of payments data – the usual

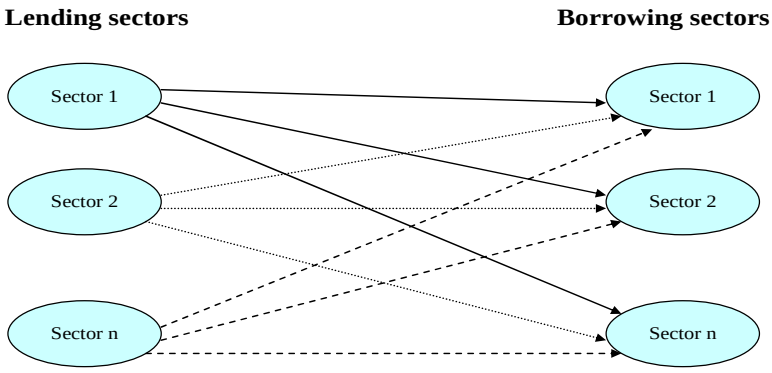
source for the rest of the world sector in sectoral accounts – only covers investments flowing back into the domestic economy (but even then, usually with no way to identify the foreign investor as an institutional investor). Here only heuristic – and heroic – assumptions would serve to approximate the real risk pass-through effect.

Figure 2. Flow of funds and institutional investors

2a. The lender-borrower flows are channelled through the institutional investors.



2 b. Consolidating out the institutional investors reveals the ultimate who-to-whom flows.



The presentation proposed here allows for an alternative analysis of household portfolios. As discussed above, risks, intersectoral vulnerabilities and analysis of fragility indicators are obvious areas where this presentation is of interest. Figure 2, however, illustrates another use of this methodology in the case of flow of funds.

The question "What are the sources of financing of each borrowing sector in terms of the corresponding lending sectors?" is answered by showing the investment financing links on a "transactor" basis: funds flowing from one sector to another are shown as the same irrespective of whether they are materialised as issuance or liabilities or disposal/acquisition of assets.[7] The consolidation of the institutional investor transactions reveals the actual

[7] As an example, an acquisition of public debt securities by households that is sold by non-financial corporations would be shown as a flow from households to non-financial corporations if the transactor approach is followed.

sources of financing of the borrowing sectors, thus showing, in particular, whether domestic household savings or non-resident household savings finance the domestic investment.

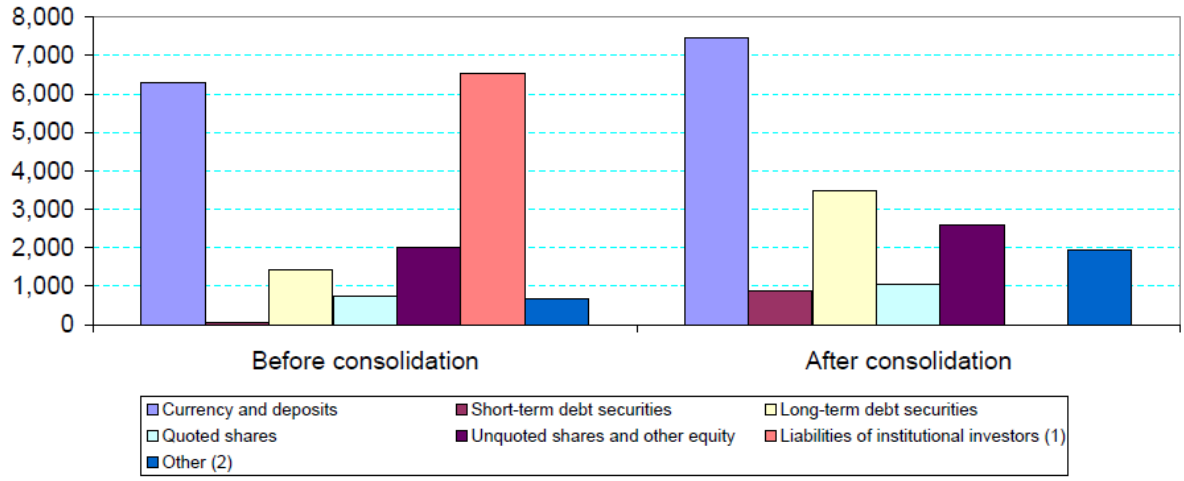
5. Consolidating institutional investors in the EAA

Chart 2 shows the balance sheet of households in the EAA that results from the substitution of institutional investor liabilities explained above.

Chart 2

Assets of households before and after institutional investors' consolidation in the EAA

Stock data at the end of the third quarter of 2009, in EUR bn



(1) Mutual fund shares and net equity of households in pension fund reserves and life insurance reserves. (2) Loans, other insurance technical reserves and other accounts receivable (the high amount in the consolidated version is due to the inclusion of loans of OFI other than Investment Funds, as a result of the simplifications made)

Some additional simplifications have been made in deriving the data. Due to the lack of relevant detail described in Section 2, all life insurance and pension fund technical reserves are replaced by the corresponding assets. This replacement is inappropriate for defined-benefit pension funds and non-unit linked insurance policies. Moreover, assets of ICPFs are earmarked for life and social insurance, as opposed to non-life insurance, on a pro rata basis. Similarly, investment fund assets have been derived from all OFI assets on a pro rata basis.

Furthermore, as anticipated in Section 4, no sectoral detail is available that makes it possible to identify the assets earmarked for each holding sector, the "who-to-whom square". What is more, the EAA does not yet provide a simpler who-to-whom breakdown of the liabilities of the institutional investors that would at least enable a proportional allocation of the risks.

To bridge this information gap, two additional assumptions have to be made regarding (i) the proportion of household investments in resident and non-resident institutional investors' liabilities and (ii) the asset structure of the non-resident institutional investors. In this exercise these two aspects have been covered by making a single assumption: that the balance sheet

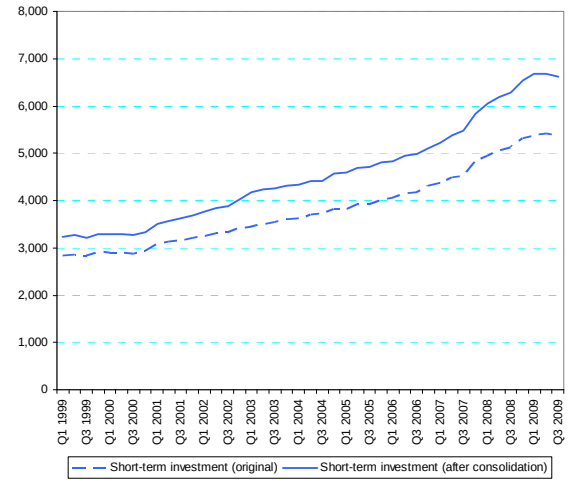
structure for non-resident institutional investors is the same as for resident institutional investors. In such a case the simple proportion of household holdings over the total liabilities of institutional investors[8] can be applied to the assets of resident institutional investors as proposed in Section 4. This assumption has been made in order to derive the data in Chart 2.

To illustrate how this alternative presentation can enrich the analysis, Chart 3 shows the development of the investment items, grouped according to the usual monetary analysis categories, that is, short- and long-term investment,[9] before and after the substitution.

Chart 3

Households' short- and long-term investment before and after institutional investors' consolidation

3a. Short-term investment (Stock data in EUR millions)



3b. Long-term investment (Stock data in EUR millions)

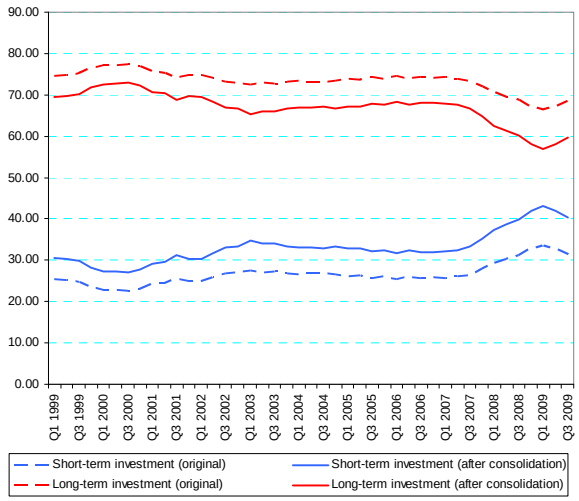


Chart 3a shows the expected change in the level of short-term investment, but also suggests that a different dynamic would result from the proposed consolidation. The acceleration in short-term investment that took place from mid-2007 onwards owing to the economic and financial uncertainty, which increased the preference for liquidity and less risky assets, is more pronounced when the behaviour of the institutional investors is also factored in the household portfolio analysis using the approach presented here.

Chart 3b corroborates this in terms of share over total investment, also providing the remarkable finding that by the beginning of 2009 short-term investment instruments are only 12 percentage points below long-term investment ones in the portfolio of euro area

8 Note that this could be greater than 100 per cent.

9 Short-term investment includes currency and deposits included in the M3 definition (overnight, with agreed maturity up to two years, redeemable at notice up to three months and repos being liabilities of MFIs), money market funds and debt securities with a maturity of less than two years if issued by MFIs and less than one year in all other cases. Long-term investment comprises all other deposits and debt securities, shares and insurance technical reserves.

households[10]. Only by the end of the first semester of 2007, the distance between long-term and short-term investment was as large as 35%: the gap has been closed by 23% in just one and a half years[11]. This trend has continued even in the last quarter of 2008 and first of 2009 in spite of the deceleration of short-term investment in those quarters, reflecting the more acute negative development of long-term investment (and the large holding losses in long-term assets).

6. Afterword

The exercise in this paper illustrates the benefits of looking at institutional investor data in an integrated statistical framework such as the EAA. The exercise itself will be improved as new data on investment funds and ICPFs become available during 2009, covering who-to-whom information, and a distinction is made between institutions taking the risks of their investments (non-unit linked insurance policies, defined-benefit pension funds) and those passing the risks on to the holders of their liabilities (investment funds, unit-linked policies, defined-contribution pension funds).

But beyond the specific example chosen, this paper illustrates the advantages of integrated, comprehensive statistical products for all kinds of analysis. The EAA combines various statistics in a common framework bridging the classification, valuation and treatment differences that might exist among them. This allows the analyst to look at the global aspects of economic developments: for instance, securities issues by economic agents can be seen in the light of who is acquiring them, real investment in the context of total investment and savings and external financing, and income development with reference to wealth changes.

This global view is a unique deliverable of integrated systems like the EAA, which will prove increasingly more productive as users become more familiar with it and the products gain in detail and timeliness.

[10] The concrete figure must be taken with caution as it heavily depends on the statistical simplifications taken for the exercise in this paper.

[11] A similar calculation on the original data yields a narrowing of just 15%.

Discussant comments on session IPM71: Statistics of institutional investors

Chihiro Sakuraba[1]

All four speakers encompassed the recent activities of institutional investors in their individual countries with deep insight.

Barend de Beer introduced the South African flow of funds compilation procedure. He demonstrated the effectiveness of the flow of funds accounts by analysing the activities of foreign investors. Every central bank faces difficulties in data collection to one degree or another, but the South African Reserve Bank has implemented a very clever technique for classifying and disclosing data from reporting institutions. Such transparency should be followed by other statistics compilers.

Jani Matilainen presented the innovative developments in statistical reporting systems throughout the euro area. The recent Irving Fisher Committee on Central Bank Statistics seminar, one in the International Statistical Institute series, featured new compilations adopted by the European System of Central Banks. As Jani explained, European central bankers provide investment funds with the option of reporting either individual securities or their aggregate holdings. Such flexibility minimises reporting burdens.

Jani also took the position that securitisation involves "de-recognition" in accounting frameworks. His argument is so critical that a lack of understanding of the entire system of financial products in a quantitative manner will inevitably lead to mistake in policy decisions of monetary authorities.

Ian Nield made a persuasive case for compiling flow of funds accounts. Recently, the Reserve Bank of New Zealand obtained comprehensive information on securities transactions by requesting it from a settlement system, Austraclear New Zealand. I suppose that building a good relationship with the central securities depository is one approach for monetary authorities, while obstacles remain to accessing classified data on individual trade. In my view, hedge funds tend to use foreign agent banks which keep the records secret.

Robert Gadsby highlighted the risk-averse behaviour of institutional investors using a quantitative approach. The study is the successful outcome of integrating the European statistical framework into the euro area accounts (EAA). His empirical results showed that the degree of risk aversion accelerated around 2007 if the amount of institutional investors' assets is included in non-financial sectors such as households. Investment funds are usually blamed for propagating shocks. However, funds in the euro area behaved conservatively in the past two years. Such unexpected results allow policymakers to understand the nature of investment behaviour. The study shows the importance of enhancing financial statistics.

At the IPM 71, we discussed the obstacles to expanding reporting of financial statistics. Efficiency, a cooperative response and the time required to compile all the data seem to be the key factors.

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[1] Bank of Japan.

Invited Paper Meeting 72

Measuring access to monetary and financial services

Papers:

Measuring the evolution of monetary and financial services in Portugal
João Cadete de Matos and Luís D'Aguiar, Banco de Portugal

Measuring consumer access to financial services in South Africa
Penelope Anne Hawkins, Feasibility (Pty) Ltd and the University of Free State

Access to financial services in Argentina: a national survey
Gastón Luis Repetto and Andrés Denes, Central Bank of Argentina

Measuring the evolution of monetary and financial services in Portugal

João Cadete de Matos[1] and Luís D'Aguiar[2]

Introduction

This paper aims to describe, in a concise way, the evolution of monetary and financial services in Portugal since the Portuguese accession to the European Economic Community, highlighting some of the principal milestones that were achieved along the way.

Financial services (other than insurance, pension funding and compulsory social security) cover a broad range of activities regarding the obtaining and redistributing of funds. They include monetary intermediation, eg the receiving of deposits and/or close substitutes for deposits, and the extending of credit or lending of funds through a variety of forms (such as loans, mortgages and credit cards). In the EU context, those activities are carried out by the so-called monetary financial institutions (MFIs), a category that encompasses central banks, credit institutions (as defined in EU law) and other resident financial institutions that fulfil the MFI definition, irrespective of the nature of their business (eg money market funds). A second class of financial services, which could be called non-monetary financial intermediation, comprises the activities of, for example, holding companies, trusts, funds and similar financial entities (excluding money market funds), financial leasing companies, credit-granting by institutions other than MFIs, other financial service activities primarily concerned with distributing funds other than loans and own-account investment activities. A last category of financial services concerns activities that are auxiliary to financial services and insurance activities involved in, or closely related to, financial service activities, but which do not themselves provide financial services.

Our attention throughout this paper will be centred specifically on the first of those three groups. The monetary sector plays a key role in the economy through the provision of monetary and financial intermediation and payments services. In this way, MFIs enable an efficient allocation of savings and investments, and allow financial transactions to take place at minimum cost. The MFI sector is, by far, the main contributor to financial service activities in Portugal. In addition, this sector has a superior statistical coverage, as compared to that of, for example, non-monetary financial institutions. In Portugal, the monetary sector comprises the Banco de Portugal – which is the Portuguese central bank and, as such, exercises control over key aspects of the financial system – and four other types of monetary institutions: universal or all-purpose banks, which account for most of the monetary intermediation activity; mutual agricultural credit banks; small savings banks; and money market funds.

Given the lack of comprehensive and reliable micro data (census- and/or survey-based) and the methodological difficulties inherent in the measurement of access to finance, the focus of this paper will be on the provision of, rather than the access to, financial services. The virtual absence of significant non-price barriers for firms and households in the use of financial services in Portugal, on the one hand, and the fact that the provision of financial services

[1] Banco de Portugal, Statistics Department.

[2] Banco de Portugal, Statistics Department.

may be seen as an indicator of the potential access to financial services, on the other, mitigate the possible detrimental consequences derived from following this approach.

Finally, considering that Portugal is a member of the European Union, this paper will dedicate a few words to a number of initiatives brought about by such participation, which has substantially contributed to improving the efficiency of the Portuguese financial services industry. In particular, this paper will address: (i) the Portuguese response to the policy orientations in connection with the European Commission's policy framework i2010 – European Information Society 2010; and (ii) the ongoing European financial markets integration process – one of the cornerstones of the so-called Lisbon Strategy, set out by the European Council in Lisbon in March 2000 to make the European Union "the most dynamic and competitive knowledge-based economy in the world, capable of sustainable economic growth with more and better jobs and greater social cohesion, and respect for the environment by 2010".

Turbulent beginning

Since 1986, the year that marked the Portuguese accession to the European Economic Community (EEC) – the forerunner of the European Union – the growth in the provision of financial services in Portugal has been remarkable, especially if compared with the situation at the time of the revolution of April 1974 that put an end to almost 50 years of relative isolation under an authoritarian regime.

After the completion of democratic consolidation in Portugal, which took place in the second half of 1982 following the first constitutional revision that enforced popular suffrage as the only source of public power, the Portuguese financial system underwent a number of noteworthy changes to its legal framework and, concurrently, to its functioning, as part of a major structural reform that was taking place within the context of an IMF agreement during the 1983–85 period of macroeconomic adjustment. This, in turn, had a significant impact on the provision and usage of financial services in Portugal.

First and foremost, the banking sector was reopened to private initiative in 1984, thus ending a seven-year period in which the private sector was not allowed to set up new banks in Portugal. In addition, new legislation allowed for the introduction of innovative financial instruments (eg new types of deposits and certificates of deposit), which, in turn, brought about a more diversified portfolio of financial assets available to savers – and other types of financial intermediaries (eg investment funds and non-monetary credit institutions, such as financial leasing companies, factoring companies and hire-purchase financing companies), particularly in markets in which banks were not allowed to be present. The capital markets (both primary and secondary) that had been virtually inactive since the 1974 revolution were restructured and a number of initiatives (such as the granting of tax incentives for investment in the capital market) were taken with a view to its revival.

This movement towards greater liberalisation and innovation gained further momentum after Portugal joined the EEC, on 1 January 1986, beginning with the passing of legislation to further align the Portuguese legal framework with existing Community law. This legislative alignment has focused, inter alia, on the following aspects: defining credit institutions; rules for granting and revoking licences to establish credit institutions; rules for the operation and supervision of credit institutions; solvency and liquidity ratios; and the promotion of competition.

In particular, the opening up of the banking sector to private investors, on the one hand, and the denationalisation of state-owned banks, insurance companies and other public enterprises allowed by the passage of the so-called Re-privatisation Law (April 1990) – most of the resident banks had been nationalised in September 1974 and March 1975 (only

foreign banks evaded nationalisation) – on the other hand, provided a strong impetus towards diversification, modernisation and competition in the Portuguese financial system.

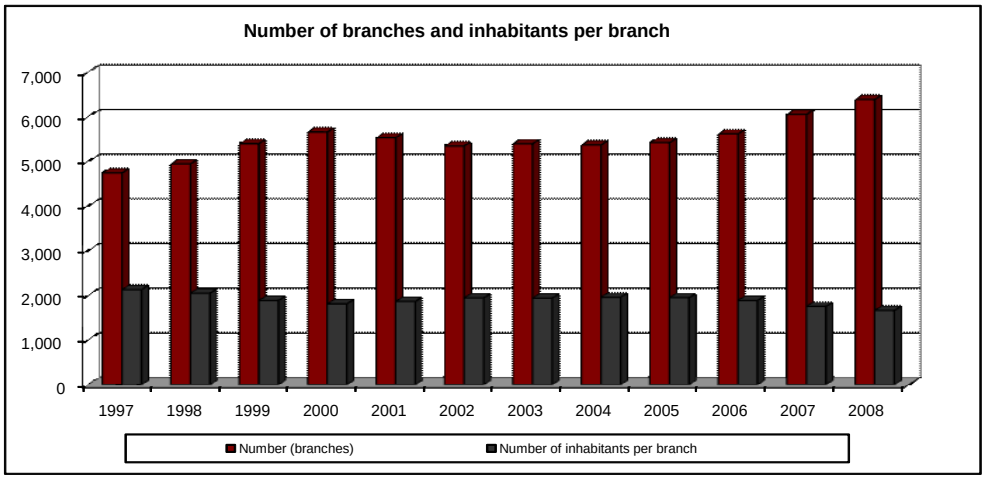
A new legal framework for the financial sector, published in 1992, introduced the concept of "universal banks"; most banks took this opportunity to extend the range of their activities, leading to an increase in competition and innovation, emphasised by the emergence of new types of financial institutions. The prospect of the single market and the establishment of an increasing number of foreign banks in Portugal led to the expansion of new markets.

In parallel with these developments, the Portuguese economy experienced a striking recovery in the years that followed EEC accession: for the first time since World War II, the country recorded five consecutive years of economic growth. In fact, Portugal's GDP, led by strong exports and a healthy capital formation, grew by an annual rate of 4.6% from 1986 to 1990, one of the highest growth rates among OECD countries.

The new competitive framework introduced incentives for innovation and the introduction of more advanced technologies. Since the late 1990s, the technological progress and narrowing margins in business as a whole have fostered the rationalisation of the production and distribution of financial products, with the gradual substitution of labour for new technologies. The strong growth of other administrative costs in 1997–99 revealed the need to meet the massive investments at the communication and information system levels – partly linked to the ongoing restructuring operations within newly built banking groups – which also contributed to the rationalisation of the use of labour.

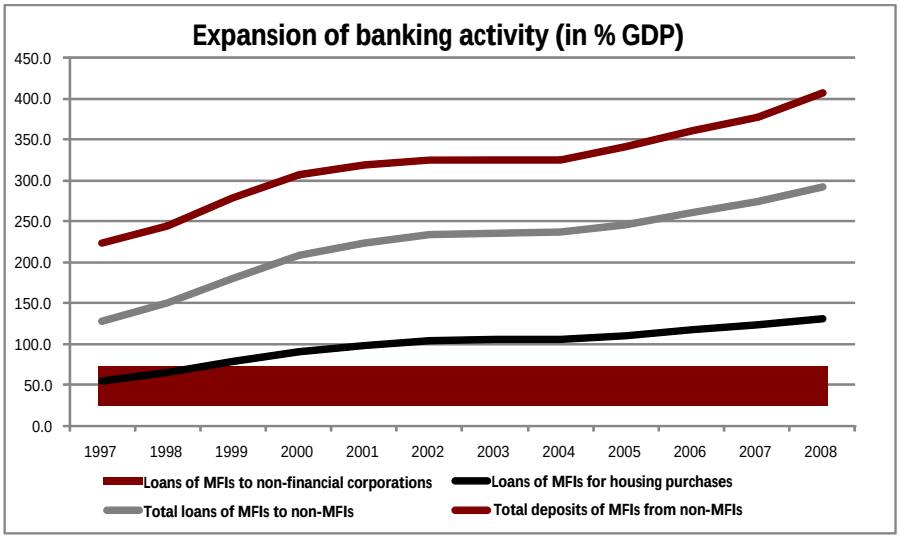
The successive reductions in the number of credit institution employees per branch (from 13.6 in 1997 to 9.8 in 2008) underscore this fact: the decrease resulted both from staff reduction and the increase in the size of branch networks (6,391 branches in 2008 compared with 4,746 in 1997). Consequently, staff costs fell as a percentage of total average assets and as a proportion of total costs: the ratio between staff costs and total operating costs fell from 76% in 1985 to 63% in 1997 and to 54% in 2008. Moreover, the number of people served per branch (see Figure 1) decreased from 2,130 in 1997 to 1,663 in 2008.

Figure 1



Banking activity witnessed a strong growth over this period (see Figure 2): loans to non-financial corporations reached 68.2% of GDP in 2008 (30.4% in 1997) and housing loans amounted to 62.9% of GDP in 2008 (24.6% in 1997). Total non-monetary deposits grew from 95.7% of GDP in 1997 to 114.5% in 2008.

Figure 2



Boom in retail financial services

One of the most striking developments that took place during that period was the substantial increase in the application of technological innovations (mainly in telecommunications), which made it possible to implement teleprocessing networks, either within the larger banks or through interbank links, with visible benefits for the provision of financial services, particularly in the field of retail payments. This increase was backed by the creation of Sociedade Interbancária de Serviços (SIBS), a company that was founded in 1983 by a number of resident banks (today, the company's shareholders stand for practically the whole Portuguese retail banking sector). Its aim was to introduce a single payment platform that met the banking establishments' needs, while developing their facilities and technology and extending their international scope. In 1985, the network became operational under the Multibanco name.

Multibanco, a sophisticated network shared by every bank operating in the economy which fully integrates automated teller machines (ATMs) and electronic funds transfer at point of sale (EFTPOS) terminals, revolutionised the way retail operations are carried out in Portugal. Since its implementation, new features have been constantly added to the system, involving no extra cost to its users.

In addition to cash withdrawals and balance enquiries, customers can carry out a wide range of operations through Portuguese ATMs, such as: money transfers (both to other customers in the same bank and to other banks); utility bill payments; payments to the state and social security; mobile phone top-ups; transport ticketing; event booking and ticketing, etc. Currently, more than 60 different services are available to ATM users, of which around half may also be accessed via EFTPOS terminals.

Both the volume of transactions carried out through the system and its demographic and geographic coverage have been expanding at a fast pace, as illustrated by the following facts:

- The number of ATMs installed in Portugal (see Table 1 below), including the limited-access ATMs operated by credit institutions, was 16,885 by end-2008 (provisional figures), equating to 158.9 ATMs per 100,000 people, and 183.3 ATMs per 1,000 km^2, compared to 821 in 1990 – 7.7 and 8.9, respectively.

  The demographic ATM penetration is currently one of the highest in the world. According to a 2008 World Bank policy research report (see references below),

Portugal ranked fifth among the 99 countries covered by the study (second in the European Union after Spain); the geographic ATM penetration was also very high (12th and sixth, respectively).

Figure 3

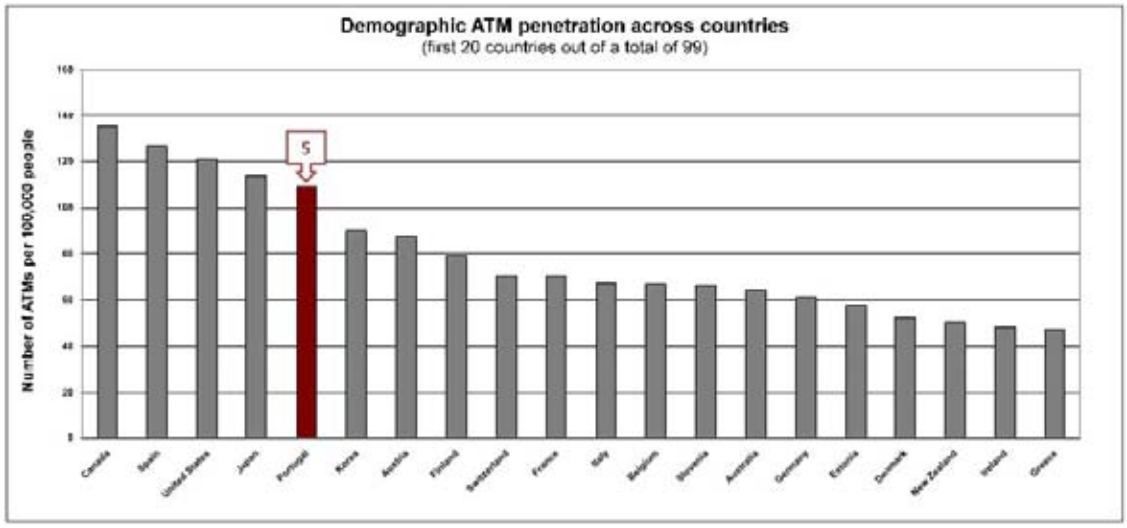
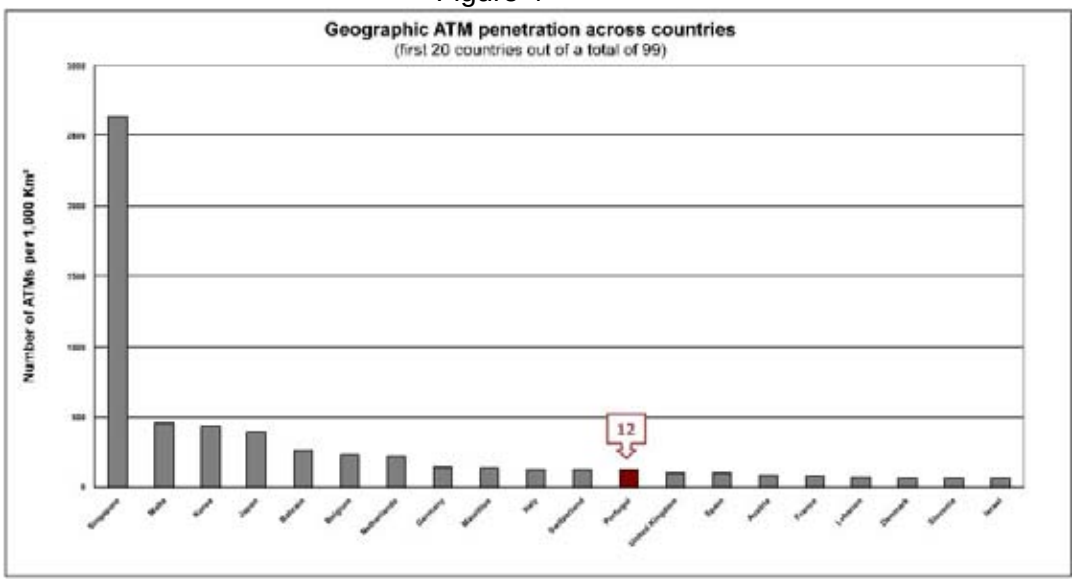


Figure 4



- In 2007, 476.8 million transactions (cash withdrawals and debit payments) were carried out in both open and limited-access ATMs (39.2 million in 1990), amounting to approximately €32.8 billion. The number of (debit) cards valid for the Multibanco network reached 18.2 million (2.4 million in 1990).
- EFTPOS terminals also expanded rapidly. At the end of 2008 (provisional figures), there were 226,118 terminals (2,127.7 per 100,000 people and 2,454.7 per 1,000 km^2) – mainly installed in retail outlets and at filling stations – compared with 2,672 in 1990 (25.2 per 100,000 people and 29.0 per 1,000 km^2). In 2007, the ETFPOS terminals registered an annual turnover of €25.3 billion, compared with €0.23 billion in 1990. These turnover figures corresponded to 781.3 million operations in 2007, compared with 7.8 million in 1990.

Table 1

Payment cards and terminals

(Number of units)

	2006	2007	Rate of change (%)	2008	Rate of change (%)
Active cards *	**17,642,048**	**18,178,388**	**3.0**	**19,767,925**	**8.7**
Debit cards	10,721,586	10,854,984	1.2	11,029,146	1.6
Credit cards	6,920,462	7,323,404	5.8	8,738,779	19.3
Number of terminals	**188,394**	**218,230**	**15.8**	**243,003**	**11.4**
ATMs	14,688	15,860	8.0	16,885	6.5
POS terminals	173,706	202,370	16.5	226,118	11.7

* Cards used at least once in a payment card accepting device.

Table 2

Use of payment instruments in Portugal

(Number in millions, and composition)

	1989		1998		2008	
	Number	%	Number	%	Number	%
Cheques	194,1	80.6	258,8	37.2	173,3	12.4
Payment cards [1]	7,6	3.2	315,8	45.5	893,6	64.1
Transfers	27,6	11.5	45,1	6.5	136,2	9.8
Direct debits	11,4	4.7	66,1	9.5	190,7	13.7
Other [2]	0,0	0.0	9,0	1.3	0,9	0.1

[1] Cash withdrawals not included.
[2] Including commercial effects and e-purse *Multibanco*.

The activity of SIBS was instrumental in generating economies of scale derived from a more rational and effective use of the financial, technical and human resources needed to develop more advanced payment instruments and systems. In addition, SIBS made the Multibanco network open to all those taking part in payment system operations, which allowed for network economies and the safety inherent in a single system.

Further, this scheme has returned to its users a substantial part of the productivity gains generated from ongoing technological and organisational developments both directly, through the supply of a service that is increasingly wider, of a better quality and at a better price, and indirectly, through increasing efficiency in the banking system as a whole.

A Banco de Portugal study of July 2007 estimates that, during 2005, cash withdrawals from ATMs, rather than at bank counters, saved consumers 11.2 million hours in processing time, and banks participating in this study cut costs by 46%. For cash deposits at ATMs, estimated gains were around 443,000 hours for customers in terms of processing time and cost cuts for the banks amounted to €4.3 million. With credit transfers through ATMs, gains were estimated to be around 491,000 hours in processing time and €5.1 million in transaction costs. Consumers also gained around 1.5 million hours in checking balances and account entries through ATMs instead of over-the-counter. Taking gross average salaries as a point of reference (as detailed in the statistics for OECD countries in 2005), the benefit for the consumer is around €86 million, corresponding to 13.6 million hours of processing time.

Another successful example of the application of new technologies to the payments systems is the so-called Via Verde (literally, “green-light way”) – an innovative electronic toll collection

system used in Portugal since 1991 that allows drivers to proceed through motorway and bridge tolls without stopping, the amount due being electronically controlled and automatically charged to their bank accounts. Via Verde is Europe's first and most advanced electronic toll payment system and was the first to be universally applied to all the tolls in a country. In addition, it shows the highest rate of penetration in Europe: more than one third of Portuguese tolls are currently equipped with Via Verde. Since its launch, the range of services provided through this system has continued to increase. The application of this technology has been successfully extended to, inter alia, payments for petrol in filling stations, car parking payments and, more recently, vehicle access control systems aiming at restricting private car entry in central areas of the capital, Lisbon. Currently, Via Verde has more than 2.1 million users and accounts for around 62% of all motorway toll transactions in Portugal (around 70% in urban areas).

The availability of information and communication technologies (ICT) has also led Portuguese banks to make considerable efforts to modernise customer access to financial services in new, cheaper ways, and to more people. As a complement to "in-person" services, online connections with corporate customers, home banking and mobile banking (m-banking) are now extensively available in Portugal and increasingly used by firms and households.

Home banking has become the third most preferred channel to get in touch with a bank – after ATMs and face-to-face contact with the bank teller. In 2007, around 19% of people in Portugal with access to a wide range of transaction banking services that are appropriate to their needs and socioeconomic status (ie the "fully banked", following the terminology in the Commission's 2008 report) favoured home banking – more than seven times the percentage in 2000 (2.7%). The rising number of Portuguese households with at least one computer at home (in the period 2004–08 the average annual growth rate was 6%) and access to a broadband internet connection (35%) is likely to increase the use of home banking as an alternative to traditional banking outreach.

With m-banking, banks transmit information to their customers wherever their location and at reduced cost. This is vital for a number of banking services (eg alerts), as well as for traditional marketing campaigns. From the demand-side viewpoint, people frequently do not have time to get to a bank branch, and the internet may not be an option in some cases – such circumstances favour the use of a more straightforward channel. For a sizeable part of the Portuguese population, using mobile phones to obtain access to certain financial services, such as checking bank balances or conducting other basic operations, is second nature. The Portuguese are clearly a phone-savvy nation. For many, the mobile phone is the organisational hub of their lives. In 2008, the number of mobile phone subscribers amounted to almost 15 million, corresponding to a market penetration rate of around 152%, one of the highest among the EU-25 member states and well above the EU-25 average (119%). Additionally, the total number of possible users of Universal Mobile Telecommunication System (UMTS) services was 4.3 million.

The continuous expansion of both internet and m-banking in Portugal should contribute to a noticeable improvement in access to financial services, by offering services that are, concurrently, more affordable and more suited to the prospective customers, particularly to the so-called "marginally banked" (ie people with a deposit account that has no electronic payment facilities and no payment card or cheque book), who have a bank account but rarely use the related electronic payment facilities and cards.

To conclude this point, it is safe to say that the Portuguese retail payment system is widely recognised today as highly developed, in terms of technology, accessibility, time-saving features and nationwide coverage. The system processes millions of operations on a daily basis, both counter-based at thousands of bank branches and electronically through the ATM/EFTPOS system. Last but not least, its overall quality can be recognised by what is, in relative terms, a very small number of complaints on the part of the banks' clientele.

Role of the Banco de Portugal

The Banco de Portugal is the Portuguese central bank and is an integral part of the European System of Central Banks (ESCB). As such, it pursues the objectives and participates in the performance of the tasks entrusted to the ESCB, particularly the maintenance of price stability, viewed as a precondition for increasing economic welfare and the growth potential of an economy. The Banco de Portugal is also accountable for the efficient and safe functioning of the country's payment systems, including the issuance of banknotes and clearing services – an essential condition for the sound operation of the economy. In addition, the Banco de Portugal provides a wide range of services both to banks, such as the running of the Central Credit Register (including the centralisation of information on protested bills and cheque defaulters) and the Interbank Money Market operation, and to non-financial companies, eg the maintenance of the Central Balance Sheet Data Office (CBSO). Moreover, the Banco de Portugal supervises the resident credit institutions and other financial companies, thus providing for the stability and soundness of the financial system and ensuring the efficiency of its operation, the safety of deposits and depositors and the protection of consumers of financial services. Last but not least, another service provided by the Banco de Portugal includes the compilation, analysis and dissemination of monetary, financial, exchange and balance of payments statistics, which are instrumental to decision-making; in this way, it influences the financial service activities in the economy.

Services related to the payment systems

Being the legal entity responsible for the regulation and oversight of payment systems, the Banco de Portugal has lent its full support to the modernisation of the Portuguese payments industry, which has undergone considerable changes in recent years. The oversight function is performed by monitoring payment systems, assessing their compliance with the Core Principles for Systemically Important Payment Systems (approved by the Committee on Payment and Settlement Systems of the G10 central bank governors and adopted by the Eurosystem in 2001), issuing regulations, exercising moral suasion and providing settlement services for banks or payment and clearing systems. It also plays a catalyst role in developing these systems and promoting coordination among the relevant parties.

The Banco de Portugal is both manager and settlement agent for the interbank clearing system and the real-time gross settlement system (RTGS). The main objectives of the RTGS are to: (i) minimise credit, liquidity and systemic risks; and (ii) provide participants with information in the course of the day on the balance of their accounts with the Banco de Portugal and on queuing and other operations that have been carried out. As such, it constitutes an essential instrument to enable participants to manage their funds. In preparation for Stage Three of the EMU, the Banco de Portugal worked on connecting the RTGS to the Trans-European Automated Real-time Gross settlement Express Transfer system (TARGET) – a payment system in which processing and settlement take place continuously ("in real time") rather than in batch processing mode; transactions can be settled with immediate finality, and each transfer is settled individually instead of on a net basis. The TARGET system replaced the arrangement in force prior to the introduction of the euro and the launching of a single monetary policy in 1999, according to which, payments between EU countries mainly relied on correspondent banking. In February 2008, Portugal migrated to the new TARGET 2 system.

Services related to the Central Credit Register (CCR)

CCR is a database managed by the Banco de Portugal on the basis of credit-related information (including potential liabilities, such as unused amounts on credit cards and open credit lines) that is supplied by the participants (all resident credit-granting institutions). The

main aim of the CCR is to provide information to back up the participants in their assessment of the risks attached to extending credit. To this end, the participants can access aggregate information on the credit liabilities of each client vis-à-vis the financial system. Any person has the right to be informed about the data recorded in his/her name in the CCR and, where necessary, ask the participant responsible for reporting to the Banco de Portugal to correct and update such information.

Box 1

Ranking of public CCR coverage (in % of adult population)

1	**Portugal**	**81.3**
2	China	62.1
3	Belgium	56.5
4	Malaysia	48.5
5	Latvia	46.5
6	Spain	45.3
7	Ecuador	37.2
8	Mauritius	36.8
9	Bulgaria	34.8
10	Argentina	34.3

Source: World Bank, *Doing Business 2009.*

Other noteworthy figures about the Portuguese CCR

- Threshold: minimum of 50 € per credit balance
- 5.6 million private individuals registered
- Over 280,000 corporations registered
- 216 participants (i.e., reporting agents)
- 15 types of financial products
- 20.5 million monthly records
- 245 million annual movements

Source: *Banco de Portugal.*

The CCR database fulfils all the requirements for data protection, as laid down by the National Commission for the Protection of Data. Moreover, the Banco de Portugal is legally authorised to use the CCR information for purposes such as: (i) the supervision of credit institutions and other financial companies; (ii) the analysis of the stability of the financial system; (iii) monetary policy operations and intra-daily credit; and (iv) quality control and compilation of statistics (eg the distribution of credit by branch of activity). In particular, the CCR:

- ensures the centralisation and the subsequent dissemination throughout the banking system (generally on a daily basis) of credit incidents (protested bills) submitted to the Notary Public Offices by financial institutions, thus providing the financial institutions with an additional means to better evaluate the risks of their active operations and
- is responsible for checking compliance with the duties assigned to the credit institutions as regards the use of cheques (still a very popular means of payment in Portugal), centralises the information reported by credit institutions and discloses through the banking system the list of cheque defaulters.

Services related to the Central Balance Sheet Data Office (CBSO)

CBSO is a repository of economic and financial data from a representative sample of Portuguese non-financial corporations. This database is chiefly built on individual and unconsolidated corporate accounting data, submitted at quarterly and annual frequencies. Among its various possible uses, the database enables a more informed assessment of the developments in the economic and financial situation of non-financial corporations, provides

reporting companies with information relevant to their management function, including an understanding of their positioning within their respective sectors of economic activity, and allows the Banco de Portugal to compile statistics that, besides complementing the existing ones, serve as an additional means to crosscheck their internal consistency.

In 2007, the annual survey was substituted as a data source for the CBSO by the information concerning corporate annual accounts reported under the so-called IES arrangement. Formally developed in January 2007 through the joint efforts of the Banco de Portugal, Statistics Portugal (the Portuguese national statistics office), and the Portuguese Ministries of Finance and Justice, IES aims to define a harmonised solution for the collection of annual data from the financial statements of non-financial corporations. IES, which stands for Informação Empresarial Simplificada (meaning "simplified corporate information"), is the electronic submission of accounting, fiscal and statistical information that companies usually have to provide to the above-mentioned authorities. IES allows companies to fulfil four reporting obligations to four different authorities via one single electronic submission at one moment in time. This innovative solution contributes to bringing significant cost savings to both the reporting corporation and the public entities involved, and makes it possible to construct statistics from information collected through administrative acts.

Services related to market conduct supervision

In a market characterised by contractual freedom and financial innovation, it is incumbent upon the Banco de Portugal to check for compliance with the minimum requirements of information supplied to customers on the financial conditions applied to the different banking operations and services, as well as on the respective risks. This mission will be referred to here as market conduct supervision (MCS), as opposed to prudential supervision, which is more focused on guaranteeing the soundness of financial undertakings and contributing to the stability of the financial system.

Informed decision-making by the banks' clientele, who are especially aware of the risks inherent in financial products and services, is a key requirement for the efficient operation of the retail financial markets and the mitigation of risk in the financial system. The disclosure by credit institutions of relevant information concerning their products and services in a transparent, intelligible and standardised way promotes such decision-making. However, the dissemination of information along those lines may not be sufficient, given that clients' decisions are also determined by their level of financial literacy. Therefore, it is also necessary to foster financial education among the public at large.

The Banco de Portugal's MCS is structured on the basis of a number of reciprocally complementing guiding rules, ranging from the requirement for credit institutions to observe the principle of transparency and rigour when informing their clients along the various stages of the marketing of banking products and services, to the development of the normative framework that governs the conduct of credit institutions in the retail financial markets. Concurrently, they include monitoring compliance with regulations – eg via surveillance activity related to the commercialisation or promotion of financial products and services, by responding to clients' complaints and through comprehensive on-site inspections – as well as fixing cases of non-compliance and, in the most serious situations, applying administrative sanctions.

Another guiding principle consists in promoting the quality of the demand for financial products and services by fostering initiatives that contribute to raising clients' competences in assessing costs, expected income and risks related to those products and services.

Building up the Information and Knowledge Society – a few milestones

- In May 2000, during the Portuguese Presidency, the EU adopted the eEurope initiative with a view to: (i) making the internet cheaper, faster and safer; (ii) investing in people and their qualifications; and (iii) stimulating the use of the internet. These ideas were effectively implemented as a central component of the European Commission's policy action.
- In November 2002, the Knowledge and Innovation Mission Unit (UMIC) was established to define and coordinate the policies on the Information Society and the e-Government in Portugal. Its action plan was based on seven points: (i) an Information Society for all; (ii) new abilities; (iii) quality and efficiency in public services; (iv) better citizenship; (v) health within everybody's reach; (vi) new ways of creating economic value; and (vii) attractive contents.
- UMIC presented the Broadband National Initiative in August 2003. This initiative was approved by the Government with the purpose of intensifying the use of, and access to, broadband internet in Portugal, contributing, on the one hand, to an increase in the productivity levels and competitiveness of the national economy and, on the other hand, to greater social cohesion.
- In 2005, the European Commission launched the i2010 – European Information Society for growth and employment initiative. One of the objectives of this strategy is of special interest in this context: "An Information Society that is inclusive provides high quality public services and promotes quality of life" (Objective 3). To reach this goal, it is necessary, first, to foster ICT growth and, second, to guarantee that ICT: (i) benefits all citizens, by making ICT products and services more accessible and providing people with basic digital competence; (ii) promotes better, more cost-effective and more accessible ICT-based public services; and (iii) improves the quality of life (via, for example, ICT-enabled health and welfare services).
- The Connecting Portugal initiative, one of the strategic components of the Portuguese Government's Technology Plan, may be viewed as a response to the challenges of i2010. The priorities of this initiative are to extend the progress accomplished in the area of the social use of ICT in Portugal, namely in the scope of the international comparisons required by the Lisbon Strategy, and the independent, regular and transparent evaluation of the information systems of public services and administration. The objectives underlying this initiative are, inter alia: (i) to promote a modern citizenship which is informed, conscious and active, and for which the use of ICT is a natural tool to access information, education, cooperative work and public debate; (ii) to guarantee a competitive national telecommunications market, especially regarding costs of services both to citizens and to companies, and the wide availability of high-quality advanced services, assuring competitiveness at the same level as the best European practices; and (iii) to promote the increasing use of ICTs by companies, supporting them in their modernisation, as a key condition for their competitiveness in the international market, and to assure the development of new technology-based companies, namely those producing software.

Towards a single market in financial services in the European Union

Portugal has been actively involved in the European Union's efforts to create an integrated Europe-wide single market in financial services through a framework of legislation, cooperation and practice within which financial services can operate as a whole across borders to achieve the free movement of capital and services. An important step in that direction took place at the Lisbon summit in March 2000, when the EU Heads of State and

Government formally launched the Financial Services Action Plan (FSAP), an ambitious legislative and regulatory programme aimed at removing barriers to the cross-border flow of financial services and achieving a single market in financial services by 2005.

According to a November 2000 report from the so-called group of "Wise Men" chaired by Baron Lamfalussy, a single market should provide:

- Improved allocation of capital, by means of: (i) more efficient, deeper and broader security markets, enabling savings to flow more efficiently to investment; (ii) lower transaction costs and improved market liquidity; (iii) more diversified and innovative financial systems; and (iv) more opportunities to pool risk.
- More efficient intermediation between savers and investors, through: (i) intensified competition among financial intermediaries across Europe, leading to fewer inefficiencies; (ii) giving users greater freedom of choice; and (iii) the opportunity to reap economies of scale and scope across a larger market.
- Stronger, faster-growing European economy, resulting from the above.

A single market for financial services structured along those lines was far from being achieved in the time envisaged, despite the legislative work on the FSAP having been completed. The FSAP had mostly succeeded in enhancing the integration of the securities and wholesale markets. The next steps were to implement, at the national level, the measures already adopted and to assess their impact on the market. Less successful, however, were the efforts to create an internal market for retail customers, where further action was still required. Although indirectly benefiting from the integration of wholesale markets, the European Union's retail financial markets remained fragmented. Cross-border transactions for individuals and small- and medium-sized enterprises remained limited, and a high level of heterogeneity still existed on various key aspects – eg prices, available products and distribution channels. Integration had mainly occurred on the supply side of the market through firms establishing subsidiaries and branches outside domestic markets.

When Portugal reassumed the rotating Presidency of the EU Council during the second half of 2007, the strengthening of the EU strategy for financial services was among its main concerns. The priorities in this area were, inter alia: (i) promoting the completion of the single payments area; (ii) increasing the integration of the retail financial services market; (iii) enhancing market integration in the field of clearing and settlement of securities transactions; and (iv) improving the efficiency of regulatory and supervisory frameworks.

As of today, EU financial integration is an ongoing process. While several legal and cultural factors will continue to play an important role in hindering full integration, recent initiatives to reduce fragmentation in payment infrastructures could promote further integration and lead to a reduction in consumer prices.

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Measuring consumer access to financial services in South Africa

Penelope Anne Hawkins[1]

Introduction

It is recognised that access to financial services plays an important role in relation to economic growth, poverty reduction and social inclusion, as financial exclusion acts as a brake on the development of households (World Bank (2006)). However, measuring such access remains somewhat problematic and involves a number of compromises.

While access to financial services is sometimes conflated with access to credit or to a bank account, a more complete list should include the fact that consumers require the ability to:

- make payments
- save and make investments
- manage risk
- obtain credit and loans
- make financial provision for old age.

Such items are not easy to measure, and measurement is often confined to formal sector services.[2] For example, access to an entry-level bank account is often seen as a proxy for the ability to make payments and to save. As entry-level bank accounts may come with restrictions on payment types and have very low or zero interest payable on positive balances, their appropriateness as a proxy for these needs is arguable. However, it is widely acknowledged that access to an entry-level bank account may well be a necessary first step in acquiring the ability to make payments and to save.

The data on access to financial services remain relatively weak – for both developed and developing countries – especially if one thinks of access in broader terms than simply access to an entry-level bank account. Standards for measuring access are not widely established. Moreover, access is a nuanced subject, embracing availability, affordability and appropriateness, which are subjective and elusive to measurement. A proxy for access to financial services that is more readily amenable to measurement is the use of financial products; this has become the de facto alternative. Usage measures the coincidence of demand and supply of services, but cannot measure voluntary exclusion (where services are extended but not taken up) and involuntary exclusion (where services are not extended). Ideally, the measurement of access, rather than usage, should take account of both current use and voluntary exclusion (Claessens (2006)). Others have argued that the distinction between access and use is too fine a point to pursue and that the focus should be on the measurement of the latter (Honohan (2009)).

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[2] While it is acknowledged that there is widespread informal use of financial services, such as money guards, informal saving clubs and taxi drivers (to transmit funds), these are even less susceptible to measurement and are largely excluded from the discussion here.

The discussion below centres on an important aspect of the use of financial services – the number of accounts and the number of credit agreements. What is clear is that even the measurement of usage is not always straightforward. Data sources have variable accuracy and comparability. While regulators may be considered a neutral and accurate source, they can sometimes provide only incomplete statistics on basic data such as numbers of accounts or policies (see, for example, Mylenko (2009)). Data collected from providers and consumer surveys have coverage and accuracy problems. In particular, self-reporting by consumers of certain financial products, such as credit products, is particularly weak. Survey data also suffer from weak comparability over time and across countries (Cull and Scott (2009)). The present paper argues for an approach that employs a diverse number of sources in the hope that they will confirm each other. Where they do not, explanations need to be sought.

In South Africa, measuring access to financial services has been facilitated by the formation of the Financial Sector Charter (FSC) and the National Credit Act (NCA). The FSC placed the onus on financial sector firms to meet access and empowerment targets which were to be reported on an annual basis. Access standards based on physical accessibility, appropriateness to the needs of the un-served population, affordability, simplicity and non-discrimination were developed for each of the reporting industries. The standards were to form the basis of reporting to the FSC, in terms of achieving access targets, and were to be used in the evaluation of new and existing products for which firms claimed access points.[3] While events have subsequently overtaken this initiative,[4] the process has served to hone the understanding of industry participants and social partners alike on the complexity and nuances of access.

Around the same time that the FSC was being developed, a separate but related initiative led to the establishment of an industry-sponsored survey of consumers, known as Finscope™. The Finscope™ survey focuses on the financial products and services used by South African consumers.[5] The strength of this annual survey lies in its national coverage and its reporting on the use of banking services.

Parallel to this process has been the development and legislating of the NCA, whose remit includes all categories of consumer credit, by non-bank and bank providers alike. The NCA established the jurisdiction of the National Credit Regulator (NCR). Since the implementation of the NCA in 2007, credit providers have been required to report in some detail to the NCR.

These two initiatives have provided potentially rich sources of data on access both to banking services and to credit. In the following two sections, the discussion highlights some of the strengths of these data sources and concludes with suggestions on how to improve the measurement of access.

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[3] See Feasibility (2005) and the *2006 Annual Review* of the FSC Council.

[4] The Financial Sector Charter was a voluntary commitment by the financial sector industries in South Africa to redress inequalities borne of the apartheid years. The FSC aimed to address empowerment and access and has subsequently been superseded by the broad-based black economic empowerment (BBBEE) Codes of Good Practice legislated and regulated through the Department of Trade and Industry.

[5] The Finscope™ survey has been in operation since 2003, although a change in the population sampling base in 2005 means that the years 2005–07 are comparable. In 2008, the questions changed once again.

Access to bank accounts

The use of an entry-level bank account is often seen as the primary proxy for access to financial services, with the number of accounts an obvious initial indicator for access and usage. Even such an apparently simple indicator presents problems related to consistency.

While such data could ideally originate from central bank sources, through the returns of registered banks and cooperatives, the data are not always – as in the case of South Africa – reported to the central bank.

Moreover, banks use different definitions of account dormancy, which can prove to be vexatious where attempts are made to track improvements in access. The issue of dormancy is important, as it may provide an indication of the lack of appropriateness of such services. For example, if bank accounts are opened, but not used, it may be that the reality of fees and charges are discouraging use.

The Mzansi account, which is a standardised entry-level bank account offered by the big four banks and the Post Office, was launched in 2004. The measurement of dormancy here is complicated by the fact that, for the banks, dormancy is taken to mean that customers make no transactions for 12 months, whereas the Post Office employs a 24-month period.

In South Africa, the annual reports of the major banks typically provide information on the number of accounts and clients. This raises the problem of interpretation. The number of accounts cannot be seen to provide information on the number of uniquely serviced individuals, and even data on the number of clients suggest double-counting, as individuals may hold accounts at different banks. Moreover, the measurement of access begs the question of access to what – are all bank accounts equivalent? It is here that a framework of access standards is useful as a point of departure. The reference here to interpretation and to a framework of access standards indicates that measurement cannot stand on its own – we need some kind of analysis (theory) within which measurement makes sense. Theory needs data and data need theory.

The Finscope^{TM} consumer survey, which has been published since 2003, has proven to be a useful source of data, given the absence of official data. Honohan and King (2009) note that the survey is "driven by a market research and market development perspective…the impression [is] that the Finscope^{TM} approach has much of the market survey about it". The Finscope^{TM} survey is a "product-based" survey. So, for example, respondents are not asked if they have an account with a bank, or have access to one, but are instead deemed to be banked if they make use of any of a number of specifically named banking products or services. The list of products and services tracked by Finscope^{TM}, together with the results for 2005–07, are shown in Table 1 below.

While the Finscope^{TM} survey is nationally based and is large – with 3,900 respondents in the 2007 survey – there is some evidence to suggest that this somewhat exhaustive product-based survey approach can be mimicked by official, rather than industry-based, surveys – such as labour force surveys – where financial products and services would be dealt with at a more general level. For example, the question: "Do you have a bank account?" could be asked, instead of employing the Finscope approach, which is to ask: "Do you use any one of the following products and services …?" (Cull and Scott (2009)).

Table 1

Self-reporting by consumers on the use of banking services

	2005	2006	2007
Total	**47%**	**51%**	**60%**
% share of respondents with different banking products/services			
Mzansi account	2	6	10
ATM card	44	48	55
Debit/cheque card	14	15	25
Savings book at a bank	3	3	3
Post Bank transaction account	N/A	N/A	1
Post Bank savings account	N/A	N/A	4
Savings/transaction account	33	38	43
Current/cheque account	7	7	8
Credit card	6	7	9
Fixed deposit account	4	3	3
Personal garage/petrol card	2	2	2
Money market account	1	1	1
Cellphone banking	N/A	1	4
Notice deposit account	N/A	N/A	2
Call account	N/A	N/A	0
Village bank account	N/A	N/A	0

Source: Finscope™, 2007. N/A implies that the question was not asked in previous years.

The data in Table 2 below shows an increasing use of bank accounts in South Africa since 2004. According to Finscope™, an average annual growth rate of 10.4% has been achieved since 2004, when there were 12.9 million banked individuals, and 2008, when it estimated that 20 million people had active bank accounts. This trend is confirmed by the AMPS Living Standard Measure (LSM) survey, which is also a consumer survey but of a far more general nature, with the questions based on institutions, such as: “Do you have an account with any of the following banks?” Both surveys show trends which accord with the reported growth in the client base of the major retail banks. While the growth rates recorded by the surveys vary, the trend is in the same direction.

Table 2

Measures of the number of banked individuals

Source	**Banked individuals (in millions)**				
	2004	**2005**	**2006**	**2007**	**2008**
Finscope	12.9	14.3	15.8	19	20
AMPS LSM	11.9	13	14.1	15.3	17.5
Estimated major banks' client base	11.1	12.5	14.1	16.6	18
Mzansi accounts opened	0.5	2.1	3	4.9	6

Annual growth rates	**2005**	**2006**	**2007**	**2008**
Finscope	10.9%	10.5%	20.3%	5.3%
AMPS LSM	9.2%	8.5%	8.5%	14.4%
Estimated major banks' client base	12.6%	12.8%	17.7%	8.4%

Sources: All Media Product Survey, various; Bankable Frontier Associates, 2009; Finscope™, 2007, 2008.

The number of Mzansi accounts has ballooned since their launch in October 2004. The data reflect the number of accounts opened, but not necessarily those in use. By the end of 2008,

it was estimated that 6 million Mzansi accounts had been opened, of which 3.5 million were active (Bankable Frontier Associates (2009)).

Access to credit

The information sources for access to credit have recently been bolstered by the advent of the NCA. Prior to the NCA, the provision of credit to consumers, including the quantum in value and in number of loans, could only be estimated. While there was reporting of the loan book by banks, non-banks did not report their loans to any authority except for micro lenders, who were regulated by exemption to the Usury Act, and reported to the Micro Finance Regulatory Council (MFRC). Data on the number of loans were not collected systematically. Data regarding trends in non-bank loans, such as furniture accounts, could be gleaned from patchy reporting to StatsSA, but the annual reports of listed non-bank firms were the only useful source in some cases.

Self-reporting of credit data by consumers through survey instruments has generally proven to be unreliable in that consumers tend to understate their use of such products and services. The Finscope^{TM} survey has proven to be no exception. For example, while it estimated that 14% of the total adult population had a loan or facility in 2007 – up from 11% in 2006 – only 1% of the population admitted to having a micro loan (from a formal provider), and none admitted to having a loan from an informal provider. This compares to the 8.3 million formal micro loan accounts reported to the MFRC at that time (statistics of the loans registered under the exemption notice, 29th period, December 2006). While it could be argued that some degree of the underreporting relating to financial services may be due to the complexity of the products and standards (for example, customers may not always be aware that they have an overdraft facility), it may also arise from the perceived intrusiveness of the survey questions (Honohan (2009)) and the reluctance to admit to the use of such products.

In Table 3 below, the Finscope^{TM} data on access to credit are reported, reflecting the results for 2005–07.

Table 3

Self-reporting by consumers on access to credit

Per cent

	2005	2006	2007
Adult population with a loan	**10**	**11**	**14**
Personal loan from a bank	2	3	4
Personal loan from a retail store	..	..	0
Loan from friend or family	3	4	5
Loan from an employer	1	0	1
Loan from a micro lender	1	1	1
Loan from a development agency	..	..	0
Loan from a village bank	..	..	0
Loan from an informal money lender	0	0	0
Loan from a stokvel/umgalelo/savings club	1	1	1
Loan from or arrangement with a pawn shop	..	..	0
Loan from a local spaza	0	0	0
Vehicle/car finance through a bank or dealer	2	2	3
Vehicle/car finance from elsewhere	0	0	0
Overdraft facility	1	2	2

Source: Finscope^{TM}, 2007.

The data above appear to belie the 17.6 million credit-active individuals listed by the credit bureaus (NCR (2009), Credit Bureau Monitor) and provider data discussed below.

The NCR has recently released data (for banks and non-banks) on the number of credit agreements undertaken by individuals. The data suggest that, in June 2008, there were almost 36 million credit agreements (see Table 4 below). The information is based on returns submitted to the NCR by the top 45 registered providers.

A similar, but independent, survey was conducted by Feasibility in the third quarter of 2008, on behalf of the NCR. The exercise canvassed the same top 45 providers, together with a number of other specialist providers. In spite of a broader survey base, the Feasibility exercise identified almost 32 million agreements. It is not known whether, in the intervening period, the providers revised some of their categorisations (as they are required to report to the NCR only on individuals and some small businesses), or whether there was a nonchalant approach to a non-official (although officially sanctioned) survey.

What both data sources reveal is that the number of agreements and their book value appear to be complementary and, indeed, such data cannot be independently interpreted. For instance, while the number of store cards amounted to 11.7 million by the end of June 2008, (over six times the number of mortgages) the value of store card facilities amounted to R14.2 billion in aggregate, not R729.5 billion. Moreover, for such analysis to add to our knowledge of access, more needs to be known about the distribution of such accounts and agreements.[6] Both consumer and provider survey data can help to provide insights into such matters.

Table 4

Reporting by providers on access to credit

Agreement type	Number of agreements (millions)		Value of book (R billions)	
Jun 2008	NCR data	Feasibility survey	NCR data	Feasibility survey
Mortgages	1.8	1.9	R706.40	R729.50
Other credit agreements: asset finance, furniture loans	5.8	5.1	R231.10	R188.20
Of which:				
Asset finance		1.8		R176.00
Furniture loans		3.3		R12.20
Credit facilities: overdrafts, credit cards, store cards	22.8	19.8	R133.10	R88.20
Of which:				
Overdrafts		2.0		R37.10
Credit cards		6.1		R36.90
Store cards		11.7		R14.20
Unsecured credit and short-term credit	5.3	5	R45.80	R36.10
Total	35.7	31.8	R1,116.40	R1,042.00

Source: Feasibility, "Pricing of and access to consumer credit", 2009; NCR, Consumer Credit Report, June 2008.

[6] This is the topic of another paper: Feasibility (2009): "Pricing of and access to consumer credit".

Conclusions

This paper has shown that even an apparently simple proxy of access (the number of bank accounts or credit agreements), is fraught with measurement problems. The problem is no simpler for matters such as the number of insurance policies or investment products. For example, South Africa has one of the highest penetration rates in terms of long-term insurance, even for developed countries, and yet the distribution of such polices is highly skewed.

Underlying the discussion is the age-old debate about the relationship between measurement and theory. This paper has concentrated on the measurement side, but measurement needs to be supplemented by an appropriate theory. Indeed, some would argue that the theory dictates what is to be measured. Now that the FSC has essentially been relegated to obscurity, some of the finer detail of what is meant by "access" may well be lost. The outcome may be even more emphasis on measurement, at the expense of theory.

The approach of establishing access standards for the range of financial industries is a necessary starting point in the measurement and analysis of something so important – and so intractable. It constitutes an approach which suggests that both theory and measurement matter. Such a framework, which can make use of both official returns and consumer and provider surveys, may well provide the best possible information on access trends – which are vital both to state policy and to company strategy – and would be greatly superior to a focus on a single elusive quantum.

> "When you cannot measure what you are speaking about, when you cannot express it in numbers, your knowledge is of a meagre and unsatisfactory kind." (Lord Kelvin)
>
> "When you can measure what you are speaking about, when you can express it in numbers, your knowledge is still of a meagre and unsatisfactory kind." (Frank Knight)
>
> "But do I thus measure, O my God, and know not what I measure?" (The confessions of St Augustine)

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Access to financial services in Argentina: a national survey

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Introduction

Most of the recent studies about financial access use data provided by the "supply side" of financial markets as input for their analysis. Amounts of deposits and credits and numbers of accounts, financial institutions, branches and ATMs, are some of the considered variables. Statistics of this kind are frequently gathered and regularly published by financial regulators. Most of the core indicators of financial access, depth and coverage are produced by combining this information with economic and socio-demographic data from the geographical region under study. The analysis of these indicators leads to general conclusions about how broad, deep and accessible financial markets are. Nevertheless, this sort of information is not sufficient when we attempt to narrow the information gap mentioned in the abstract.

Technical notes on the household survey methodology

A stratified random sample of 2,415 households from 94 districts was interviewed during the second quarter of January 2007. This statistically representative sample – on the national and regional levels – for districts with more than 20,000 inhabitants covered at least one district of every province in Argentina, representing approximately 86% of the Argentinean population. However, we should proceed carefully when arriving at conclusions, since districts with a low population present a more pronounced lack of financial infrastructure.

The unit of analysis of the survey is the household, and the unit of response is the head of the household or his/her spouse answering on behalf of all the members of the family unit. The questionnaire is made up of 52 questions that can be subdivided into five thematic groups: (i) experience, preferences and usage of financial services; (ii) perception of the financial system and its agents; (iii) barriers and reasons for the existence of financial (self-) exclusion; (iv) needs and interests that can expand the access and usage of financial services; and (v) profile of the household and its members.

The duration of each interview was, on average, close to 40 minutes and the non-response rate was 32%, which is within the standards for this kind of survey. Considering that answers on households' general income are only occasionally sincere or reliable, some questions on certain variables – (eg education, assets and employment) were included in the questionnaire so that the socio-economic status (SES) of the household could be validly inferred.

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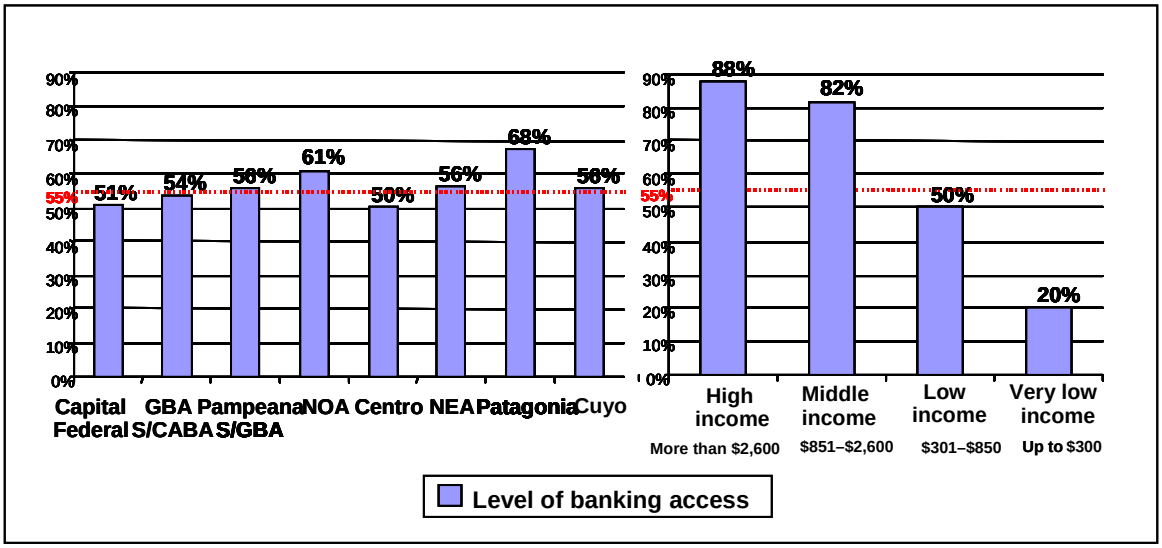
General results: regional and socio-economic status analyses

One of the main purposes of the survey is to measure households' level of access to financial services, in particular to bank services. Therefore, the indicator which shows the percentage of households that have or use any financial product or service provided by a bank – "Level of banking access" or LBA – is central to our analysis. In this case, the Argentine LBA reached 55% of the households located in districts with more than 20,000 inhabitants. An interesting approach regarding the behaviour of this variable is to observe how it performs by region, on the one hand, and through different socio-economic statuses, on the other. Box 1 illustrates these topics.

Box 1

Level of banking access by region and SES



The LBA oscillates between 50% and 68% among the regions. Patagonia is the region with the highest percentage, and Centro is, in contrast, the region with relatively fewer households having or using bank products or services.

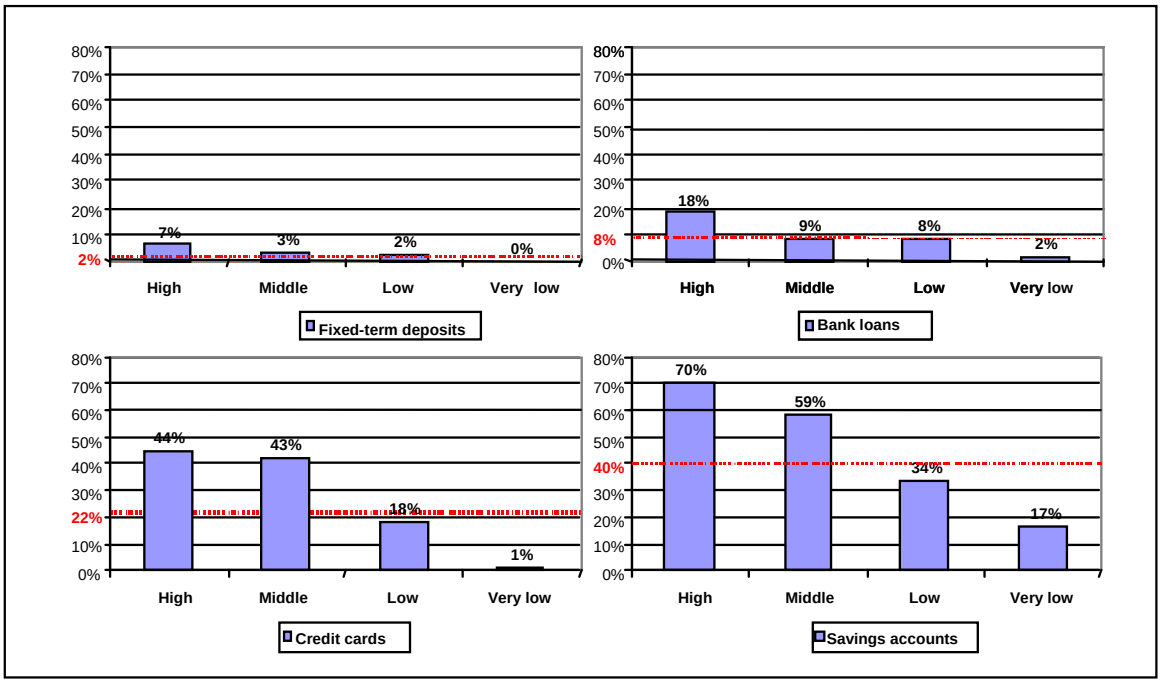
The indicator presents a clear pattern among different socio-economic statuses. As could be expected, a very significant percentage of high- and middle-income households (88% and 82%, respectively) use banking services. The percentage falls below the average (55%) when we analyse low-income households (50%), and plummets dramatically for the very low-income households (20%). This means that 80% of such households are excluded from the banking system.

After quantitatively identifying the households that have or use banking services or products, it is important to explore which services or products are being used by these households. From the information presented in Box 2 we can derive a significant conclusion. Middle-income households show dissimilar behaviour depending on the product used for the analysis. In the case of bank loans and fixed-term deposits, the levels of usage among middle-income households are quite similar to the figures of low-income households, but differ sharply from the percentages of high-income households – for both products, the high-income household figures are double those of the middle-income households. When we use savings accounts and credit cards to compare behaviour between different socio-economic statuses, we see that middle-income household levels of usage approach those of high-income households, and are significantly different from low-income household levels. The

figures for very low-income households, for all four products, are lower than the average, markedly lower than for low-income households.

Box 2

Access to particular financial products by SES



The main obstacles that hinder the access of households to financial services are: (i) the lack of confidence in banks (41% of households); (ii) not having money to save (32%); (iii) not needing a bank account (21%); (iv) the complexity of banks (18%); and (v) their preference for handling their money privately (15%). Moreover, the aspects that would most encourage households to begin using banking products or to use them more frequently were: (i) faster cashiers (67% of households); (ii) kinder treatment by bank employees (64%); (iii) quicker answers to enquiries (64%); (iv) confidentiality (64%); and (v) consideration for customer mistakes (63%).

Although this initial approach to the issue clarifies some aspects of the current situation of the Argentinean financial system, a more detailed analysis is required if we want to design effective policy actions to broaden financial access. In this connection, the segmentation of homogeneous groups will be presented in the next section.

Segmentation methodology

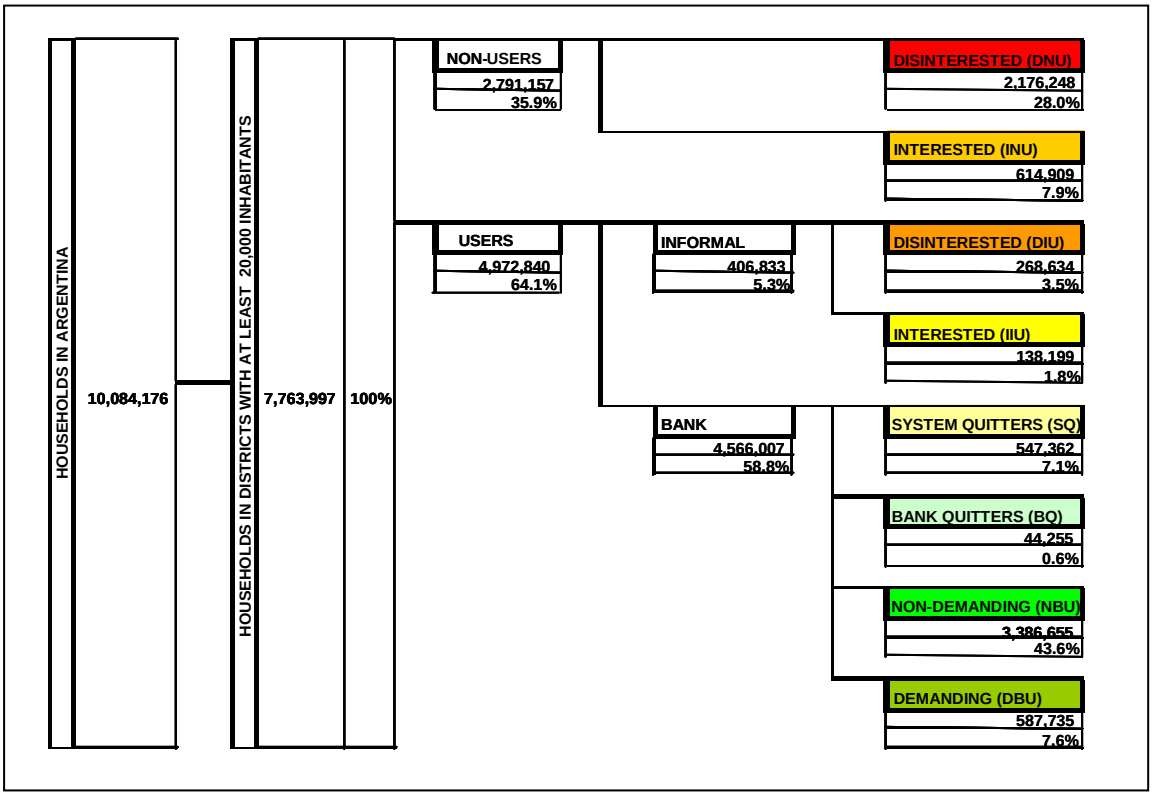
The segmentation of homogeneous groups is based on four major aspects: (i) effective access to financial services of households; (ii) the nature of the supplier of these services; (iii) the households' declared interest in using banking services; and (iv) the expressed future actions that can change the financial conditions of households.

As shown in Box 3, starting from a total of 7,763,997 households – representing the total number of Argentinean households in districts with more than 20,000 inhabitants – we have identified eight exclusive groups. The first big division is between households that use financial services and households that do not. The non-user households are subsequently

divided into two groups, taking into account their interest in using banking services: “disinterested non-users” (DNU) and “interested non-users” (INU).

Box 3

Box 3: Household segmentation



Households that use financial services are separated by considering the provider of the services –BCRA-regulated or non-regulated. The subgroup of households served by non-regulated (informal) institutions is also subdivided according to their interest in using banking services, leading to two new groups “disinterested informal users” (DIU) and “interested informal users” (IIU). Households that currently use banking services are divided into the last four groups. Those that stated their desire to stop using banking services within a three-month period were called “system quitters” (SQ). Households that stated their willingness to change the bank currently providing the financial services they use were called “bank quitters” (BQ). Finally, the last two groups of households using banking services are separated according to their desire to use a greater number of services or add a new provider. Households that will stay with the same bank and not sign up for new products were called “non-demanding banking users” (NBU). Conversely, households that stated their wish to use a greater number of services or start banking with a new bank were called “demanding banking users” (DBU).

Econometric exploration

We can explore how different factors affect the inferred probability of a household belonging to each of the groups discussed above by using a series of MLOGIT (multinomial logit) models. The factors considered are related to the household’s characteristics (such as region of residence, number of household members, number of members with positive income,

saving capacity, and SES), the head of the household (labour market participation), and the interviewed member of the household (gender, age, access to health insurance, nationality, willingness to make bank deposits, bank loan requests, usefulness of VAT refunds for debit card owners, perception regarding the degree of control of his/her financial situation, degree of risk aversion, reception of bank offers). We also include controls for the number of banks and the number of bank branches available in the district of residence.

These "core" variables define our base model. Moreover, we incorporate, in three subsequent models, the answers given to the following questions: (i) Why don't you use banks/or use banks more?; (ii) Which of the following factors can a bank offer you so that you will be interested in starting to use its services/or use its services more?; and (iii) What are the three main issues that you would carefully analyse if you were considering asking for a bank loan? Box 4 summarises the econometric results.

A plus sign (+) indicates that a positive and statistically significant relationship between the variable and the probability of belonging to the particular group dominates through the four models. A minus (–) sign reflects the opposite relationship. If there is no sign attached to the pair of variables/group, this indicates that the estimated signs alternate between pluses and minuses when they are statistically significant or are statistically insignificant at the 1% level of significance. Moreover, we highlight in light green or light blue those pairs for which there exists a complete dominance of a plus or minus sign, respectively, across all four models. The interpretation of the box is, thus, very straightforward. Hence, we leave the analysis of the box below to the readers and the actual presentation in IPM72.

Box 4

Estimated signs and statistical significance of the main variables

Variable			1st to 4th models							
Number	Group	Description	DNU	INU	DIU	IIU	SQ	BQ	NBU	DBU
1		NOA	+	+	-	-	+	+	-	+
2		Centro	+	-	+	-	-	+	-	-
3		NEA	+	+	-	-	-	+	-	+
4		Patagonia		+		-		+		
5		Cuyo	+	-	-	-	+	-	+	
6	Household	# of members	-	+	+	+	-		-	+
7		# of members with positive income	-	-	-	-	+	+	+	+
8		Saving capacity	-		-	+	-	-	+	+
9		Middle income	-	+	+	+	+	+	-	-
10		Low income	+	+	+	+	+	+	-	-
11		Very low income	+	+	+	+	-	+	-	-
12		Unemployed	+	-	-		+	-	-	-
13	Head of Household	Retired	-	+	+		-		+	+
14		Self-employed	+	+	-	+	+	+	-	-
15		Male	-	+	+	-	+	+	-	+
16		Age	+	-		+	+		+	-
17		Health insurance	-	+	-	+	-	+	+	-
18		Foreigner		+		+	+	-	-	-
19	Interviewed Member of the Household	Willing to deposit in a bank account	-	+	+	+	-	+	+	+
20		Asked for bank loan	-	-	-	+	-	+	+	+
21		Finds VAT refund useful	-	+	-	+	+	-	+	+
22		Keeps financial situation under	-	-	+	-		-	+	+
23		Risk aversion	-	-	-	+			+	
24		Received bank offer	-	+	-	-	+	+	+	+
25	RFIs	# of RFIs	-	-	-	-	+	-	-	-
26		# of RFI branches per 1,000 adults	+	+	+	+	+	+	+	+

Regarding the goodness of fit, the base model successfully predicted 63.6% of the cases and the other three models succeeded in more than 70% of the cases. The prediction of the DIU group in the base model is the poorest, with a success rate of 10.6%. In the model that included the main obstacles, the percentage rises to 71%, and the best predicted group was NBU when considering the model that controlled for obstacles, with a hit rate of 86%.

Another criterion to determine the appropriateness of the model is to consider that, out of a total of 208 coefficients – one for each pair of variables/group – 152 (73%) contained a full sign coincidence among the four models, in 37 (18%) one sign is dominant over the other and over non-significance, and only in 19 cases (9%) is there no dominance or statistical significance.

The core variables included in our base model help us to understand the expected effects of some specific factors that impact on households' access to financial services in general, and to bank services in particular. Nevertheless, financial access also depends, at least in theory, on subjective perceptions regarding the past, present and future of the economic context, the financial system, and the socio-economic situation of the respondent. These aspects can be addressed by adding to the base model the answers given to the previously introduced questions as explanatory variables. In particular, the inclusion of these variables allows us to explore the impact – in terms of change in predicted probabilities – of the main obstacles to, and boosters for, financial inclusion.

Rather than reporting estimated coefficients or analytically computed partial effects, we have decided to present, instead, standardised coefficients in Boxes 5 and 6. The first box shows the standardised coefficients for the model that includes the answers to the question: "Why don't you use banks/or use banks more?", and the second box contains those corresponding to the question: "Which of the following factors can a bank offer you so that you will be interested in starting to use its services/or use its services more?". We have two main reasons to report standardised coefficients instead of estimated coefficients or analytically computed partial effects.

First, even though it is convenient for public policies to explicitly define their target population, most central banks act through financial instruments that, in general, have a multi-group impact. Hence, if we report marginal effects, it will be more difficult to indicate the group in which the expected relative effects of a certain policy are more significant. Moreover, the estimated coefficients or analytically computed partial effects are associated with groups that have very different relative participation in the population. Thus, a group with a small participation in the population can have a very small – relative to the estimated coefficients or analytically computed partial effects for larger groups – but highly (statistically) significant estimated coefficients or analytically computed partial effects.

Second, and considering the estimated coefficients or analytically computed partial effects within each group, the relevance, in terms of having a substantive impact, depends on the rest of the same group's estimated marginal effects. If the estimated values for variables beyond the influence of central banks, such as gender or age, are much larger than those estimated for the variables within our area of direct or indirect influence, the impact of a policy instrument that has statistically significant estimated coefficients or analytically computed partial effects, but a small relative value, will be almost inessential.

To standardise the coefficients, we have proceeded as follows: (i) within each group we have calculated the absolute value of the estimated coefficients for each variable in the relevant model specification; then (ii) we have calculated the ratio between the absolute value of the estimated coefficient for each obstacle or booster and the value obtained in step (i); and finally (iii) we have added a negative sign to the ratios obtained from step (ii) if the estimated partial effect was negative. Hence, the larger the standardised reported coefficient, the larger the positive impact of removing the particular obstacle or of advancing the particular booster for the reference group.

In Box 5 we have grouped the potential obstacles in nine main categories: (i) lack of interest/self-exclusion; (ii) income-related (low or volatile); (iii) distrust; (iv) requirements; (v) financial literacy; (vi) proximity/geographical convenience; (vii) costs; (viii) quality of services; and (ix) rejection (feeling of being discriminated against). In Box 6 we have grouped the potential boosters in five main categories: (i) products; (ii) costs; (iii) delivery channels; (iv) quality of services; and (v) information.

Box 5

Standardised effects of removing particular obstacles

Type	Description	Group							
DISINTEREST	I don't need a bank account	DNU 0.57	NBU 0.55	DIU 0.00	BQ 0.00	IIU 0.00	SQ –0.02	DBU –0.26	INU –0.64
	I prefer to save at home	DNU 0.87	NBU 0.34	INU 0.10	IIU 0.00	BQ 0.00	DIU 0.00	SQ –0.02	DBU –1.02
	I prefer to handle money by myself	DNU 0.65	INU 0.18	IIU 0.00	BQ 0.00	DIU 0.00	SQ –0.02	DBU -0.19	NBU –0.27
	A family member has a bank account	DNU 1.21	INU 0.39	DIU 0.00	IIU 0.00	SQ 0.00	DBU –0.35	NBU –1.59	BQ –9.58
INCOME	I don't have enough money to save	DNU 1.19	NBU 0.41	SQ 0.01	DIU 0.00	IIU 0.00	BQ 0.00	INU –0.23	DBU -0.33
	I don't have a regular income	DNU 0.67	INU 0.58	DBU 0.32	SQ 0.02	IIU 0.00	BQ 0.00	DIU 0.00	NBU –0.38
	I'm unemployed	NBU 5.83	DNU 1.78	INU 1.36	DBU 1.32	SQ 0.02	IIU 0.00	BQ 0.00	DIU –48.93
DISTRUST	Banks kept my money in the 2001 crisis	DNU 0.53	NBU 0.52	INU 0.47	DBU 0.08	SQ 0.01	DIU 0.00	BQ 0.00	IIU –0.12
	Nobody is responsible if my bank keeps my money	NBU 1.34	DNU 1.12	DBU 0.21	INU 0.05	DIU 0.00	SQ 0.00	BQ –0.18	IIU –4.15
	I don't trust banks	DNU 0.83	INU 0.13	DIU 0.00	BQ 0.00	IIU 0.00	SQ 0.00	NBU –0.41	DBU –0.48
	Banks don't guarantee confidentiality	NBU 2.30	DNU 1.36	SQ 0.00	DIU 0.00	IIU 0.00	INU –0.03	DBU –0.33	BQ –5.50
	Banks don't respond to their mistakes	DNU 1.12	NBU 0.77	INU 0.52	SQ 0.00	DIU 0.00	IIU 0.00	BQ 0.00	DBU –1.21
REQUIREMENTS	I don't fulfil the bank's requirements	DBU 0.27	DIU 0.00	IIU 0.00	BQ 0.00	DNU –0.30	SQ –0.32	INU –0.33	NBU –1.47
	I don't have ID	NBU 4.35	DNU 2.29	INU 1.30	SQ 0.00	BQ 0.00	IIU 0.00	DIU 0.00	DBU –30.18
FINANCIAL LITERACY	I don't know how to open an account	NBU 5.06	DNU 1.67	INU 1.62	DBU 1.61	DIU 0.00	IIU 0.00	BQ 0.00	SQ –48.08
	I don't know how to use a bank account	DNU 0.77	DBU 0.35	INU 0.34	NBU 0.27	SQ 0.03	DIU 0.00	BQ –33.25	IIU –43.04
PROXIMITY	There is no bank near my house/work	NBU 7.52	DBU 2.10	INU 0.87	SQ 0.04	IIU 0.00	BQ 0.00	DIU –0.06	DNU –23.63
COSTS	Using a bank is too expensive	DNU 0.18	DBU 0.05	NBU 0.04	IIU 0.00	BQ 0.00	DIU 0.00	SQ –0.01	INU –0.17
QUALITY OF SERVICES	Banks offer a poor service	SQ 0.02	IIU 0.00	DIU 0.00	DBU –0.05	DNU –0.17	BQ –0.45	INU –0.55	NBU –1.83
	Banks are too complicated	INU 0.39	NBU 0.10	SQ 0.01	IIU 0.00	BQ 0.00	DIU 0.00	DNU –0.32	DBU –0.81
	Bank employees are not kind	NBU 1.13	DNU 0.66	INU 0.25	DIU 0.00	SQ –0.01	BQ –0.03	DBU –0.70	IIU –1.68
REJECTION	Banks don't want me as a client	DNU 0.61	INU 0.45	DIU 0.00	BQ 0.00	IIU 0.00	SQ –0.12	DBU –0.66	NBU –1.32
	Banks have never offered me anything	NBU 1.47	DBU 0.46	DNU 0.38	INU 0.37	SQ 0.01	DIU 0.00	IIU 0.00	BQ 0.00

Box 6

Standardised effects of advancing particular boosters

Type	Description	Group							
PRODUCTS	Savings account easy to open	DIU 2.02	IIU 1.78	DBU 0.03	BQ –0.02	INU –0.12	SQ –0.15	DNU –0.95	NBU –1.24
	Automatic debit system to pay services	NBU 1.81	DNU 0.70	DIU 0.62	INU 0.43	BQ 0.16	SQ 0.03	IIU –0.64	DBU –0.75
	Fixed-term deposits with convenient interest rates	NBU 0.33	BQ 0.03	INU –0.09	IIU –0.14	DIU –0.17	DNU –0.17	DBU –0.21	SQ –1.10
	Credit card with benefits and discounts	IIU 2.36	DBU 1.10	BQ 0.32	DIU 0.32	SQ 0.28	INU 0.21	NBU 0.18	DNU –0.94
	Loan with low payments	DIU 1.56	DNU 1.03	BQ 0.16	INU 0.00	NBU –0.15	IIU –0.16	SQ –0.35	DBU –0.47
	Loan with basic requirements	DBU 2.59	IIU 2.30	DNU 0.47	NBU 0.21	INU –0.03	BQ –0.04	SQ –0.07	DIU -0.30
	Automatic loan at ATM	SQ 0.22	BQ 0.00	INU –0.20	DIU –0.21	IIU –0.40	DBU –0.51	NBU –1.24	DNU –1.30
	Crisis insurance	DBU 1.61	BQ 0.00	SQ -0.88	INU –1.01	DNU –1.57	IIU –1.91	DIU –2.02	NBU –2.45
COSTS	Low maintenance fees	SQ 2.13	NBU 1.15	DBU 0.85	DNU 0.45	BQ 0.17	INU –0.08	DIU –0.20	IIU –0.69
	Low transaction fees	NBU 2.14	DNU 2.11	SQ 1.13	DIU 0.85	INU 0.16	DBU 0.08	BQ –0.12	IIU –0.57
DELIVERY CHANNEL	Bank branches near the house or work	NBU 0.43	BQ 0.09	INU –0.01	DNU –0.15	DBU –0.60	DIU –0.82	IIU –1.73	SQ –1.79
	ATMs near the house or work	SQ 1.89	IIU 1.49	NBU 1.42	DIU 0.36	DBU 0.22	INU 0.11	BQ 0.02	DNU –0.84
	Simple ways to operate	DBU 1.26	DNU 0.58	INU 0.06	DIU 0.05	BQ 0.01	SQ –0.49	IIU –0.90	NBU –1.67
QUALITY OF SERVICES	Kindness of bank employees	IIU 1.36	DIU 0.75	DNU 0.31	BQ 0.04	SQ –0.23	INU –0.32	NBU –0.93	DBU –1.03
	A helpful advisor	DBU 0.76	SQ 0.35	IIU 0.31	DNU 0.16	NBU 0.15	BQ 0.05	INU 0.05	DIU –0.34
	Quick response to enquiries and questions	SQ 2.06	NBU 0.80	DBU 0.55	INU 0.42	DNU –0.12	IIU –0.42	BQ –0.43	DIU –0.56
	Consideration of customer errors	IIU 0.61	DNU 0.46	DIU 0.18	BQ 0.02	INU 0.00	NBU –0.08	SQ –1.78	DBU –4.60
	Quick and good services of bank cashiers	DBU 1.03	IIU 0.75	INU –0.39	SQ –0.47	BQ –0.75	NBU –1.24	DNU –1.59	DIU –2.63
	More security when handling money	IIU 0.42	INU 0.20	BQ 0.12	DIU 0.10	DBU –0.22	SQ –0.74	DNU –0.91	NBU –1.19
INFORMATION	Confidentiality of customer information	DIU 1.57	IIU 1.55	SQ 0.97	DNU 0.75	NBU 0.53	INU 0.30	BQ 0.01	DBU –0.37
	Transparency in bank statement	IIU 4.12	SQ 1.07	DBU 1.05	NBU 0.81	DNU 0.29	INU 0.24	BQ –0.39	DIU –0.40

In both boxes, we have highlighted in light blue the group/obstacle and group/interest pairs that exhibit a standardised coefficient larger than one. As before, the interpretation of both boxes should be straightforward. Hence, we leave their analysis to the readers and the actual presentation in IPM72.

Conclusions

The main conclusion of this paper is that relevant information for central banks may come from surveys such as the one we have summarised in this document. Moreover, when combined with appropriate analytical tools, and an open discussion to improve interpretation, this information could facilitate the decision-making process aimed at improving the regulation and supervision of financial institutions.

Some examples of regulation that has benefited from the findings of the survey are the authorisation/adaptation/adoption of: (i) transitory/mobile branches; (ii) credit lines oriented towards the characteristics of micro-entrepreneurs; (iii) credit scoring and screening techniques; (iv) a new type of regulated financial institution called Cajas de Crédito Cooperativas; (v) a transparency regime; (vi) a financial literacy programme; and (vii) a simplified savings account, among others.

Due to the success of the survey, and the significance of the conclusions we have reached, we have been instructed by the Board of Directors to implement a second wave of the survey. We are currently doing the field work for this second wave. This survey contains, additionally, a separate subsample that will be collected in districts where there is no financial infrastructure provided by institutions that are regulated and supervised by the BCRA. With this new addition, our aim is not only to gain a better understanding of how non-users think, feel and behave where they at least have geographical access to a bank, but also to explore in detail how people deal with their financial needs where it is not physically possible to become a bank client.

Luck is always considered an important variable when making policy decisions. But luck is not enough when the final purpose is to build an inclusive financial system, a system that aims to gain scale, to reduce unitary costs, to improve reach (serving those who already use banking services is not enough – the challenge is to include those who lack access), to provide better coverage (a wide spectrum of products and services tailored to the needs of current and potential customers), to promote institutional diversity – this means to allow or, even further, to promote experimentation, to achieve sustainability (weak and inefficient social and economic actions/institutions must be prevented), to be transparent (educated and informed customers are not an option, but a requirement), and permanency – as policymakers, we must avoid short cuts or transitory solutions regarding financial inclusion.

At the start of this paper, we stated that access to financial services is important for individual and social well-being. One of our goals is to reduce the information gap that we face when designing and developing policies to maintain price and financial stability. After reading this paper, we hope that the reader will feel, as we do, that information has a key role to play in the process of understanding a subject as complex as financial behaviour, that understanding is a precondition for designing appropriate policy instruments, and that well-tailored policy instruments are essential when developing effective actions to promote inclusive financial systems.

Special Topics Contributed Paper Meeting 28

Measuring bank services – further developments

Chair: Steven Keuning, European Central Bank

Papers:

Risk and bank service output
J Christina Wang, Federal Reserve Bank of Boston

Treatment of risk in the estimation of FISIM
Satoru Hagino and Katsurako Sonoda, Bank of Japan

Bank services: some reflections on the treatment of default risk and term premium
Antonio Colangelo and Reimund Mink, European Central Bank

Measuring the services of commercial banks in the NIPA
Dennis J Fixler, Marshall B Reinsdorf and Shaunda Villones, Bureau of Economic Analysis

The measurement of financial services in the national accounts and the financial crisis
Michael Davies, Australian Bureau of Statistics

On a risk-adjusted FISIM
Wolfgang Eichmann, Federal Statistical Office, Germany

Discussant: Adelheid Bürgi-Schmelz, International Monetary Fund

Chairman summary of session STCPM28: Measuring bank services – further developments

Steven Keuning[1]

Opening remarks

The treatment of the conceptual issues and practicalities relating to the measurement of bank services[2] based on the 2008 System of National Accounts (SNA) was the focus of this special contributed paper session. The meeting addressed the essence of risk in the national accounts and the plausibility of calculating bank services based on current methodology. The rapid growth of bank output volume in the current financial crisis is difficult to interpret against activity in financial intermediation.

The level of (current and constant price) Financial Intermediation Services Indirectly Measured (FISIM) is sensitive to the choice of the reference rate.[3] In the current environment of volatile differentials between market and official rates, the view is expressed that the choice of a risk-free reference interest rate is to split bank interest margins into depositor and borrower services and should take account of the term structure and risk profile of the asset structure of banks. A failure to exclude the compensation for *risk-taking* from the output will lead to changes in output which are unrelated to changes in input and technology and to an overstatement of bank output, which will distort productivity analyses. On the other hand, *risk management* is an integral part of bank output.

Further work to define bank services has also been suggested, to include: (i) the choice of several reference rates to "reflect the risk and maturity structure of deposits and loans"; (ii) the definition and decomposition of SNA interest into risk and term premium; (iii) a price *and* volume analysis of the changes in FISIM and the identification of price and volume components for (other) payments of financial services; and (iv) a wider measurement of financial services, namely in the definition of income and the recording of financial assets and interest flows.

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1 European Central Bank.

2 Bank services impact on most components of production, expenditure and income measures of GDP. From a supply and use perspective, the financial sector produces or supplies bank services. The logic of national accounts requires that the output of banking services must be allocated to consumers to identify the purchase of such services and to classify them as: intermediate consumption (if a firm borrows from a bank); final consumption expenditure (a household depositing money with a bank or obtaining a loan from a bank); or exports (for services attributed to non-residents). This logic is accepted internationally.

3 Paragraph 6.166 of 2008 SNA: "The reference rate to be used in the calculation of SNA interest is a rate between bank interest rates on deposits and loans. However, because there is no necessary equality between the level of loans and deposits, it cannot be calculated as a simple average of the rates on loans or deposits. The reference rate should contain no service element and reflect the risk and maturity structure of deposits and loans. The rate prevailing for inter-bank borrowing and lending may be a suitable choice as a reference rate. However, different reference rates may be needed for each currency in which loans and deposits are denominated, especially when a non-resident financial institution is involved."

Concluding remarks

1. No one was advocating the elimination of all risk from FISIM, but the debate focused on the allocation of various categories of risk assessment, risk management, risk-taking and provisions for defaults when calculating FISIM appropriately (eg similar to non-life insurance output).
2. Various proposals have been presented and discussed for the treatment and calculation of term and default risk premium (or an equivalent credit default cost) in the valuation of bank services in the national accounts.
3. Banks provide risk assessment services and this is part of financial services output.
4. The real issue is to allocate the income generated by risk-taking. The dispute is not whether this income should be allocated to banks (it should) but whether it is remuneration for a productive service and thus part of value added, or a part of property income, similar to interest earned on holding debt securities.
5. Similarly, the insurance industry transfers risk, and it was noted that, in that case, losses are covered (claims are subtracted from premiums in insurance output), while this is presently not done in FISIM or in the banking industry. This national accounts treatment was thus possibly inconsistent.
6. Test calculations may, therefore, be done using both ex ante and ex post indicators for credit default cost: loan loss provisioning; write-offs/other changes in value; and writedowns/revaluations.
7. Further study is needed to decide whether the transformation of maturities should be included in FISIM.
8. There is a need to look at the cost accounting of services and, in particular, at loan loss provisions using, for instance, micro-supervisory data.

The debate has been given new impetus; the full involvement of central bank statisticians together with a possible task force can take forward the ideas debated today towards a harmonised calculation – preferably at a monthly or quarterly frequency – of bank services, which would not yield completely implausible outcomes (such as negative FISIM output). In Europe, the establishment of such a task force has already been agreed by the European Committee on Monetary, Financial and Balance of Payments Statistics (CMFB), but it would be important to incorporate non-European views as well, as demonstrated by the very valuable exchange of views during this session.

Risk and bank service output

J Christina Wang[1]

1. Introduction

Defining and measuring bank output has long been a difficult and, hence, somewhat contentious issue. This has been made even more challenging by rapid and massive changes over the past two decades in both the form of organisations and the range and features of financial instruments offered by banks. Nowadays, banks engage in a wide range of non-traditional activities, such as underwriting firms' public offerings of debt and equity securities, standby letters of credit, and a variety of derivatives contracts (eg swaps and options). The main reason for the difficulty in measuring the output is that much bank service output is not explicitly priced. Instead, the implicit charges for financial services are bundled with interest flows between banks and their customers; on net, banks earn a positive spread between interest rates received and interest rates paid.

In this paper, we review a new measure of bank output implied by dynamic optimising models of bank operations in Wang (2003a) and Wang et al (2004). Rigorous theoretical foundations enable this new measure to resolve many extant conceptual issues. The key model implication for output measurement concerns the role of risk – in order to impute the nominal value of each implicitly priced bank service, its reference rate of interest (equivalent to "the user cost of funds") should be adjusted for the risk inherent in the associated financial instruments.[2] Otherwise, nominal bank output will be overstated.

The principle underlying these models' implications for output measurement is in fact intuitive: banks should not be counted as producing more services *merely* by taking on greater risk. This logic should be more compelling today, following the recent global financial crisis, the root of which arguably lies largely in the flawed incentive scheme that encouraged excessive risk-taking by equating more risky returns with better performance. So, in the case of bank services furnished without explicit charges, since what we observe is the sum of the implicit service revenue and net returns on bank assets associated with the services, we have to impute the former by removing the latter from the total income. A large modern literature on asset pricing under uncertainty informs the estimates of asset returns, which depend on the market context in which banks operate, particularly the way in which financial markets set the rates of return on (and thus prices of) risky securities. In the real world with risk-averse investors, securities with risks that cannot be costlessly diversified away always command returns in excess of the risk-free rate. These risky rates, as determined by markets, form the "reference rates" – the risk-adjusted opportunity cost of funds with no services attached – for estimating the returns purely due to banks' asset ownership. The

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[2] Which components of risk – systematic vs idiosyncratic – should enter the reference rates also depends on whether there is information asymmetry between banks and holders of non-insured bank liabilities; further details below.

nominal value of bank output then equals the total income net of the pure asset returns.[3] Lastly, we discuss briefly how bank risk management activities, which have become increasingly important, affect the measurement of reference rates and, in turn, bank output.

This paper then summarises the results from empirical studies (Wang (2003b), and Basu et al (forthcoming)) that implement the new model-implied measure of bank output. These studies demonstrate that, given the available data, it is practical to correct for the systematic risk in reference rates at the level of both individual banks and the banking sector as a whole. Their numerical results indicate that, if returns due to the systematic risk are not removed from the reference rates, the upward bias in measured nominal bank output can be large – near 25% based on both micro and macro data.

Knowing the reference rates for risky assets suffices for measuring current price output. But to measure constant price output, one must also understand what exactly it is that banks actually produce. Theories of financial intermediation indicate that banks' raison d'être is to reduce transaction costs by performing tasks that mitigate the asymmetric information problems and facilitate transactions (see, for example, Diamond (1984)). So, in our framework, only bank activities – services – that fulfil these functions are considered bank output. By nature, a "service" produced by a bank is like any other professional service, eg accounting and consulting: it is a flow of output that is valued by customers and created through a production process using real resources. The only difference is that banks routinely receive compensation for these services implicitly in the form of positive interest margins. This practice of bundling implicit service revenue can pose conceptual difficulties for measuring constant price bank output, by confounding financial services and the associated financial instruments. It is therefore doubly important to emphasise the distinction: only the financial services are bank output (see also Schreyer and Stauffer (2003) on this point).

The theories imply that, to measure constant price output of implicitly charged bank services, it is best to use a quantity index of quality-adjusted transaction counts directly, instead of deflated financial balances. In particular, Basu and Wang (2008) demonstrate formally that the real quantity of bank output is unlikely to be of fixed proportion to the volume of bank assets or liabilities, whether they are book or market value, on- or off-balance sheet. The corollary is that the reference rates or the related rate spreads are not the right implicit price deflators for deriving the real output of banks. The quantity index and the relevant interest margin then imply an implicit price index for bank services provided without explicit charge.

The paper then summarises the empirical estimates in Inklaar and Wang (2007) of constant price bank output using transaction data from the US Bureau of Labor Statistics (BLS). The main result is that the output series constructed using the transaction counts exhibits rather different growth patterns from the series estimated using asset balances, translating into different patterns of productivity growth. In addition, we estimate the degree by which the existing BLS data underestimate bank output because they under-represent non-traditional banking activities such as commitment lending and securities underwriting.

The last section will analyse the implications of the theories on data priorities going forward – what additional data should be collected in order to improve the accuracy of output measurement, especially in light of the developments in the latest financial crisis?

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[3] This imputed net income can also be viewed as corresponding to the so-called gross margin concept in the national accounts (if banking is regarded as a "margin industry" analogous to wholesale and retail trade, as well as insurance), except that, here, the margin is adjusted for the risk differential between bank assets and liabilities. See Chapter 7 of Triplett and Bosworth (2004) for an extended discussion on the relationship between the gross output vs gross margin view of banking.

2. Optimal bank operation and current price bank output

2.1 The relationship between risk and current price bank output

One must first define a concept before attempting to measure it accurately. So, what is the output of banks? Wang (2003a) and Wang et al (2004) answer this question with simple dynamic optimising models of bank operation under uncertainty, to capture the intertemporal nature of banks' operations and the integral role of risk.[4] These models focus, in particular, on the measurement of financial services provided without explicit charge. The premise underlying the measurement of implicit bank output is that a bank output measure should be invariant to how a service is compensated for – via explicit revenue, a barter for cost saving on certain inputs, or a higher-than-otherwise return on funds. The logic is straightforward. When a firm expends inputs to create a commodity that is valued by certain parties, that commodity should be recognised as an output – it is conceptually irrelevant via what medium (eg fiat money or other commodities) the firm exchanges for the output's value. Applied to banks, this principle means that, for example, it makes no difference whether a bank charges depositors for its services and at the same time pays the market rate for the depositors' funds, or pays for the funds in part with the services directly.

At the same time, the models in Wang (2003a) and Wang et al (2004) emphasise the fundamental distinction between the flow of services and the per period returns accrued to the stock of financial instruments. The returns are solely to compensate suppliers of funds for forgoing current consumption in exchange for future consumption; the returns would still be demanded even if there were frictionless financial markets and thus no need for banks to exist. Any rate of such returns corresponds to the so-called reference rate, defined as the opportunity cost of funds without any services attached. In a world with risk-averse agents and non-diversifiable risk, this opportunity cost of funds is comparable across securities only after adjusting for risk. This can be viewed as an extension of the concept of "user cost of money" (Barnett (1978)) to take account of the fact that the reward for most investments is uncertain. Consequently, the return on a risk-free security is not the appropriate opportunity cost for risky securities.

The key message from these models for estimating current price output of bank services provided without explicit charge is that, in cases where the implicit revenue is combined with the pure financial returns, the latter must be netted out of a bank's total income to impute the former. In other words, only the portion of income other than risky asset returns should be counted as bank output. To estimate the pure returns, the reference rate should be adjusted for the risk of the financial instruments associated with the service. In practice, the rate of return on a market debt security subject to the same risk but without any services attached serves as the proxy for the pure cost of funds on a loan. The corollary is that there is not a unique reference rate.

What determines this risk-adjusted opportunity cost of funds that investors expect on a financial security? Applying standard theories of asset pricing, Wang (2003a) and Wang et al (2004) show that, as long as banks themselves face no agency problems when they raise outside funds, the risk-adjusted reference rate is determined only by the correlation between a security's return and the systematic risk factors (such as the representative consumer's marginal rate of intertemporal substitution in the consumption CAPM).[5] The implication for

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[4] Wang et al (2004) extend Wang's partial equilibrium model to a general equilibrium setting and demonstrate that all the qualitative results in Wang (2003a) continue to hold.

[5] One sufficient condition is if a bank holds a perfectly diversified portfolio. Otherwise, the reference rate for each additional financial claim depends on its covariance with the bank's existing portfolio. For details, see Wang (2009).

fixed-income securities such as loans is that the expected rate of return demanded by a lender depends on how a debt's (maturity-dependent) interest rate risk, default risk, liquidity risk, and prepayment risk covary with risk factors priced in the debt market. The expected return should, on average, equal ex post realised returns, as it is the rate required by a lender given his or her ex ante expectation of the payoff on a debt. Note that this is distinct from the interest rate that the borrower must promise in the contract and is obligated to pay conditional on his or her remaining solvent ex post. The latter is higher, because it needs to offset the positive odds of the borrower becoming insolvent ex post. In fact, this contractual rate, also referred to as yield (on market debt), rises with the borrower's probability of default and expected loss-given-default, which depends both on his or her systematic and idiosyncratic risk, even with complete markets.

Let $R_{t,n}^M$ denote the yield to maturity promised at time *t* on a defaultable market debt security with maturity *n* and a certain risk profile, but no services attached. Then, it can generally be expressed as:[6]

$$R_{t,n}^M = r_{t,n}^M + d_{t,n}^e = \left(r_{t,n}^F + r_{t,n}^P\right) + d_{t,n}^e \,. \tag{1}$$

r_t^M is the expected rate of return required on this defaultable debt. It can be further expressed as the sum of a risk-free rate $r_{t,n}^F$ and a risk premium $r_{t,n}^P$. $r_{t,n}^F$ is the yield on a debt of the same maturity but not subject to default risk, or with any embedded options (ie not callable or putable).[7] Yields on US Treasuries are arguably the best example; $r_{t,n}^F$ is the guaranteed return if the debt is held until maturity.[8] In addition, a defaultable debt must also offer a (most likely positive) return premium $r_{t,n}^P$, determined by the correlation between the probability of default or loss upon default and the risk factors priced in the market. Then, the difference between the yield $R_{t,n}^M$ and the expected return r_t^M is the default premium $d_{t,n}^e$, that is, the extra return that must be promised to investors because they are paid in full only when there is no default ex post.

Now consider an optimising bank's interest rate decision when making a loan with the same (systematic) risk profile as the above market debt. In addition to the cost of funds, the bank needs to charge implicitly for the services performed (eg screening and monitoring). As shown in Wang (2003a), the required rate of return on a loan (r_t^A), inclusive of the implicit service charge, should be optimally set as[9]

$$r_t^A = r_t^M + r_t^S = r_t^F + r_t^P + r_t^S \text{, and } r_t^S A_t = c_t \mu_t \,. \tag{2}$$

r_t^S is what we shall call the service spread, that is, the extra interest rate charged to compensate the bank for processing the loan. The optimal r_t^S satisfies the condition that the extra interest receipt (ie r_t^S times the loan balance A_t) equals the marginal processing cost of a loan c_t times the optimal markup μ_t (determined by competition in the loan market).

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6 To be precise, this is an approximation – exact only for instantaneous returns under continuous compounding.

7 Yields on callable and putable bonds must be adjusted for the embedded option to be comparable with those on option-free debt instruments. Bonds with prepayment risk, such as mortgage-based securities, are essentially callable bonds, as borrowers are granted the option to pay off the debt (ie call the bond) before maturity.

8 Note that even for this type of debt there is still interest rate risk, ie the return is almost surely uncertain if one sells it prior to the maturity date.

9 For brevity of exposition, from now on we omit the subscript denoting maturity, unless confusion is likely.

Then, for a portfolio consisting of *N* loans of different maturities and made in different periods, its reference rate is a weighted average of individual loans' reference rates:

$$r_t^M = \sum_{i=1}^{N} \omega_i \, r_{\tau_i, n_i}^{M_i}, 0 \le \tau_i \le t, n_i \ge t - \tau_i \,. \tag{3}$$

ω_i is the portfolio weight of loan *i*, τ_i is the period in which loan *i*'s interest rate was set, and n_i is its maturity. Empirically, equation (3) is especially relevant for loans that typically have long maturities, such as real estate loans.

The optimising bank then sets the contractual interest rate (R_t^A) accordingly:

$$R_t^A = R_t^M + r_t^S + (d_t^{A,e} - d_t^{M,e}) \,. \tag{4}$$

This highlights the fact that the reference market securities are only required to have the same systematic risk as the loans; the securities can have a different expected probability of default or prepayment from the loans. Therefore, the accuracy of empirical estimates (to be discussed below) relies positively on the degree to which each category of loans and the reference securities used have the same systematic risk despite the securities' generally lower default probability.

2.2 Imputing current price output of implicit bank services

Derivations in the previous section imply that, on average, a bank's nominal output of implicit lending services to borrowers can be imputed as:[10]

$$Y_t^A = r_t^S A_t = \left(r_t^A - r_t^M \right) A_t \,. \tag{5}$$

According to the nomenclature of the 1993 System of National Accounts (SNA 93), r_t^M is the reference rate. Previous discussions make it clear why the reference rate should be risk adjusted. Consequently, the rate varies depending on the financial security or portfolio of securities associated with the services considered.

By comparison, the US National Income and Product Accounts (NIPA) currently impute bank services to borrowers using a nearly risk-free rate as the reference rate:

$$\left(r_t^A - r_t^F \right) A_t = \left(r_t^P + r_t^S \right) A_t = Y_t^A + r_t^P A_t \,. \tag{6}$$

The output value imputed according to equation (6) will be an overstatement of the actual service output. The informal justification for equation (6) is to regard $r_t^P A_t$ as compensation for a so-called "risk-bearing" service. Wang and Basu ((2006), Section 3.4) discuss at length why risk-bearing is not a productive service according to the conceptual framework of SNA 93 and, more importantly, why the NIPAs' imputation results in inconsistent accounting of the fund-using firms' output, by making it dependent on their source of funding (ie the public debt market vs banks) even given identical underlying true output. Moreover, this formula can create a perverse incentive for banks, and financial institutions in general, to seek higher risk exposure in order to appear more productive. In fact, this may partly explain what is referred to as the "reach for yield" phenomenon characterising financial intermediaries' reaction to the environment of prevailing low interest rates from 2003 to 2005. Such risk-seeking behaviour is now widely blamed for sowing the seeds of the most severe post-war financial crisis that started in the summer of 2007. So, our proposed modification of the accounting method for bank output can have an added benefit of providing financial

[10] See Wang et al (2004) for a detailed discussion of how the actual value in each period deviates from this average.

intermediaries with better incentives so that they are less likely to take excessive amounts of risk.

The value of implicit depositor services can be similarly imputed. Let D_t denote the deposit balance, r_t^D the interest rate paid, and $r_t^{M'}$ the corresponding reference rate (ie the return on a market security with the same risk). Then, the nominal output of depositor services is

$$Y_t^D = \left(r_t^{M'} - r_t^D\right) D_t . \tag{7}$$

For insured deposits in the United States (ie up to $100,000 per individual), the relevant market rate is the risk-free (Treasury) rate, ie $r_t^{M'} = r_t^F$. For the remaining, uninsured, deposits it is $r_t^{M'} > r_t^F$ because the holders are exposed to some risk in bank asset portfolios.

Note that equation (5) implies zero implicit services (to asset issuers, ie Y^A = 0) if a bank passively holds market securities in its investment portfolio, since $r^A = r^M$. Likewise, equation (7) implies zero implicit services (ie Y^D = 0) to holders of bank term liabilities (that is, commercial papers, market and privately placed bonds), since the interest rate paid equals the reference rate (ie $r^D = r^{M'}$). Also note that under virtually all circumstances (that is, whenever there are equity holders), r^M in equation (5) is greater than $r^{M'}$ in equation (7), because bank assets are typically more risky than their liabilities. In other words, the reference rates for imputing lending and depositor services almost always differ by a positive margin.

Exhibit 1 illustrates the imputation of nominal output of implicit bank services. Note that only part of a bank's net interest income constitutes nominal output of bank services; the remainder – corresponding to the risk premium $\left(r^M - r^F\right)A$ – is excluded.[11] This is precisely because the reference rate for lending services generally exceeds that for depositor services. The risk premium, along with actual interest expenses on bank liabilities, constitutes pure transfer of capital income. It is part of the factor income generated by the capital used in the borrowing firms' production or consumers' consumption. This income is then transferred from the end users of funds to the ultimate suppliers of funds – the bank shareholders. Only when all investors are risk neutral or all risk is idiosyncratic will this risk premium disappear. Exhibit 1 illuminates how our model-based output measure differs from the NIPAs' current measure, which uses a (nearly) risk-free rate as the single reference rate (see Fixler et al (2003)). As we have argued, this overstates bank output by the amount of the risk premium.

2.3 Implications for current price output of fee-generating bank services

The theories have an important measurement implication for bank services that generate explicit fees: contrary to the common opinion, not all fee income is compensation for services and so should not be automatically considered bank output. This is the only logical conclusion as long as pure asset returns, risk-free or risky, are classified as transfers; the natural corollary is that the capitalised present value of future flows of asset returns should also be regarded as transfers, no matter what it is called – fees or otherwise. A clear example is loans: if a portion of the interest income on loans is counted as transfers of pure property income, so should its corresponding present value. This means that, when a bank receives a lump sum payment from securitising a pool of loans, the only consistent solution is to partition the total receipt and count as bank output only the part that represents the loan

[11] As shown, it is ignored for simplicity that the balance of loans exceeds that of deposits, with bank equity making up the difference.

buyer's implicit payment for the bank's screening services. The rest of the receipt, corresponding to the value of the loans themselves, is but a transfer of property income.[12]

In fact, this measurement implication is particularly relevant for the accounting of non-traditional bank activities, most of which generate explicit fees. Inklaar and Wang (2007) show that the same logic applies to any exotic securities underwritten by banks, by proving that it holds for options. As first argued by Black and Scholes (1973), options can be used to express virtually all contingent claims. For example, loan commitments or lines of credit can be modelled as put options written by banks to their borrowers. Credit derivatives such as credit default swaps (CDS) can also be expressed as options.

2.4 Empirical estimates of current price output of implicit bank services

Several studies have implemented the bank output measure implied by the above theoretical framework using both bank-level and industry-level data. Collectively, they impart the key message that it is feasible to implement the new output measure using publicly available data, even though the estimates can be noisy because of data limitations. To improve the accuracy, the theoretical framework summarised above provides guidance on what additional data to collect and how to prioritise the effort.

Wang (2003b) uses balance sheets and income statements filed quarterly by all US bank holding companies (BHCs) to their regulator (the Federal Reserve), combined with interest rates on market debt securities most comparable to bank loans, to estimate the current price output of individual BHCs according to the new measure.[13] The new output series, which is later updated to Q1 2008, is then compared with estimates for the two existing measures – one based on the real book value of assets (and liabilities in some cases) and used in virtually all micro studies of bank productivity and the other used in the US NIPA.

The reference interest rate for the loan portfolio associated with each type of borrower service is approximated using publicly available data on the expected rate of return (r^M) on market debt with the most similar risk – depending on attributes such as term, default and prepayment probability, and borrower type (eg firms vs consumers). The regulatory filings provide data only on a few broad categories of loans, which we match with market securities as follows: residential mortgages with mortgage-backed securities (MBS), consumer loans with certain asset-backed securities (ABS, eg based on credit card receivables), and commercial and industrial (C&I) loans with commercial paper.[14] As such, each r^M we use can be a noisy proxy for the true reference rate on the matched category of bank loans, since we do not observe the maturity and risk composition of loans and thus cannot assess how accurate the match is. On the other hand, using market debt returns almost certainly underestimates the true risk premia on loans, since the market securities have, on average, much lower realised default rates and are thus likely to command a lower risk premium as well.

The main findings of BHC-level output estimates can be summarised as follows. First, output according to the new measure is more than 25% smaller than that based on the US NIPA measure (ie using the risk-free reference rate). More importantly, output estimates according to different measures exhibit different time series properties. The new series is more volatile

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[12] To see the logic clearly, consider the alternative: if the bank receives an explicit servicing fee along with the market value of just the loans, then only the servicing fee should be considered the bank's output.

[13] Accounting data from regulatory filings both by banks and by BHCs are publicly available from the Federal Reserve Bank of Chicago at: www.chicagofed.org/economic_research_and_data/bhc_data.cfm.

[14] Since the payoff on whole loans can be synthesised using MBS of different ratings, the loan reference rate should ideally be computed as the weighted average of differentially rated constituent MBS yields.

over time, and it appears to be affected more by the recessions during the sample period (1990 to 1991 and 2001). This can be largely explained by the countercyclical share of market securities on banks' balance sheets and thus their returns (in excess of the risk-free return) in overall income. Since the NIPA measure counts such "excess" returns on securities as part of bank output, whereas the new measure does not, the latter is more volatile over the business cycle. Second, the new series shows a higher growth rate than the two existing measures, especially in the mid- to late 1990s. This seems consistent with the observation that investment grew steadily during those years. Lastly, one interesting result is that the nominal value of the new output equals banks' non-interest cost on average, implying zero profit in the long term. This may be viewed as informal support for the new measure of bank output if one assumes that the free entry condition holds in banking at least in the long term.

Basu et al (forthcoming) estimate the current price output for the US banking industry. At the aggregate level, more data are available on the risk characteristic of bank loan portfolios to enable a more accurate estimate of the overall (credit) risk premium. In particular, the Survey of Terms of Business Lending (STBL), conducted by the Federal Reserve, provides summary information on the risk rating and interest rate collected at the individual C&I loan level. Since the survey oversamples large banks, it offers a fairly representative mapping of the relationship between the credit risk and loan interest rate for the banking industry as a whole, enabling us to estimate the risk premia on C&I loans more accurately. In short, it is likely that industry output is estimated with less measurement error using aggregate data.

The industry-level estimates confirm the qualitative results from the BHC-level analysis in Wang (2003b). Even based on conservative estimates of the risk premium (that is, the difference between the risk-adjusted reference rate and the risk-free rate), incorporating risk in reference rates (see Exhibit 2) is shown to be quantitatively important (see Table 1). Compared to bank output calculated using the risk-adjusted reference rate, output computed using the risk-free reference rate according to the current NIPA method overstates imputed bank output by 45% on average (see Exhibit 3). It, in turn, overstates total bank output, which also includes explicit fees, by 21%. Only bank services to households contribute to GDP, whereas the services to firms (non-financial as well as financial) are counted as intermediate (service) input. In sum, the impact on the US GDP amounts to an overstatement of 0.3 percentage points. Furthermore, the new measure of bank output lowers the estimate of the share of capital in banks' value added from 59% (higher than that of the petroleum refining industry) to 42% (the level for all private industries), and lowers the internal rate of return on fixed capital of the banking industry from 17.8% (9 percentage points above the average for all private industries) to 6.8%. These new estimates seem more plausible, providing additional support to the theory that the new measure of bank output improves upon the current NIPA measure.

3. Constant price bank output

3.1 Flow of bank services not proportional to the stock of financial instruments

As difficult as the measurement of current price bank output is, it is even more challenging to measure the constant price (ie real) output of banks. Apart from the major difficulty that most other service industries are confronted by (adequate quality adjustments), one must first answer the fundamental conceptual question when it comes to measuring the real output of banks: what exactly is it that banks produce? Only in accordance with the definition can the right measure of the real value of bank products be derived.

As emphasised in the theoretical studies mentioned above, the value added of banks is not the funds they borrow and lend, but the array of services that they provide to facilitate the exchange of funds.[15] Services are generally intangible and many of these bank services are not even explicitly charged for, while financial instruments such as loans are often the most tangible manifestation of those services. It is understandable, therefore, that real financial balance makes for an appealing proxy for the quantity of bank service output. But this requires the implicit assumption that the former is in constant proportion to the latter.

There is, however, little theoretical basis for this restrictive assumption. Both Wang (2003a) and Wang et al (2004) argue that, generally, there exists no invariant value mapping between flows of bank services and stocks of the associated holding of financial instruments, regardless whether the stock is measured by book or market value. To understand why financial balances are a poor proxy for financial services, consider a simple example. Suppose loan A has a smaller balance but is more risky than loan B, then monitoring loan A may well require more bank services, resulting in a bigger (implicit) income. An output measure based on loan balance will, however, give the opposite result. This example illustrates intuitively the basic problem with using financial balance to measure bank output: any single attribute of financial instruments is inevitably a poor proxy for the quantity of the associated services. These instruments are fundamentally contracts of contingent claims and thus almost certainly have multi-dimensional attributes, all of which can affect the amount of bank services produced in creating the contracts. For the purpose of bank output measurement, any attribute matters only to the extent that it affects the value and quantity of the services produced.

Basu and Wang (2008) make this point more formally through a general equilibrium Baumol-Tobin model where households need bank services to purchase consumption goods and bank deposits are the single medium of exchange in the economy. Their model shows that financial services are proportional to the stock of assets only under restrictive conditions, especially troubling among which is the requirement of constant relative technologies in the financial sector. In contrast, measuring real financial output by directly counting the flow of actual transaction services is a method robust to technological changes.

In fact, these models have further argued that the supply of banking services and the holding of financial balances can be carried out separately. Developments in the banking industry in recent decades provide strong support for this argument; it has become increasingly prevalent where financial firms provide financial services without holding the associated securities, and vice versa. More generally, Wang el al (2004) reason that the (often implicit) services produced by banks in making a loan are qualitatively the same as the services produced in underwriting a credit derivatives contract. A loan subject to default is shown to be equivalent to a default-free bond combined with a short position in a put option (Merton (1974)). Since all the credit risk in a loan subject to default risk lies in the embedded put option, issuing a loan involves similar tasks (eg screening and monitoring) as writing a put option to the borrower.[16] In short, the new output measure is invariant to the balance sheet status of financial instruments resulting from a bank service.

The fundamental distinction between service flows and asset balances may be less obvious in traditional bank lending, where the intermediary both performs the services and holds the assets. But it is no less intuitive once we focus on the underlying services. For instance, originating a $1 million residential mortgage almost certainly involves much less than

[15] The funds themselves can be thought of as a special type of “intermediate input” – special in that they are not the output of any other producing entities.

[16] In recent years, such implicit options have in fact been made explicit and traded in the rapidly growing credit derivatives market (eg credit default swaps).

10 times the services in originating a $100,000 mortgage, given the ready availability of credit scores for individuals. Fixed proportionality is even harder to defend for services to depositors vs account balances. Studies on payment services suggest that the amount of work in clearing cheques is independent of the dollar figure of the cheques or the account balance (see, for example, Radecki (1999)). The same is true for many other depositor services (eg issuing money orders, transferring funds, etc). These empirical facts are all consistent with the theoretical argument in Basu and Wang (2008).

3.2 Empirical estimates of constant price output of bank services

The theoretical models imply that it is preferable to measure the flow of services directly instead of using proxies such as balance sheet stock values just because they are more readily observed. Since traditional bank activities often generate no explicit fees for services, the usual method – deflating revenue using price indices to estimate indices of real output – is seldom applicable. The alternative is thus to construct quantity indices of tasks performed by banks; we will call this the "activity counts" method. If count data of distinct bank activities exist, such as the number of a particular category of loans originated within a quarter, then constant price output can be measured as indices of the activity counts. Ideally, each type of activity should be defined sufficiently narrowly so that there are no quality differentials and the quantity of output equals the simple sum. To aggregate across different services, the nominal share of each activity in total service revenue (ie nominal output) serves as the weight. The combination of current and constant price output then implies the implicit price deflator.

Inklaar and Wang (2007) use this approach to estimate the real output of implicit bank services of the industry as a whole. They make use of the activity counts that the BLS has in fact been tabulating since at least 1987. Specifically, for lending services, the BLS tallies the number of four types of (new and outstanding) loans – real estate, credit card, consumer instalment and C&I loans; for depositor services, the BLS collects the number of cheques cleared and electronic fund transfers (to proxy for transactions associated with demand deposits), deposits and withdrawals related to time and savings deposits, and ATM transactions; and trust services are proxied by the number of accounts managed. The growth rates of these quantity indices are then aggregated using their respective (implicit) revenue weights, which is better grounded in theory than the employment weights used by the BLS. For example, growth in the numbers of C&I, residential real estate and consumer loans is weighted respectively by the imputed implicit revenue attributed to the three corresponding types of loans. The authors show that, over the sample period, simply deflated balances tend to overstate the growth of implicit bank output relative to the measure according to the activity index. The real quantity index combined with the imputed implicit income then implies a price deflator. The authors also illustrate that, if one must use loan balances to estimate real implicit output, less biased proxies can be constructed by deflating using the price indices of the physical assets funded by the loans. Residential mortgage loans are a good example: deflating the loan balances using the general consumption or GDP deflator biases up the growth of residential lending in the years when house prices appreciated much faster than the general price level; instead, it is better to use a house price index.[17]

In addition to the traditional banking activities covered by the BLS data, Inklaar and Wang (2007) also account for the novel banking activities using data from call reports (financial reports filed by banks to their respective regulatory agencies) as well as periodic surveys by

[17] We show that the proxy of residential mortgage lending services derived by deflating the balances with a house price index can be reasonably accurate to the extent that the fraction of home purchases financed by borrowing is stable.

the Census Bureau. These encompass securitisation and servicing, investment banking (including advisory, brokerage and underwriting), loan commitments and sales of insurance contracts. As this study shows, fees and commissions from these activities as a fraction of total bank income (both explicit charges and implicit revenue) has been trending up rapidly over the past two decades. Each category of explicit income is then deflated using the best matched implicit price index derived earlier. The authors show that ignoring these non-traditional banking activities results in a downward bias in the estimate of total bank output. At the same time, they readily acknowledge that data limitations, especially in terms of detailed data for quality adjustments and the construction of accurate price deflators, introduce possibly non-trivial measurement errors into the estimates.

Wang (2003b) estimates real output for individual BHCs. Since no activity data are available at this micro level, quantity indexes are derived by deflating revenue using the aggregate price deflators for bank services. The deflators for implicitly priced bank services (whose revenue is imputed as in the previous section) are derived as described above. The estimates of bank output at the BHC level (updated to Q1 2008, most recently) are qualitatively similar to those at the industry level: the new output series exhibits faster (owing to the non-traditional activities), albeit more volatile, growth, compared with the book value-based and US NIPA output measures. Wang (2003c) then applies the real output series to estimate productivity and returns to scale at the BHC level (also updated to Q1 2008). Average productivity growth across all the BHCs (weighted by the sum of explicit and implicit service revenue) estimated using the new output series is faster but more volatile, and there appears to be at least a moderate degree of increasing returns to scale, as opposed to the constant returns to scale generally found in the micro banking efficiency studies.[18]

Not surprisingly, the BLS activity count data illustrate the primary empirical difficulty with the direct approach to bank service accounting – activities are classified so broadly that there is often much quality heterogeneity even within the same category. For instance, C&I loan portfolios as well as their evolution over time may differ substantially across banks in terms of *characteristics that matter for the amount of services performed*, such as the distribution of loan size and credit rating, industry and geographic mixes, etc. Consequently, using the simple sum of C&I loan numbers to measure the output of total C&I lending may introduce serious measurement errors, probably even biases. Moreover, screening and monitoring may be two rather different activities. So, ideally, we should instead tally the number of, along with the interest rate on, new vs outstanding loans for each sufficiently narrowly defined category within which the services entailed are similar enough to allow a simple count of transactions to measure bank output.

An alternative to the direct approach is feasible for services that are charged for explicitly in some cases but not in others. Nowadays, for example, originations of residential mortgages often carry explicit fees in the United States, but sometimes the fee is amortised and subsumed into interest over the loan's maturity. Since essentially the same services are performed in both cases, explicit price indices derived from former cases can be used to deflate the imputed implicit service revenue in the latter. This approach may be more useful going forward, as banks have been charging explicitly for an increasing share of services (Stiroh (2000)).

[18] Because of the greater volatility of the new output series and hence a more severe errors-in-variable problem, it leads to a bigger upward (downward) bias in the estimate of the degree of returns to scale from the cost (production) function. Since the former is above 2 and the latter slightly below 1, the correct value is most likely to be moderately above 1.

4. Concluding remarks

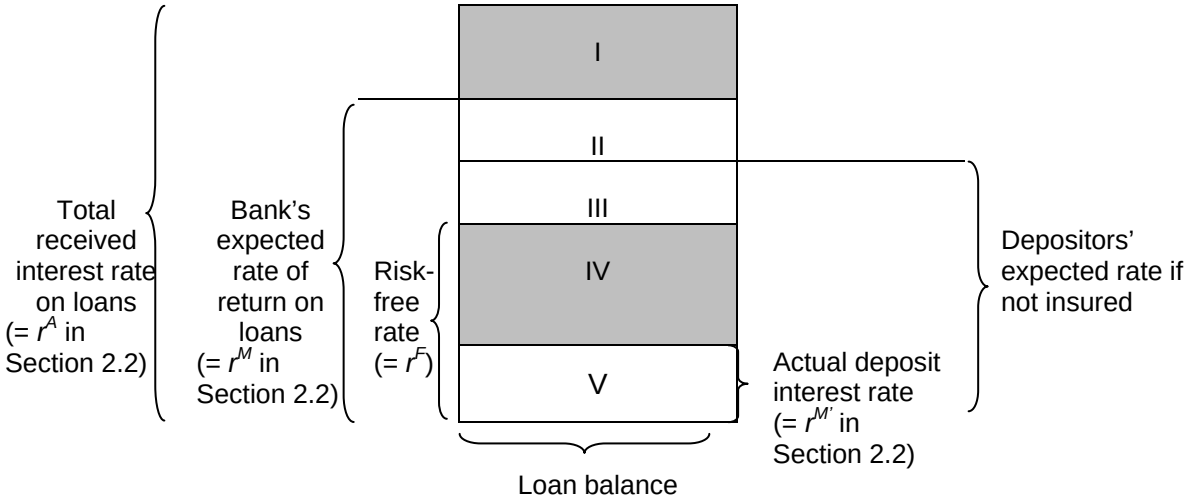
The statistical properties of an output estimate cannot per se establish its validity. Instead, it should be justified on theoretical grounds – consistency with basic economic theories that can rationalise the operation of the firms concerned. This is the principle underlying some recent efforts (Wang (2003a), Wang et al (2004)) to model bank operations. Consistent with widely received theories of financial intermediation, production and asset pricing, these models yield a coherent framework for measuring the output of bank services. The key is to recognise that banks perform qualitatively the same services – processing financial information and transactions – and so their output should and can be measured in the same way whether or not the services are priced explicitly or associated with any on- or off-balance-sheet financial claims. Implementing the output measure implied by these models generally entails constructing the quantity index of each type of service based on quality-adjusted transaction counts. The true revenue from each type of service serves as the weight for aggregating across different service types. In cases where implicit charges for services are bundled with asset returns, the true service revenue needs to be imputed from the total bank income by removing the risk-dependent returns on the associated assets.

Follow-up empirical studies (Basu et al (forthcoming), Inklaar and Wang (2007)) demonstrate that the measure of bank output implied by the above theoretical framework can, in fact, be implemented using publicly available data. The sources of data range from yields on market debt most comparable to bank loans in terms of risk characteristics, financial statements filed by banks to their regulators, bank transaction counts and revenue by activity, as tabulated by statistical agencies. The primary finding is that both current and constant price output based on the new measure have rather different levels and time paths of growth than those based on the extant output measures over the past 20 years. Different patterns of output growth will translate into different patterns of productivity growth. These differences suggest the need to examine whether bank output has been overstated during this period and, more generally, to what extent the post-1995 productivity acceleration according to official data was due to the mismeasurement of financial service output.

This conceptually sound measure, however, can only be imprecisely implemented at present because of data limitations. We therefore advocate that an effective approach to improving empirical estimates is to collect additional data that are called for by the theory. Arguably, the most important among such data needs is the transaction counts of different types of bank activities, starting with those accounting for the largest shares in (explicit plus implicit) bank service revenue. Bank activities should be classified according to characteristics that matter for the amount of services provided, so that each type corresponds to homogeneous services. For example, originating conforming residential mortgages in the United States requires an essentially uniform set of tasks and can be considered a single type of activity. In addition, in order to impute implicit service revenue more precisely, we need more detailed data on the interest rates charged along with risk ratings of the associated financial instruments. Such data may become more readily and widely available as they will be required by new regulatory rules to enable better risk management within each intermediary and more effective supervision. Meanwhile, when one has to use approximations for practical purpose, one must be clear about the conditions under which the proxies are appropriate.

Exhibit 1

Decomposition of a bank's total interest receipt



Notes:

1. The content of each area:

Area I: implicit fees for intermediation services in lending (eg origination and monitoring)
Area II: loan risk premium
Area III: deposit insurance premium
Area IV: implicit fees for transaction and payment services (eg mostly to depositors)
Area V: deposit interest payment

So,

Area (I + … + V): a bank's total receipt of loan interest income
Area (II+ … + V): the bank's expected return on the funds given the loans' systematic risk
Area (III+IV+V): depositors' expected return on deposits given the risk of the bank's loan portfolio (if without deposit insurance)
Area (IV+V): risk-free return x deposit balance

NB: when loans are funded by deposits plus equity, the loan balance exceeds the deposit balance. An equivalent calculation is to adjust the two deposit-related rates on the right of the block and the risk-free rate by (deposit balance/loan balance).

2. The risk-free rate is the rate of return required by depositors given deposit insurance, whereas the "depositors' opportunity cost of capital" is the return they would demand without deposit insurance. The two rates should be very close (or the same) for banks with very low credit risk (eg having AAA-rated bonds outstanding).

Exhibit 2

Average interest rates on loans and deposits, and corresponding reference rates, Q2 1997–Q4 2007

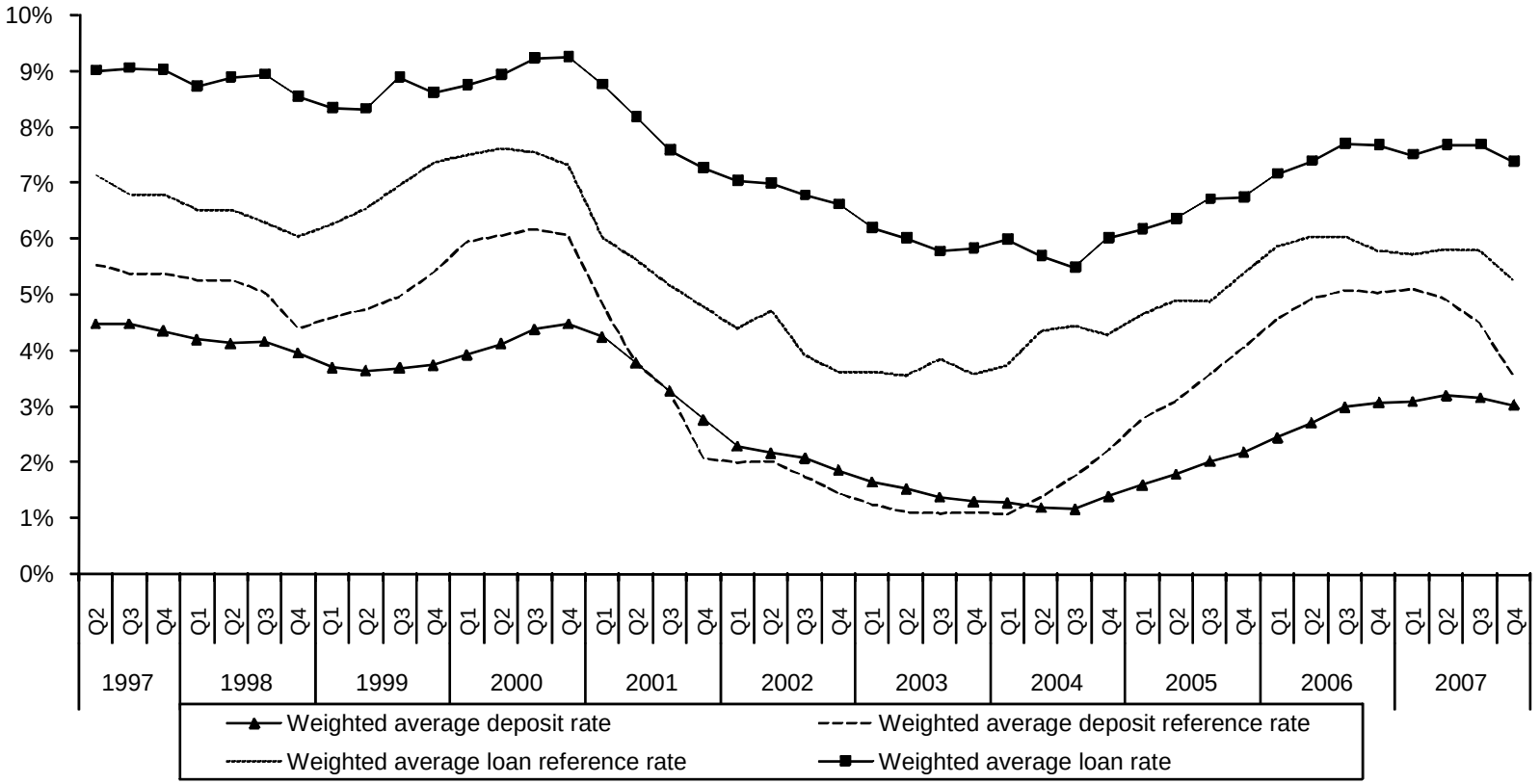


Table 1

The effect of risk adjustment: imputed output of US commercial banks at current prices in Q4 2007

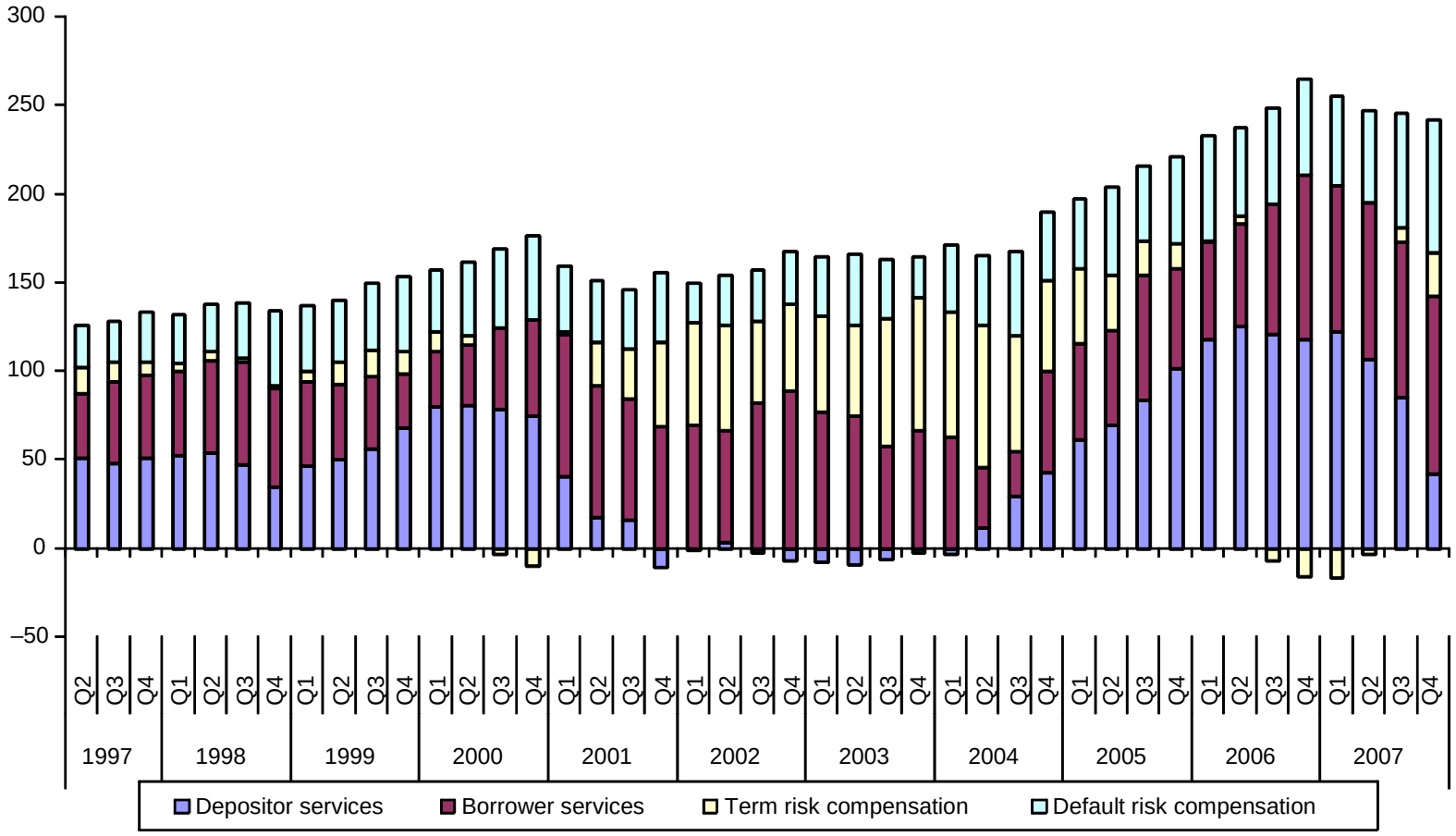
USD billions

	Average balance	Interest flow	Annualised interest rate	Reference rate			Imputed output		
				risk-free	term	default & term	risk-free	term	default & term
Deposits in domestic offices	5,504	152	2.8%	3.5%	3.5%	3.5%	39.0	42.5	42.5
Demand deposits	486	0.0	0.0%	3.5%	3.5%	3.5%	16.9	16.9	16.9
Time and savings deposits	5,018	152.2	3.0%	3.5%	3.5%	3.5%	22.1	25.6	25.6
Loans in domestic offices	5,471	395	7.2%	3.5%	4.0%	5.7%	205.0	177.0	83.7
Real estate loans	3,545	235.3	6.6%	3.5%	4.3%	5.8%	112.2	84.3	31.5
Consumer loans	804	80.9	10.1%	3.5%	3.5%	4.9%	53.0	52.9	41.1
Commercial & industrial loans	1,123	78.8	7.0%	3.5%	3.5%	6.0%	39.8	39.8	11.1
Total	10,975	547	6.6%	3.5%	3.8%	4.6%	244.0	219.5	126.2

Exhibit 3

Imputed output of US commercial banks and risk compensation at current prices, Q2 1997–Q4 2007

USD billions



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Treatment of risk in the estimation of FISIM

Satoru Hagino[1] and Katsurako Sonoda[2]

1. Treatment of FISIM in Japan's national accounts

Financial Intermediation Services Indirectly Measured (FISIM) are the productive services of financial intermediaries measured indirectly. They are based on the assumption that, in the absence of explicit charges, the compensation for financial intermediation services is included in the interest margin between deposit and lending rates. The amounts of such services are allocated to depositors and borrowers using a reference rate, which represents the pure cost of borrowing funds. The difference between the reference and lending rates corresponds to services provided to borrowers, while the difference between the reference and deposit rates corresponds to services provided to depositors.

In Japan, the figures of the trial estimation for the fiscal year starting in 1995 have been published by the Economic and Social Research Institute of the Cabinet Office in its *Annual Report on National Accounts*. The estimation method is deliberately envisaged and is broadly consistent with international guidelines. However, the reference rate might be reconsidered, since it does not satisfy the requirements for the reference rate. In the trial estimation, the reference rate is defined as financial intermediaries' interest payments to financial institutions divided by the balances of borrowings from them. In Japan, other financial intermediaries borrow large amounts of money from other depository corporations, and their interest payments include the compensation for services provided by other depository corporations. As a result of using a high reference rate, the trial estimation of the Cabinet Office tends to result in the overestimation of FISIM on the deposit side (see Table 1 below).

For the measurement of Japan's FISIM, the reference rate should be based on the interest on claims among other depository corporations such as money market rates. For FISIM on the lending side, however, multiple reference rates might be necessary. The margin between the reference and lending rates of other depository corporations is recorded as their FISIM. This margin is recorded again as part of the FISIM of other financial intermediaries as long as the same reference rate is used. Such double-counting should be eliminated by measuring the FISIM of other financial intermediaries based on their own interest margin, ie the margin between their borrowing and lending rates.

For other depository corporations, interest rates corresponding to the maturities of deposits and loans should be utilised. The use of an interest rate of the call market – the annual average of call rates with maturities of overnight up to three months, for example – or the Tokyo Interbank Offered Rate (Tibor) for three months tends to result in negative FISIM on the deposit side due to the zero or extremely low interest rate policy. Another factor is that such interest rates correspond to relatively short maturities, while the average maturity of deposits is calculated to be approximately one year and that of loans to be between three and four years. It is therefore considered optimum, for example, to apply the yen-yen swap rate for one year or the average of yen-yen swap rates for three and four years as the reference rate. If the yen-yen swap rate for one year is applied, estimated amounts of FISIM on the deposit side become positive for the year 2006. If the average of yen-yen swap rates

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for three and four years is applied, estimated amounts on the deposit side become positive from 2003 to 2006, while the estimated amounts on the lending side become smaller (see Table 1 below).

The 2008 System of National Accounts (SNA) recommends that the maturity structure of deposits and loans be reflected in a reference rate. In conformity with this recommendation, two different reference rates may be used when the maturities of deposits and loans are different from each other. Thus, the use of a single reference rate for one currency needs to be reconsidered. The ECB proposal in terms of the reference rate as described below appears to be quite relevant to this issue.

2. Treatment of risk premia in the measurement of FISIM

2.1 ECB proposal

During the OECD joint working party on financial statistics and national accounts held in September 2008, a participant from the ECB proposed the exclusion of term and credit risk premia from the measurement of FISIM. This proposal uses two main methods: (i) using reference rates that correspond to maturities of deposits and loans, eg the six-month interbank rate for maturities of less than one year, the three-year government bond rate for maturities from one to five years, and the seven-year government bond rate for maturities of more than five years; and (ii) calculating and deducting either the yield spread between corporate and government bonds or the yield spread between asset-backed and mortgage-backed securities (ABS/MBS) and government bonds.

2.2 Treatment of the term premium

The term premium discussed by the ECB corresponds to the margin between the reference rate for deposits and that for loans as described above. By calculating FISIM for deposits and loans separately, using two different reference rates, the term premium might be excluded from FISIM. By adopting such an estimation method, Japan's FISIM would be decreased by approximately 20%, compared to the estimation method that uses a single reference rate (see Chart 1 below).

Such exclusion would be appropriate as long as FISIM is limited to deposits and loans. This limitation is justified only by underlining the functions of deposits and loans that are not realised by other financial instruments. In fact, transforming maturities is not a unique function of deposits and loans; it can be realised by means of securities other than shares, eg by issuing short-term securities and holding long-term securities, by accepting short-term deposits and investing in long-term securities, or by issuing short-term securities and investing in long-term loans.

Term premia represent the compensation given to financial intermediaries for bearing interest rate risk, since they are not able to earn profits simply from interest rate spreads in the long term. Such activities can be regarded as compensation for productive services other than FISIM. This is because, in the system of national accounts, the bearing of risk is not generally regarded as a productive service, but the provision of insurance policies by insurance companies, in contrast, *is* regarded as a productive service. Similarly, the bearing of interest rate risk by financial intermediaries – including by issuing or holding securities other than shares – could be regarded as a productive service. The amounts of insurance services in the national accounts are based on the margin of insurance companies; ie the sum of the actual premiums plus the property income, less the expected claims. In a similar manner, the amounts of services bearing interest rate risk could be based on earnings corresponding to the term premia less losses caused by mismatches of maturities of assets

and liabilities. In addition, if bearing interest rate risk is regarded as a productive service, it would be necessary to explore a method of allocating it to consuming entities, eg depositors/investors and borrowers/fund-raisers.

2.3 Treatment of the credit risk premium

FISIM on the lending side corresponds to monitoring services such as financial intermediaries' advisory activities vis-à-vis borrowers with a view towards enabling them to repay on a regular basis. It appears inappropriate to understand FISIM on the lending side as opportunity costs of borrowers, though FISIM on the deposit side are generally understood as opportunity costs of depositors for settlement services. In Japan, many borrowers are small- and medium-sized enterprises as well as households, who are virtually unable to raise funds in the market by themselves. Their projects often become feasible only by borrowing money from financial intermediaries. Assuming that such entities raise funds in the financial market, they would have to pay much higher interest rates than borrowing rates. Thus, opportunity costs – which derive from borrowing rates higher than the market rates – are not observed.

When financial intermediaries provide funds to high-risk borrowers, they utilise substantial resources to avoid default by strengthening their monitoring and advisory activities. Thus, their lending rates add the compensation for their monitoring services onto the reference rate. Such a description is consistent with the reality of retail activities of other depository corporations, which are clearly distinguished from insurances services against credit risks. Given that credit risk premia include the compensation for monitoring services, it would be inappropriate to exclude credit risk premia entirely.

When financial intermediaries increase their lending to risky borrowers, however, the number of defaults tends to increase. This implies that monitoring services have not been fully provided to such borrowers. As long as financial intermediaries lend money to such borrowers, complete defaults are avoided, and thus their monitoring services continue. It is only when financial intermediaries give up avoiding defaults and stop lending that their monitoring services cease. Once that happens, they write off such loans from their balance sheets. Taking account of such a situation, losses caused by non-performing loans should be deducted from FISIM on the lending side. In Japan, the Bank of Japan calculates and publishes the amount of credit costs based on write-offs of non-performing loans and allowances of loan losses of other depository corporations. If such costs are deducted by adjusting the reference rate for loans, the estimated amounts of Japan's FISIM would decrease by approximately 20% (see Chart 1 below).

In this respect, the problem of a lagged structure of credit costs remains, although they represent total losses caused by non-performing loans over the long term. While allowances for loan losses are recognised, monitoring services are still provided. When monitoring services cease, any losses are not recognised in accounting terms due to the existing provision. In contrast, when borrowers start repaying on a regular basis, reversals of allowances for loan losses are recognised, as happened in the fiscal year 2005. Such a problem could be resolved by depending on past trends in the credit cost ratio rather than using data on credit costs that are recognised for a specific fiscal year.

3. Conclusion

Under the current framework of FISIM, which limits the scope of its measurement to deposits and loans, the term premium should be excluded. Moreover, credit costs – as opposed to credit risk premia – should be deducted from FISIM, since such costs perforce mean the failure to perform risk management activities such as the monitoring of borrowers.

From the viewpoint of statistics users, the method of deducting term premia and credit costs from FISIM would be preferable, as the amounts of FISIM remain stable even during a boom or turmoil in the financial sector. Otherwise, the fluctuation of interest margins tends to be too large in comparison with the fluctuation of production in the real sector. An advantage could be further added by utilising past trends, especially for credit costs.

Table 1

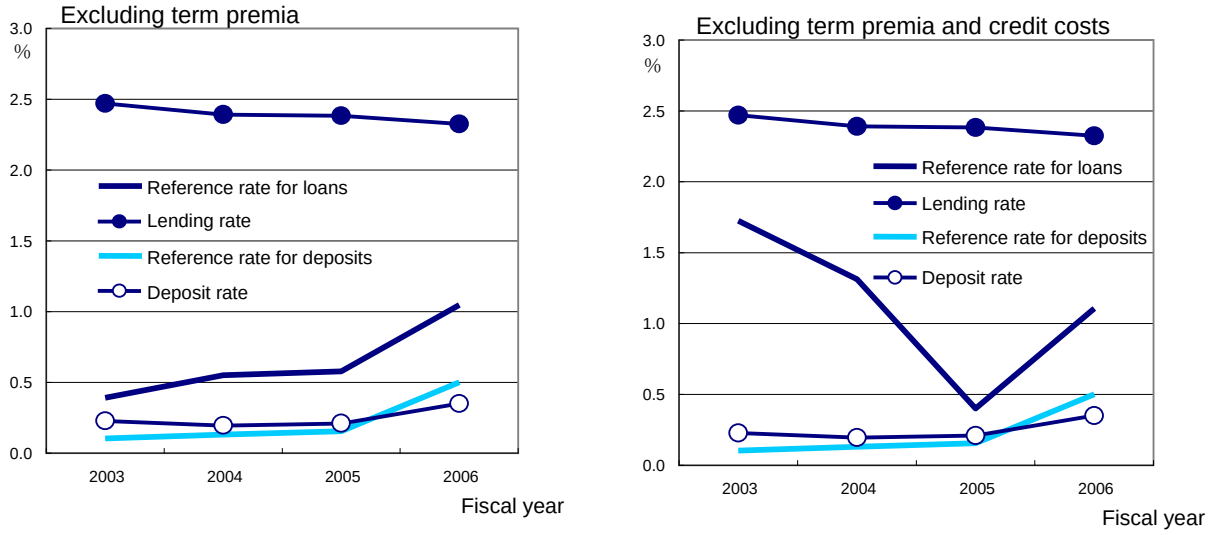
Estimation of Japan's FISIM

(Billions of yen)

Reference rate	FY 2003	FY 2004	FY 2005	FY 2006
(FISIM on the lending side)				
Trial estimation by the Cabinet Office	*10,046*	*9,759*	*9,147*	*11,469*
Average of yen-yen swap rate for 3 and 4 years	18,772	14,916	14,449	8,981
Yen-yen swap rate for 1 year	20,308	17,072	16,831	11,288
(FISIM on the deposit side)				
Trial estimation by the Cabinet Office	*14,253*	*14,088*	*14,037*	*9,334*
Average of yen-yen swap rate for 3 and 4 years	1,519	3,182	4,117	9,189
Yen-yen swap rate for 1 year	–1,555	–1,233	–761	4,548
(Total FISIM)				
Trial estimation by the Cabinet Office	*24,299*	*23,847*	*23,183*	*20,803*
Average of yen-yen swap rate for 3 and 4 years	20,291	18,098	18,565	18,170
Yen-yen swap rate for 1 year	18,753	15,839	16,071	15,837

Chart 1

Interest margin excluding term premia and credit costs



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Bank services: some reflections on the treatment of default risk and term premium

Antonio Colangelo[1] and Reimund Mink[2]

1. Introduction

Financial corporations provide financial services that may be paid for explicitly or implicitly. Explicit financial services are directly observable as charges mainly in association with the acquisition and disposal of financial assets and liabilities or with insurance and pension schemes. However, any complete measurement of the production of financial services has to take account of the value of the services for which financial intermediaries do not charge explicit fees. For instance, the payment for the services provided on loans and deposits (ie financial advice, screening creditworthiness, monitoring the performance of the loan, renegotiating the contract conditions, bookkeeping and payment facilities) is usually bundled with the interest rates charged or paid.

Implicit financial services are often referred to as Financial Intermediation Services Indirectly Measured (FISIM). While in principle they may arise from various types of financial transactions, international statistical standards confine them to deposits and loans provided by financial intermediaries. In particular, FISIM are currently compiled following a single reference rate approach in which the rate prevailing for interbank lending is seen as a suitable choice. Following this approach, the compensation for the term premium and the credit default risk is treated as the remuneration for a productive service. This paper briefly discusses the theoretical and practical shortcomings of this approach and proposes modifying the current framework based on reference rates which would reflect the term premium and the credit default risk characteristics of deposits and loans.

The paper is organised as follows: Section 2 reviews the current treatment of implicit financial services in the international statistical standards. Section 3 describes how risk components can be appropriately measured for the euro area, while Section 4 shows the improved estimates of FISIM allocated to resident households and non-financial corporations and compares them with the results obtained by applying the official methodology used for EU countries. In addition, we demonstrate that the new proposed approach can be applied in the regular and timely compilation of quarterly and annual national accounts based on harmonised ECB statistics on retail interest rates.

2. Current treatment in international statistical standards

According to the European System of National and Regional Accounts (ESA 1995), FISIM are imputed for all loans and deposits, vis-à-vis residents and non-residents, provided by deposit-taking corporations and other financial intermediaries, excluding insurance corporations and pension funds. The estimates are derived by comparing bank interest rates to a single reference rate reflecting the average interest rate at which financial intermediaries

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lend money to each other (interbank), without any distinction by type and maturity of the instrument.[3] As deposits and loans among financial intermediaries are mainly short term and (relatively) risk-free, it follows that the compensation for bearing the term premium and the credit default risk are treated as the remuneration for a productive service and thus become part of the output of financial intermediaries.[4]

The approach followed in this paper suggests why the term premium and the credit default risk should not be treated as part of the output of financial services. The *term premium* reflects the assumptions about future interest rates but is also a compensation of the investors for having their money tied up for a longer period, including the added risk of greater price uncertainty. Concerning the *credit default risk*, a difference is made between risk management and risk assessment. While risk assessment can be interpreted as a service provided to the borrower to evaluate his creditworthiness, risk management can be seen as an internal process whereby the bank organises its risks (risk controlling). Management of the default risk can be compared to an insurance contract where the lender (as the guarantor) charges a premium to the borrower in exchange of the risk of the potential default – the expected loss of the loan. Looking at a credit insurance contract, the output of a credit insurer is derived as the difference between premiums including premium supplements less adjusted claims incurred. As this compilation is based on an expectation approach, it would argue in favour of the default risk correction (discount of "expected" defaults).[5]

The current treatment of credit default risk and term premium also leads to an inconsistency in national accounts. Consider two non-financial corporations with similar characteristics that need to borrow to finance their investments. The first corporation issues a debt security and pays the market interest rate which includes the term spread and the default risk premium, while no services are paid to the holders of the debt security. The second corporation borrows from a bank and pays the interest rate charged by the bank. Under the current approach, the second corporation is assumed to pay only the interbank rate, while the remainder of the payment, including the term spread and the default risk premium, is considered bank output. Under the proposed methodology, both corporations face the same cost of funds, and only the payments in excess of this market rate by the second corporation are treated as financial services output.

Hence, for deposits and loans, both the term premium and the credit default risk need to be accounted for. In order to better compare and classify these components, detailed financial market statistics should be used, such as data on debt securities yields, money market instruments and financial derivatives. The treatment of deposits is particularly problematic: while they could be seen as a risk-free investment, at least in those cases where credible deposit insurance schemes are in place with government guarantees, as in European countries, the current turbulence in financial markets has led to the occurrence of risk premia in those cases too.

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[3] Paragraph 6.166 of the 2008 System of National Accounts (2008 SNA) allows some flexibility in compiling the reference rate, stating that "the reference rate to be used in the calculation of SNA interest is a rate between bank interest rates on deposits and loans. However, because there is no necessary equality between the level of loans and deposits, it cannot be calculated as a simple average of the rates on loans or deposits. The reference rate should contain no service element and reflect the risk and maturity structure of deposits and loans".

[4] For a detailed discussion of the conceptual limitations of the current methodology from an economic perspective, specifically in times of financial crisis, see Basu et al (2008), Keuning (2008) and references therein. In this context, the argument of the Federal Statistical Office of Germany (2009) should also be referred to: a productive service requires the input of capital and labour, thus implying that FISIM output should not reflect credit default risk and term premia.

[5] See SNA 2008, Chapter 17, Part 1: "The treatment of insurance".

A further consideration refers to the type of interest rates[6] on loans and deposits to be used to derive aggregated interest margins. While the approach currently used to compile FISIM relies on interest rates for outstanding amounts, this paper follows the framework of Colangelo and Inklaar (2008) by using interest rates on new business, ie newly negotiated interest rates during the period.[7] Interest margins are applied to the whole outstanding balance of loans and deposits to derive FISIM output.

3. Adjusting for the term and credit default risk premium

Adjusting FISIM estimates for term premia is linked to the identification of an appropriate "risk-free" yield curve from which to extract reference rates for different maturities in the case of deposits and fixation periods in the case of loans.[8] For long-term maturities, the approach consists of using the government bond yield curve, which represents the relationship between market returns and the remaining time to maturity of debt securities that are usually referred to as risk-free (among other reasons, because the government can raise revenue or increase debt to redeem the bond at maturity). For the euro area, differences in yields appear across euro area countries. Therefore, the yield curve is chosen for long-term debt securities issued by the German central government showing the lowest default risk premia. Due to the lack of a consistent yield curve on short-term government debt securities, the secured interbank lending market is referred to in order to identify the corresponding reference rates with short-term maturities. In particular, the Eurepo interest rates, which represent the reference rates for the secured euro area interbank lending market, are used for the term adjustment.[9]

An alternative approach might rely on a yield curve based on unsecured interbank lending rates and the swap yield curve.[10] In particular, the Euro Overnight Index Average (EONIA) and the Euro Interbank Offered Rate (Euribor) have become the benchmark for the euro area

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6 The euro area estimates are based on MFI interest rate (MIR) statistics (for monthly periods as from January 2003) as a harmonised and comprehensive set of interest rates applied by euro area deposit-taking corporations to resident households and non-financial corporations on euro-denominated loans and deposits. The requirements for MIR statistics follow Regulation ECB/2001/18.
See www.ecb.europa.eu/stats/money/interest/interest/html/index.en.html.

7 New business rates should be preferred on various grounds. First, rates on outstanding amounts are weighted averages of rates on current and past loans and, if anything, should be compared with a weighted average of current and past financial market rates. Second, rates on outstanding amounts are not categorised according to periods of rate fixation but if a loan with a long-term original maturity has rates which are renegotiated annually, it would be more appropriate to compare the interest rate on this loan to the yield on a bond with a time to maturity of one year rather than according to the original maturity.

8 The paper refers to breakdowns of deposits and loans as collected according to the MIR regulation. Data on corresponding outstanding amounts of deposits and loans are based on the MFI balance sheet statistics (Regulation ECB/2008/32).

9 Eurepo rates represent the rates at which euro area banks are offering money to each other as part of a term repurchase agreement having as collateral euro-denominated securities belonging to a specified list (so-called Eurepo General Collateral) which mainly consists of risk-free debt securities such as government guaranteed bonds and bills of European countries.

10 Interest rate swaps are not completely risk-free, as a counterparty risk premium exists related to the interest flow exchanges (but not to the exchange of principal) and instruments price the expected default risk of money market participants at specified maturities. In recent years, this market has become one of the largest and most liquid in the world and has the advantage that credit risk characteristics are similar across countries.

money and capital markets;[11] similarly, a reference swap yield curve is available for the euro-denominated interest rate swap market. While the spreads with respect to the yield curves as described above (German government bond yields and unsecured interbank lending rates) had been rather limited until the start of the financial turmoil (on average varying between 3 and 15 basis points from January 2003 to August 2007), they have increased considerably since then, reflecting higher credit default risk on the interbank market. This implies that they can no longer be used for the term premium adjustment. At least in the euro area, such risk premia may have been passed on to deposits, in which case for those instruments unsecured interbank rates and the swap yield curve would then represent good proxies for the credit default risk and the term premium adjustment.

Adjusting for credit default risk on loans is more challenging. It would not be appropriate to use secured interbank lending rates and the swap yield curve for this adjustment as they would both reflect the risk characteristics of the lender rather than those of the borrower. Hence, for a loan portfolio, the average default risk component of the interest rates charged to customers should, rather, be estimated by the spread between a pool of debt securities having, on average, the same risk profile as the loans under consideration, and the government bond yield. This approach is used in the simulation for the euro area.[12] In particular, euro area bond indices are used as reference rates for non-financial corporations, while corresponding indices for asset-backed securities (ABS) and for residential mortgage-backed securities (RMBS) are used for households.

An alternative approach would have been to rely on the use of loan loss provisions, which represent the expected losses on a portfolio of non-performing loans. The 2008 SNA recommends recording memorandum items relating to non-performing loans and to the related loan loss provisions.[13] Data on loan loss provisions are published by some commercial data providers for a set of euro area commercial banks, and risk premia on loans provided by those banks can thus be derived as the ratios between loss provisions and the outstanding amounts of the underlying loans. On the other side, in the context of banking output measurement, several concerns can be raised. First, the definition of loan loss provisions might vary across countries (even though International Accounting Standard 39 provides a general definition of impaired loan loss), thus resulting in a lack of data harmonisation. In addition, the construction of a representative sample of euro area banks on the basis of the available data sources may not be straightforward. The frequency of the available data and the lack of breakdowns by sector of the borrower and purpose of the loan may also be suboptimal.[14] Data on credit default swaps (CDS) for non-financial corporations could also provide meaningful measures for their default risk. For instance, commercial data providers publish data on CDS for several euro area non-financial corporations and this approach would also allow the derivation of risk premia for a higher range of maturity spectra than under the corporate bond yields approach. Yet the market is relatively new and only very big firms are likely to be involved in CDS as reference entities. Therefore, while credit default swap spreads can be of interest in the context of FISIM measurement, the available data are not yet sufficient for use in regular standardised compilation systems.

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[11] The EONIA is a weighted average of all overnight unsecured lending transactions initiated within the euro area by a panel of domestic banks, while the Euribor represents the rate at which euro-denominated interbank term deposits are offered by euro area banks (the average of the quotes provided by a panel of euro area banks).

[12] See Colangelo and Inklaar (2008) for a detailed description of this approach.

[13] See 2008 SNA, Chapter 13, Part C.3: “The balance sheet”.

[14] For euro area countries, this information could, in principle, be available with the required breakdowns from data on write-offs/writedowns which is collected for MFI balance sheet statistics (Regulation ECB/2008/32). In practice, these statistics represent poor proxies for loan loss provisions as they are collected for the evaluation of transactions and are thus subject to national accounting rules applied in the country concerned.

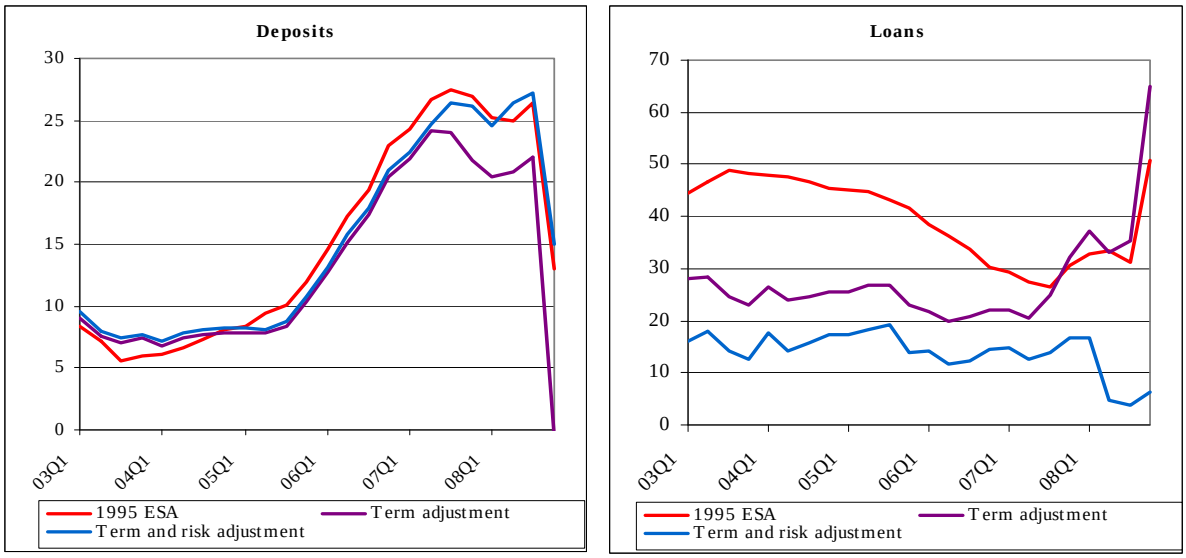
4. FISIM estimates for the euro area

The framework described above is applied to the euro area, estimating quarterly banking sector output on deposits and loans vis-à-vis euro area households and non-financial corporations for the period from the first quarter of 2003 to the fourth quarter of 2008.[15] In particular, results under term adjustment are obtained using, as reference rates, the secured interbank rates and the German government bond yield curve. In case of default risk and term adjustment, results are obtained on the basis of unsecured interbank lending rates and the swap yield curve for deposits as well as on the basis of government bond yield spreads for loans. The table in the appendix shows in detail the reference rates applied to each deposit and loan category under both approaches.

Figure 1

Euro area banking sector output on deposits and loans

(EUR billions, quarterly output, Q1 2003–Q4 2008)



Notes: The sum of the output for the various types of loans and deposits. For each instrument category, the output is derived as the product of the relevant average interest margin times the outstanding amounts. Margins under the three approaches are derived by simulating the ESA 1995 methodology, on the basis of Eurepo rates and German government bond yields (term adjustment), using the EONIA/Euribor rates and the swap yield curve for deposits, and the relevant yield curve for corporate bonds and ABS/RMBS for loans (term and risk adjustment).

Source: ECB calculations.

When adjusting for both term and default risk premia, this method yields that the euro area banking sector output vis-à-vis resident households and non-financial corporations is, on average, 37% lower than estimated under the current approach. This would also imply that GDP, the total value of goods and services delivered to final demand, is overestimated by about €19.2 billion or 0.23% of euro area GDP.[16]

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[15] FISIM estimates under the ESA 1995 approach are not based on national official statistics but have been derived by simulating this methodology.

[16] As this paper only refers to FISIM allocated to households and non-financial corporations, estimates of the GDP correction do not reflect the impact of the new approach on FISIM allocated to general government and to the rest of the world.

Appendix table:
Bank loan and deposit instruments and reference rates

	Term premium adjustment	Default risk and term premium adjustment
Loans		
Non-financial corporations		
Up to 1 year	Six-month EUREPO	ML NFC bond index, 1–5Y minus 3Y German GB yield plus 1Y German GB yield
Over 1 year and up to 5 years	Three-year German GB yield	ML NFC bond index, 1–5Y
Over 5 years	Seven-year German GB yield	ML NFC bond index, 5–10Y
Households		
For house purchases		
Up to 1 year	Six-month EUREPO	ML ABS/MBS index minus 5Y German GB yield plus 1Y German GB yield
Over 1 year and up to 5 years	Three-year German GB yield	ML ABS/MBS index minus 5Y German GB yield plus 3Y German GB yield
Over 5 years and up to 10 years	Seven-year German GB yield	ML ABS/MBS index minus 5Y German GB yield plus 7Y German GB yield
Over 10 years	Ten-year German GB yield	ML ABS/MBS index minus 5Y German GB yield plus 10Y German GB yield
Consumer credit		
Up to 1 year	Six-month EUREPO	ML ABS/MBS index minus 5Y German GB yield plus 1Y German GB yield
Over 1 year and up to 5 years	Three-year German GB yield	ML ABS/MBS index minus 5Y German GB yield plus 3Y German GB yield
Over 5 years	Seven-year German GB yield	ML ABS/MBS index minus 5Y German GB yield plus 7Y German GB yield
Other purposes		
Up to 1 year	Six-month EUREPO	ML ABS/MBS index minus 5Y German GB yield plus 1Y German GB yield
Over 1 year and up to 5 years	Three-year German GB yield	ML ABS/MBS index minus 5Y German GB yield plus 3Y German GB yield
Over 5 years	Seven-year German GB yield	ML ABS/MBS index minus 5Y German GB yield plus 7Y German GB yield
Deposits		
(same treatment for households and non-financial corporations)		
Overnight deposits	EUREPO T/N	EONIA
Deposits with agreed maturity		
Up to 1 year	Six-month EUREPO	Six-month EURIBOR
Over 1 year and up to 2 years	Two-year German GB yield	Two-year interest rate swap rate
Over 2 years	Five-year German GB yield	Five-year interest rate swap rate
Deposits redeemable at notice		
Up to 3 months	One-month EUREPO	One-month EURIBOR
Over 3 months	Two-year German GB yield	Two-year interest rate swap rate
Repurchase agreements	EUREPO Tomorrow/Next	EONIA

Acronyms:
ML: Merrill Lynch
ABS/RMBS: Asset-backed securities/Residential mortgage-backed securities
GB: Government bond

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Measuring the services of commercial banks in the NIPA

Dennis J Fixler,[1] Marshall B Reinsdorf[2] and Shaunda Villones[3]

The pivotal role of the financial sector has raised interest in measuring its role in the economy. Unfortunately, the finance sector is one of the more poorly measured sectors in national accounts. Until the 1993 update of the System of National Accounts (SNA), banks, for example, made no direct contribution to GDP and their output was simply an intermediate product.[4] This paper discusses how the United States measures banking services, especially those that are un-priced. It also discusses the next steps in better accounting for this complex and pivotal industry.[5]

1993 System of National Accounts

In recognition of the important final and intermediate contributions of the banking sector to the economy, the 1993 SNA changed the treatment of banking services. It recommended measuring implicit financial services to depositors using the difference between a risk-free "reference rate" and the average interest rate paid to depositors, and measuring implicit services to borrowers using the difference between the average interest rate paid by borrowers and the reference rate. To implement this approach, the Bureau of Economic Analysis (BEA) measures the reference rate by the average rate earned by banks on US Treasury and US agency securities.[6] Measured in this way, the reference rate is consistently above the average rate of interest paid to depositors and consistently below the average rate of interest paid by borrowers.

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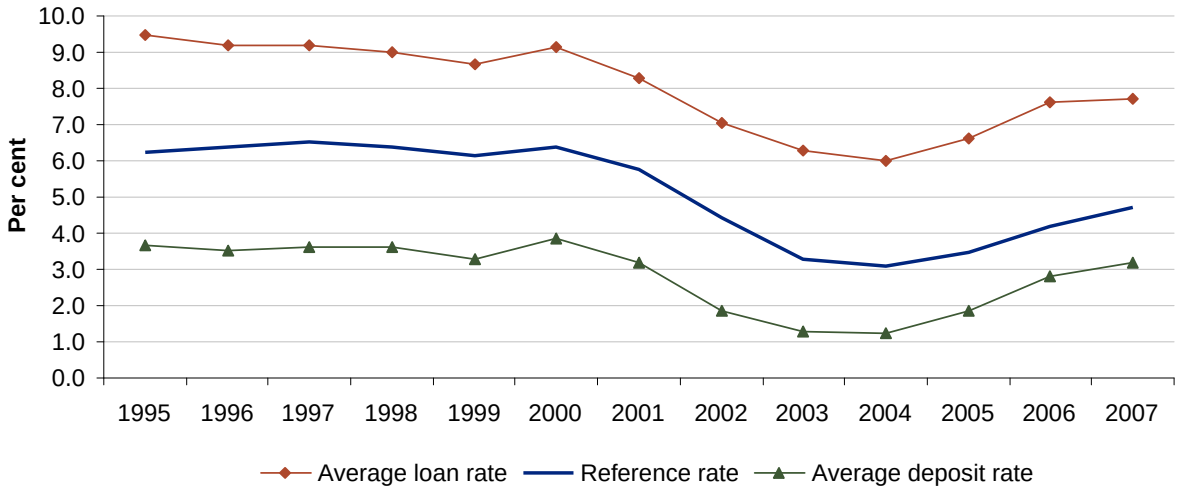
4 Unlike most nations, until 2003, the BEA attributed the entire consumption of implicit financial services to depositors, which was included in final expenditures and GDP.

5 For a more detailed discussion of the US method of measuring the implicit services of commercial banks, including the theoretical framework of the methodology, the particle measurement of interest rates and the effects on national aggregates, see the September 2003 *Survey of Current Business* articles "Measuring services of commercial banks" and "Preview to the 2003 Comprehensive Revision to the National Income and Product Accounts" available on the BEA's website: http://www.bea.gov/scb/pdf/2003/06June/0603NIPArevs.pdf and http://www.bea.gov/scb/pdf/2003/09September/0903banking.pdf.

6 As of 2005, in order to reduce volatility, mortgage-backed agency securities are excluded in the calculation of the reference rate.

Figure 1

Reference rate and average rates on loans and deposits



Source: Federal Reserve Board tabulations of commercial bank call report data.

Valuation of bank output

How to value bank output has been a topic of much discussion in the national accounts literature because banks do not explicitly charge for all the financial services that they provide, relying instead on net receipts of interest for much of their revenue. In national income accounting, interest payments are generally treated as a distribution of income by businesses to investors who have provided them with funds, not as a payment for services. In particular, the domestic portion of the "net interest" component of national income is defined as interest paid by private business less interest received by private business. Applied to banks, the usual treatment of interest flows would yield a negative contribution to the interest component of national income by the banking sector. Moreover, much of the value of the services that banks provide to their customers would be missed by the National Income and Product Accounts (NIPA) and the productivity of the banking sector (as measured by output per worker) would be understated. To avoid these results, an imputation for implicit financial services produced by banks is included in the NIPA. Depositors purchase these implicit services with imputed interest income that eliminates the gap between the total interest received by banks and the total interest paid by banks.[7]

The NIPA imputation, however, is not restricted to depositors; it also accounts for the implicit services of commercial banks to borrowers in their role as financial intermediaries. In particular, banks provide services related to the provision of credit that overcome problems of asymmetric information and that transfer risk to the bank. Banks devote staff time and other resources both to activities that serve depositors, such as clearing cheques, and to activities that serve borrowers, such as making loan underwriting decisions. Historically, banks were virtually the only source of credit for many households and businesses; the burgeoning needs for credit services were a major impetus for the growth of this industry. Accordingly, a measure of bank output should reflect borrower services along with depositor services.

[7] Until recently, many European countries treated the implicit financial services of banks as an intermediate input to a fictitious sector, thereby excluding them from GDP.

Interest margins as values of implicit bank services

By treating banks' net interest income as imputed sales of services, the NIPA recognise that adjustments to interest rates are substitutes for explicit fees to cover the cost of providing services to bank customers. If the reference rate represents the rate that banks earn on their investments after deducting expenses of providing services to borrowers, banks could, in principle, charge depositors explicitly for services and pay them the reference rate of interest. Similarly, banks could charge borrowers explicitly for services that they receive and reduce the rate of interest on loans to the reference rate. Indeed, over the last two decades, banks have substituted fee income for net interest income: in 1980, net receipts of interest constituted 80% of commercial banks' gross income (which does not reflect taxes, non-interest expenses, loan loss provisions, and gains or losses on sales of securities), but in 2007, it constituted 59% of their gross income.[8] Therefore, the exclusion of implicitly priced services would result in a substantial overstatement of banks' output growth.

Taking this logic one step further, depositors could dispense with banking services entirely and keep their money in securities, thus paying the reference rate of interest. Depositors who forgo the opportunity to earn the reference rate in order to obtain banking services choose to pay an implicit price for depositor services equal to the margin between the reference rate and the deposit rate.

The reference rate represents an opportunity cost in the banks' investment decisions. If a highly liquid security with no credit risk is available to banks, the banks forgo the opportunity to earn this security's rate of return – assumed to be the reference rate – when they invest in loans instead. The spread between this reference rate of return and the lending rate is the implicit price that the bank receives for providing financial services to borrowers, which includes the cost of bearing risk. The spread must equal the marginal cost of providing borrower services if the bank is indifferent at the margin between investing in the reference rate asset and investing in higher-yielding loans. In a marketplace where competition keeps loans from being priced at levels that yield economic profits (profits in excess of a normal return on capital), we can expect an equilibrium where banks are indifferent between investment opportunities at the margin.

Borrowers from banks are willing to pay a margin over the reference rate because they require or want lender services that issuers of credit market instruments bearing the reference rate of interest do not receive. For many, borrowing in capital markets is very costly or impossible because of the problems of asymmetric information noted above, and liquidating financial assets as an alternative to borrowing is also impossible. However, for marginal loan customers, liquidating assets that earn the reference rate or borrowing at approximately the reference rate in capital markets are alternative ways of obtaining needed funds. In particular, both household and business borrowers often choose to hold financial assets when they could liquidate those assets and reduce their loan balances. For the marginal users of the borrowed funds, the difference between the loan rate and the reference rate represents the net marginal cost borne by borrowers for liquidity management, inducing the bank to accept their risk and any other services provided by the lender. This difference can therefore be viewed as an implicit price paid for credit services.

Finally, if the bank's net return on investments funded by deposits equals the reference rate, then the implicit price that the bank receives for providing services to depositors equals the spread between the reference rate and the rate paid on deposits. This spread equals the

[8] The percentages are calculated using data from the Federal Deposit Insurance Corporation (FDIC) at www2.fdic.gov/hsob/. The growth of fee income partly reflects banks' entry into new kinds of activities, but the trend predates the repeal in 1999 of the Glass-Steagall Act's restrictions on bank activities.

marginal cost of providing services to depositors if the bank is indifferent to marginal changes in amounts on deposit. In the short term, regulatory constraints on a bank's growth based on the amount of its equity capital could prevent it from accepting deposits until it reaches the point of indifference; however, in a long-term competitive equilibrium for the industry, deposit rates will just permit banks to cover their costs. In addition, large banks that are perceived as very safe are able to borrow at approximately the reference rate in securities markets, thereby avoiding the costs of providing services to depositors. If these banks are indifferent at the margin between raising funds from depositors and raising funds in securities markets, the spread between the reference rate and the rate paid on deposits must approximately equal the marginal cost of providing services to depositors.

Next steps

The current financial crisis has raised a number of challenges for national accounts beyond the estimation of commercial bank services. The massive changes in the structure of the US and international financial sector have required regular monitoring and updating of the source data to ensure that newly emerging gaps and double-counting are detected, as institutions change their reporting status from reports to the SEC and the Treasury as investment banks to reports to the FDIC as commercial banks. Adjustments to remove capital losses from financial profit data have also been a considerable challenge. The crisis has also revealed significant gaps in our domestic and international financial data relating to detailed accounting by type of instrument, maturity and ownership. Finally, statistical agencies need to work with regulators and industry on valuation issues, ranging from derivative instruments to the real value of bank output.

The measurement of financial services in the national accounts and the financial crisis

Michael Davies[1]

Introduction

The current financial crisis has placed a strain on the ability of National Statistics Offices (NSOs) to measure developments in both the real and financial domains. Big shifts in flows, assets and liabilities as well as sharp changes in real activity and prices have strained the ability of established statistical sources and methods to provide a coherent representation of developments. Nowhere is this more evident than at one point of intersection of the real and financial domains: the measurement of financial services.

Financial services provided by financial intermediaries are paid for by both direct and indirect charges. Direct charges are those that are directly charged and include account keeping fees, credit card fees, brokerage on share trading, financial advice fees and asset management costs. Indirect charges are called Financial Intermediation Services Indirectly Measured (FISIM).

This paper is written in the context of difficulties in the measurement of financial services in Australia during the current financial crisis and reports of similar problems being experienced in other countries, especially with FISIM.

The definition and derivation of FISIM have evolved as the System of National Accounts (SNA) has moved through its versions. Attachment 1 summarises the culmination of this evolution as reflected in SNA 2008.

FISIM misbehavin'

During the recent turmoil in financial markets worldwide, the established methods for calculating financial services have produced results which are hard to interpret. In Australia, several sources and methods have produced such results, but the problematic estimates which have had the biggest impact have been those produced for FISIM.

The basic concept of FISIM is consistent with SNA principles. It was subjected to significant scrutiny during the recent update of the SNA and there is general agreement that it is sound. The minor refinements reflected in SNA 2008 have been accepted as improvements.

In the discussion leading up to SNA 2008, the method of calculating FISIM using a service and risk-free reference rate was generally accepted.

Nevertheless, the methods based on the SNA produce results that are not considered plausible by users of the data. In Australia, the established methods produced extremely high growth in the output of financial services which was not supported by industry intelligence or financial intermediary activity and profits. In Europe, the ECB has reported "distortions of the

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FISIM computation" and "implausible results". "Implausibility" is subjective and this is discussed later in the paper. For the moment, let us accept that current methods produce results which are difficult to interpret in an SNA context.

Several aspects of established methodologies have contributed to this. They are discussed below.

Reference rate

Experimental work within the Australian Bureau of Statistics (ABS) has established that the level of current price FISIM can be quite sensitive to the choice of the reference rate.

In the determination of the level of FISIM, in the simplest case where loans equal deposits, the level of FISIM is determined by the difference between the yields on the deposits and loans. The reference rate simply determines the allocation of FISIM between depositors and borrowers. However, the definition of FISIM does not require equality between deposits and loans. This means that the choice of reference rate, whether exogenous (for example an interbank rate) or calculated as the midpoint between two rates, can have a significant effect on the level of FISIM.

In Australia, a midpoint reference rate is used for practical reasons. It has the advantage of helping both to stabilise the allocation of output to user sectors and to reduce the likelihood of negative FISIM since the exogenous rates (interbank or treasury rates) can move more than the rates on deposits and loans. However, there are disadvantages. For example, when the securitisation of home loans increased significantly, the application of a reference rate calculated as the midpoint between the rates for deposits and loans to loans financed by securities issued by securitisers produced results which were difficult to interpret. As a result, the ABS introduced yields on securities issued by securitisers into the calculation of the reference rate.

Experimental work by the ABS applying a variety of methods to a common dataset gives the following initial indications:

- in many cases, using a midpoint reference rate gives less volatile results than using an exogenous reference rate
- when using a midpoint reference rate, a close match between the assets and liabilities used to calculate the reference rate and the assets and liabilities on which FISIM is calculated gives better results
- the closer assets and liabilities are to equality, the better the results.

Price and volume

The second significant contributor to the production of implausible FISIM results is the difficulty in splitting current price levels into price and volume components.

In theory, price and volume measurements should be calculated for the bundle of services made up of FISIM and services paid for directly. However, for the sake of simplicity, the following assumes that FISIM is a separately identifiable bundle of services.

The financial services paid for indirectly are like any other service produced in the economy. The fact that they are paid for indirectly does not affect the nature of the service. Like all goods and services in the SNA framework, FISIM has a volume and a price dimension.

It is difficult to split payments for services into volume and price, regardless of how they are paid for. Several approaches can be used. One is to identify a volume of services, for example a number of transactions, and use that to calculate a volume which is divided into the value of the transactions to derive an implicit price. Another is to deflate values using an appropriate price index.

A method recommended by the AEG during the update of the SNA for calculating movements in the volume of FISIM is based on the assumption that the volume of services is proportional to the balances to which they relate. A change in real balances from one period to the next is calculated by removing price change using a general price index. The change in the volume of services is assumed to be the same as the change in real balances.

The AEG recommends using a method whereby a change in the level of deposits and loans is a volume change, and a change in the difference between interest rates on deposits or loans and the reference rate is a price change.

The derivation of these volume and price changes is based on readily available data and is straightforward.

However, a variety of methods are used in different countries to calculate the volume of FISIM. Some rely on price indices to derive volumes. This can produce very different results from the method recommended by the AEG and the interpretation of the "volumes" derived is not clear.

Nature of the service

The recent developments regarding FISIM have led to a lively debate on the nature of the services which should be included in FISIM, with a focus on compensation for components related to risk.

Fundamental questions in relation to the concept of FISIM have been raised in the ECB paper "An enhanced methodology for compiling FISIM". The paper is based on the assertion that recent estimates of FISIM in the European Union are not plausible because of the volatility in current price estimates.

The current price estimates produced by the EU method are quite plausible. For example, in the case of a strong rise in current price FISIM, there are three broad possibilities:

- *The volume of services has risen strongly and the price has not changed.*

The world is going through a financial crisis. The complexity, and possibly the quantity, of the work done by financial intermediaries to continue to provide something resembling "business as usual" has risen. This can be seen as a volume increase, reflected in increased FISIM.

- *The price has risen strongly and the volume has not.*

The financial crisis has increased the cost of the provision of delivering "business as usual" services and the price of these services has risen significantly, reflected in increasing FISIM.

- *Both price and volume have risen.*

This is a combination of the two situations described above.

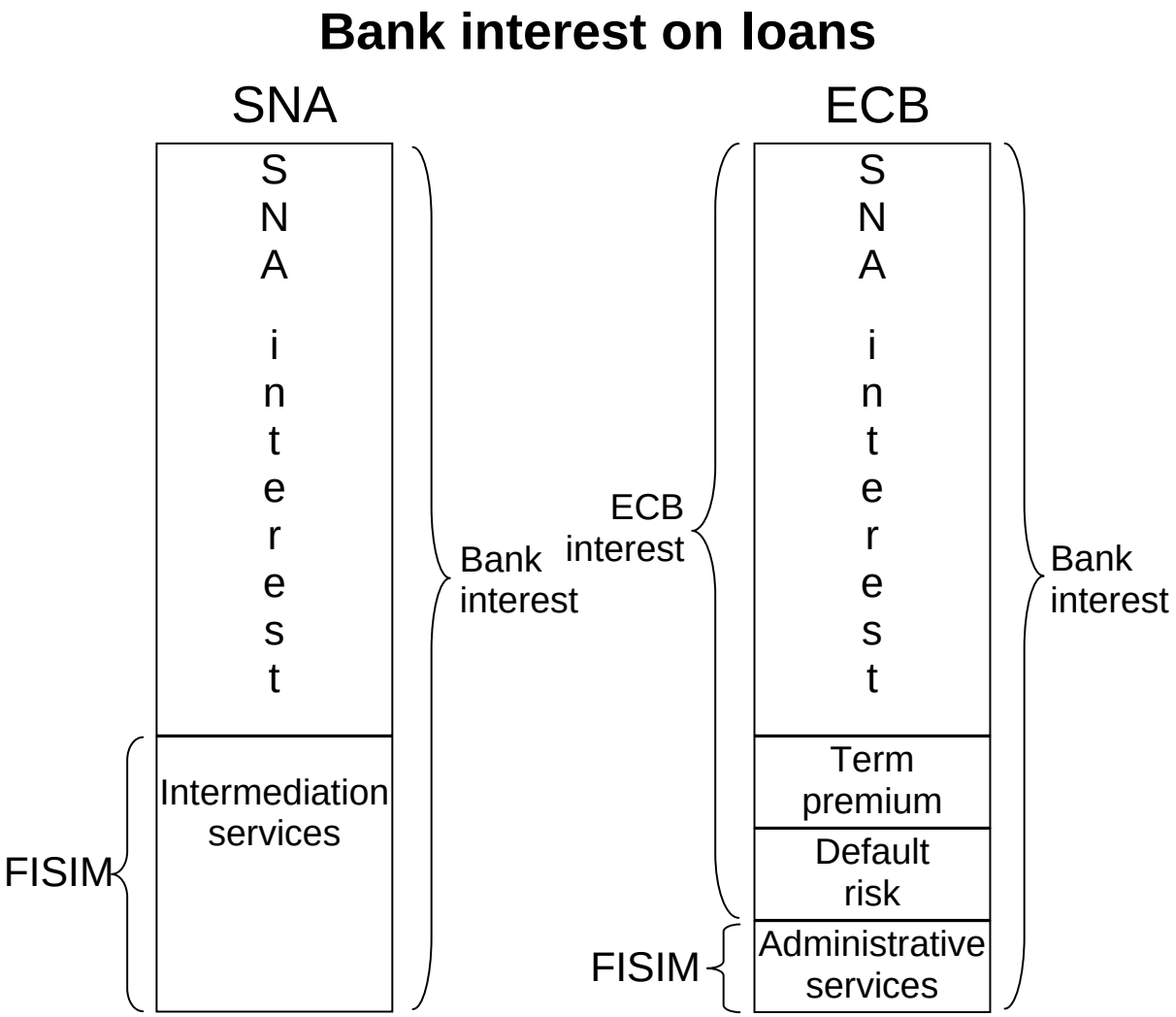
An analysis of the recent behaviour of FISIM in price and volume terms is necessary to support the contention that the estimates are implausible. The assumption made in the paper that current price output is a function of changes in input and technology is not tenable. Inputs, technology and volumes of output can stay the same while current price output varies with price. Significant price volatility while volumes stay steady during a period of financial turmoil is plausible.

Nevertheless, the paper raises interesting fundamental questions in relation to the concept of FISIM. It presents an analysis which is based on the breakdown of bank interest into several components, rather than just two, as in SNA 2008.

In SNA 2008, interest payments made to, and received from, financial intermediaries are described as bank interest. Bank interest is made up of only two components, SNA interest and FISIM. There is no further breakdown of interest in the SNA. Although SNA 2008 describes the service as intermediation, from the point of view of the users, who deposit money in and borrow money from financial intermediaries, it is not possible to distinguish between the range of services they receive, which include financial intermediation, the safekeeping of funds, the issuance of cheque books etc, and risk management. Users are paying for a complex mix of services and the value of the services is the amount they are willing to part with to obtain those services. The total value of the services is direct charges plus FISIM. There has been a lot of discussion on the nature of the services over the years, and most have included risk management as a component of the services.

A comparison between the SNA 2008 concept and my understanding of the ECB concept is presented in Diagram 1, using loans to illustrate the breakdown.

Diagram 1



The paper suggests that the term premium and default risk are components of interest faced by lenders and borrowers other than those who lend to and borrow from financial intermediaries and are therefore part of the interest component rather than part of the services provided by financial intermediaries, labelled “Administrative services” in the diagram. This accords with an idea which underpinned the development of SNA 2008 FISIM, namely that there are no FISIM on securities on which financial intermediaries cannot set rates.

This is redefining not only FISIM, but interest. The SNA 2008 definition of interest is:

> “Interest is a form of property income that is receivable by the owners of certain kinds of financial assets, namely: deposits, debt securities, loans and (possibly) other accounts receivable for putting the financial asset at the disposal of another institutional unit.” (SNA 2008, para 7.105)

The key point is that SNA interest is compensation for putting the financial asset at the disposal of another institutional unit. This definition fits well with the SNA 2008 breakdown of bank interest into SNA interest and a broadly defined set of services charged for indirectly. If we accept the ECB proposal, we need to redefine interest to include payment for default risk and the term premium. It could be argued that payment for default risk and the term premium are included in the broad definition “compensation for putting the financial asset at the disposal of another institutional unit”, but that does not appear to be the intention of the SNA 2008 definition.

The ECB proposal is an interesting one and identifies the nature of FISIM as an issue on which a variety of views are held. However, the proposal to redefine interest needs to be progressed in a broader discussion of the nature of interest and of income, rather than as a means of addressing perceived problems with FISIM.

Further exploration of this issue would be useful. Many of the issues which relate to the choice of reference rate or scope of the assets and liabilities on which FISIM should be calculated would be clarified by the outcome.

One issue to be considered is that if loans were marked to market and those values were used in deriving FISIM estimates, then the FISIM issues may be resolved, since an increase in credit risk would see a fall in the value of loans and in the value of FISIM, all else being equal. This needs to be incorporated into the unfinished debate on the valuation of assets and the recording of interest flows on a creditor basis.

Other problems with the measurement of financial services

This paper has focused on the definition and calculation of FISIM. However, the financial crisis has thrown up quite a few other challenges in the calculation of financial services.

The ABS has faced problems similar to those experienced in calculating FISIM with the calculation of the insurance service charge. This calculation is further complicated by the need to track equity in technical reserves and income flows from those reserves while asset values fluctuate. Clarification of the concept of income and the valuation of assets would also help in this case.

One problem of particular interest is related to the FISIM debate. There are several companies in Australia that manage large trusts set up to own infrastructure such as toll roads. The trusts pay the companies fees, which are recorded in the national accounts as fees for financial services. During the crisis, many of these fees have dropped substantially, presumably related to the drop in the value of the underlying assets (for example, if the project is highly leveraged). The fees are deflated using a price index, producing a big drop in the volume in this component of financial services. The question which arises is whether

changes in the current price level of fees represent a volume change, a price change, or both. An argument could be made that, if the fee relates to the underlying asset, for example a toll road, which is continuing to operate at the same level, the volume of service it relates to has not changed and, therefore, any change is a price change. This causes problems as fees drop and rise and is a worthwhile topic for discussion.

Similar problems to those described above have been experienced with fund management fees based on asset values.

Conclusion

The concept of FISIM has evolved during the development of the SNA and is sound. Implementation of FISIM has varied across countries, and some of the differences in practices reflect different understandings of the nature of FISIM. The different implementations have reacted differently to the recent financial crisis; this has provided insights into the nature of FISIM and has led to the current debate, which is as much an attempt to define interest as it is to define FISIM. Not surprisingly, the discussions lead back to the two major issues left unresolved in the update of the SNA: the definition of income and the valuation and recording of financial assets and interest flows.

A way forward is to:

- Investigate the nature of interest, including the proposition that interest is composed of identifiable separate components such as risk and term premium which need to be treated differently in national accounts. This needs to be done as part of a broader review of the concept of income.
- Analyse the combined impact of the choice of reference rate and the scope of the assets and liabilities which enter into the calculation of FISIM on the level of FISIM, taking into account the nature of FISIM and how that is reflected in these choices. This analysis must be done in terms of price and volume.
- Investigate the impact of using historical values, rather than current, marked to market values, for assets and liabilities (and hence yields) in the calculation of FISIM. This needs to be done in the context of a broader investigation of the recording of asset values and interest flows.
- Extend the investigation of the nature of financial services to other observed payments for financial services in order to identify the price and volume components.

Attachment 1:
SNA 2008 FISIM

The definition and derivation of FISIM have evolved as the SNA has moved through its versions. The following summarises the culmination of this evolution as reflected in SNA 2008.

Each party to a deposit/loan position with a financial intermediary pays a fee to the bank for the service provided, the unit lending funds by accepting a rate of interest lower than that paid by the borrower, the difference being the combined fees indirectly charged by the bank to the depositor and to the borrower. From this basic idea, the concept emerges of a "reference" rate of interest. The difference between the rate paid to financial intermediaries by borrowers and the reference rate plus the difference between the reference rate and the rate actually paid to depositors represent charges for Financial Intermediation Services Indirectly Measured (FISIM).

An indirect service charge is to be imputed in respect of all loans and deposits offered by a financial institution irrespective of the source of the funds. The reference rate applies to both interest paid on loans and to interest paid on deposits, so that the amounts of interest recorded in the SNA (SNA interest) are calculated as the reference rate times the level of loan or deposit in question. The difference between these amounts and the amounts actually paid to the financial institution are recorded as service charges paid by the borrower or depositor to the financial institution. For clarity, the amounts based on the reference rate recorded in the SNA as interest are described as "SNA interest" and the total amounts actually paid to or by the financial institution are described as "bank interest". The implicit service charge is thus the sum of the bank interest on loans less the SNA interest on the same loans plus the SNA interest on deposits less the bank interest on the same deposits. The service charge is payable by or to the unit in receipt of the loan or owning the deposit, as appropriate.

By convention within the SNA, these indirect charges in respect of interest apply only to loans and deposits and only when those loans and deposits are provided by, or deposited with, financial institutions.

SNA 2008 defines a single reference rate to be used in the calculation of SNA interest. This is a rate between bank interest rates on deposits and loans. However, because there is no necessary equality between the level of loans and deposits, it cannot be calculated as a simple average of the rates on loans or deposits. The reference rate should contain no service element and reflect the risk and maturity structure of deposits and loans. The rate prevailing for interbank borrowing and lending may be a suitable choice as a reference rate.

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On a risk-adjusted FISIM

Wolfgang Eichmann[1]

At present in Europe, the value of FISIM is defined as the absolute difference between stocks valued at actual interest rates and stocks valued at the reference rate. The question is whether this is the correct way of measuring the value of services provided by banks.

The origin of the question is rooted in the System of National Accounts (SNA) 1993. Paragraph 6.128 of SNA 93 lists the components of an actual interest rate in general terms:

– pure cost of borrowing (= reference rate)

– risk premium

– intermediation service.

According to SNA 93, a suitable choice for the reference rate is an interbank lending rate (as in the European Union) or, alternatively, a central bank lending rate.

However, if in the European practice we measure the "service charge" as the difference between the actual interest rate and the reference rate, we do not measure "intermediation services" but "intermediation services plus risk premium". In order to calculate "intermediation services" correctly, the risk premium has to be excluded. The proper formula should therefore be:

(actual interest rate – risk premium) – reference rate = intermediation service

This means that intermediation services are properly measured by the difference between the risk-adjusted actual rates and the reference rate.

In addition, only this new formula is in line with the definition of production contained in paragraph 1.20 of SNA 93. Risk assumption does not require the "use of labour and assets" whereas "intermediation services" do. Consequently, actual interest rates must be risk-adjusted.

In the case of loan interest rates of banks, it is obvious that the interest rate for a risky loan is higher than for a more secure loan.

However, in the case of deposits, the situation is more complex. At least two kinds of deposits should be distinguished: transferable deposits ("money") and non-transferable deposits ("financial capital"). This is necessary because the services provided are different in both cases. Services provided in connection with "money" include, in principle, the transfer of these deposits in order to handle payment transactions, whereas financial capital cannot be used for that purpose.

The difference between the reference rate and the rate for transferable deposits (which may be zero) has the character of a pure "service" remuneration. As this point seems to be clear, I will not be discussing transferable deposits further in this paper.

The difference between the reference rate and the actual rate of financial capital is lower (due to non-zero positive interest rates), and is even negative when the financial capital

[1] Federal Statistical Office, Germany. The views expressed herein are the personal views of the author and are not intended to reflect the views of the Federal Statistical Office, Germany. This paper will be presented at the ISI 2009 by Peter van de Ven, Statistics Netherlands.

interest rate is higher than the reference rate. This causes “negative FISIM” in the present interpretation.

Again, we have to look at the risk component. The main point in the deposit case is that the risk is not borne by the bank as in the case of loans, but by the depositor. In a more formal notation this means:

On the loan side:

Actual rate – reference rate = service + risk assumption by the bank

On the deposit side (in absolute values):

|Reference rate – actual rate| = |risk assumption by the depositor – service |

Whereas in the case of loans the difference between the actual interest rate and the reference rate can be defined as the *sum* of remuneration for a service and the remuneration for risk assumption, in the case of financial capital, ie on the deposit side, the difference between the actual interest rate and the reference rate is the *balance* of the remuneration for risk assumption by the depositor and the service provided by the bank.

In order to isolate the service component in both cases, theoretically, two possibilities exist. The first possibility is to adjust each actual interest rate by excluding the risk component. The main elements of the risk component are: address risk; currency risk; and maturity risk (ie inflation). This is the method employed by the ECB, which uses different reference rates. The second possibility is to identify a standard service component on the loan and deposit sides. This paper focuses on the second possibility.

A good measurement for the standard service component on the loan side would be the difference between a reference rate (eg short-term Euribor) and the risk-free actual rate of a short-term euro-denominated bank loan to a government (in the EMU). All other empirical differences between actual interest rates and the reference rate can then be attributed to risk assumption: address risk; currency risk; or maturity risk. If there is a case where the actual interest rate for a loan is lower than this risk-free rate, this results in interest subsidies, which should be recorded accordingly.

On the deposit side, the ideal measurement would be the difference between short-term Euribor and the lowest short-term actual deposit rate for financial capital. In this case, as mentioned above, the actual interest rate is defined as the balance of the service of the bank and the risk assumption of the depositor. If the actual rate for deposits is higher than the reference rate (“negative FISIM”, in the current interpretation), it merely means that the remuneration for (maturity or currency) risk borne by the depositor is higher than the standard service component, ie the value of the service provided by the bank.

The consequences for the FISIM compilation are as follows:

In the case of loans, the actual interest rates should be reduced by the standard service component, and in the case of deposits (financial capital), the standard service component should be added to the actual interest rates. Negative FISIM cannot occur on the deposit or on the loan side, because the Euribor is the “natural” upper or lower limit for the corresponding risk-free non-bank interest rates.

For cross-border interbank FISIM, the new approach would mean that all risk-adjusted interbank rates (internal and external) are identical, thereby equalling the reference rate by definition. In this case, FISIM is also zero by definition.

Seen from another point of view, the difference between the present and the proposed new procedure lies in the treatment of the risk component: until now, we have been recording intermediation services plus risk assumption in the production account, whereas the pure cost of borrowing (the reference rate) has been recorded in the income account. In the new proposal, we would record only intermediation services in the production account and the pure cost of borrowing plus risk assumption in the income account. This is exactly in line with

the SNA paradigm, that providing services is productive, whereas pure risk assumption is not.

Both the ECB and the DESTATIS proposals intend to exclude the risk component from the calculation of FISIM. From a theoretical point of view, the ECB version is more sophisticated than the DESTATIS one. However, from a practical point of view, the DESTATIS version is easier to implement – even easier than the existing rule. A possible compromise might be to recommend the ECB version as “A” category and the DESTATIS version as “B” category. Further investigations should focus on whether both calculations produce considerably different results. If this is not the case, a choice between both methods should be possible.

Practical considerations and examples

A practical approach should also take account of data availability. In this respect, it might be reasonable, consequently, to use the ECB interest rate statistics as a basis for the calculations of standard service components, because they are available in all EMU countries. Examples of how such calculations can be carried out are given below in Annexes 1 and 2.

The model is simplified insofar as it refers to “new business” only. This avoids the “vintage problem”, especially for long-term loans and deposits where the standard service component can be calculated using interest rates for outstanding amounts and a corresponding moving average rate for the reference rate.

Annex 1:
Standard service component prices for FISIM – "new business" November 2006

Loans

Item	Approximately risk-free interest rate	Reference rate	Difference = standard price for FISIM on loans
All loans	Loans to non-financial corporations over EUR 1 million floating rate or fixed up to 1 year 4.31%	6-month Euribor 3.79%	 0.52%

Annex 2

Deposits

Item	Approximately risk-free interest rate	Reference rate	Difference = standard price for FISIM on deposits
Transferable deposits S14	Overnight deposits from households 0.91%	EONIA 3.33%	2.42 %
Transferable deposits all other	Overnight deposits from non-financial corporations 1.49%	EONIA 3.33%	1.84%
Non-transferable deposits S14	Deposits from households with agreed maturity up to 1 year 3.10%	6-month Euribor 3.79%	0.69%
Non-transferable deposits all other	Deposits from non-financial corporations with agreed maturity up to 1 year 3.25%	6-month Euribor 3.79%	0.54%

Discussant comments on session STCPM28: Measuring bank services – further developments

Adelheid Bürgi-Schmelz[1, 2]

The discussant, Adelheid Bürgi-Schmelz, reviewed "two camps" divided by a "single reference rate" and "multiple rates", and concentrated on the issues of risk services *and* basic borrower and depositor services as the components to be measured and analysed. A number of questions were raised in an attempt to determine whether one should remove risk premia from Financial Intermediation Services Indirectly Measured (FISIM) on loans, particularly if such premia were covering risk management activities. Alternatively, the treatment of non-life insurance could offer a process for valuing risk within FISIM.

The questions were:

- Does FISIM have to cover purchased or produced insurance against the *risk of default* on loans? Is the "default premium" related to this insurance cost?
- Does FISIM cover purchased or produced insurance against *term risk* (borrowing short and lending long)? Is the "term premium" related to this insurance cost?
- How would multiple reference rates in FISIM coincide in the definition of "SNA interest"?
- In considering financial product servicing, risk and liquidity management, should the focus be on distinguishing between price and volume effects rather than on deciding to eliminate part of a nominal service transaction value, ie redefining the scope of financial services?

The discussant was not in favour of reopening the 2008 System of National Accounts (SNA) now, but was in favour of a broader review and discussion of risk and the composition of the different aspects of FISIM. The treatment of non-life insurance could offer a way forward for valuing risk within FISIM.

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[2] Contributor: Kim Zieschang, Division Chief, Statistics Department, International Monetary Fund.

Special Topics Contributed Paper Meeting 52

Lessons learnt for statistics from the current financial crisis

Chair: H W Fung, Hong Kong SAR

Papers:

The European Statistical System's reaction to the statistical consequences of the financial crisis
Walter Radermacher and Roberto Barcellan, European Commission

Further statistical work in the light of the financial crisis both within the IMF and with other international agencies
Adelheid Bürgi-Schmelz, International Monetary Fund

Statistical needs emanating from the financial crisis and the ECB's initiatives for more comprehensive financial statistics
Steven Keuning, European Central Bank

What have we learnt from the global financial crisis?
Dennis Trewin, Dennis Trewin Statistical Consulting

Discussant: J Steven Landefeld, US Bureau of Economic Analysis

Chairman summary of session STCPM52: Lessons learnt for statistics from the current financial crisis

H W Fung[1]

The meeting was organised with the objective of shedding some light on the way forward for our statistical community in formulating strategies for strengthening the existing statistical systems in order to better meet the needs of data users. Walter Radermacher of Eurostat spoke of the reaction of the European statistical system to the statistical consequences of the financial crisis. Adelheid Bürgi-Schmelz of the IMF presented a paper on further statistical work in light of the financial crisis both within the IMF and with other international agencies. Steven Keuning of the ECB discussed the statistical needs emanating from the financial crisis and the initiatives of the ECB towards more comprehensive financial statistics. Dennis Trewin, in his capacity as a Trustee of a major superannuation fund in Australia, spoke of making greater use of statistics outside the purview of official statistics in detecting financial crises and the more effective role which statistics and statisticians might play in fund management. The discussant, Steve Landefeld of the BEA, commented on the papers of the four speakers.

In summary, three important messages have emerged from the papers pointing to three broad directions of development to meet emerging data needs. First, the speakers noted that there was a need to improve the timeliness and frequency of some existing official statistics. At the same time, they cautioned that the trade-off between timeliness and quality should be carefully assessed and balanced. It is the common wish of statistical agencies to find innovative approaches for the timely production of statistics with acceptable reliability and comprehensiveness.

Second, the speakers discussed the need for statistical agencies to consider the relevance and possibility of developing and compiling new statistics or providing data at more detailed levels to complement the existing economic and financial statistics. Upon identification of such statistics, coordination will be necessary at both the national and international levels to develop the new indicators.

The third direction is to go beyond the conventional official statistical boundaries and draw on available data from non-official agencies to devise useful indicators for monitoring economic and financial development. If such indicators are identified, the role of the official statistical agencies in ensuring their integrity, methodological soundness, accuracy and reliability will have to be defined. The role of international agencies in coordinating international efforts and promoting the comparability of indicators across economies will also be important. Enhanced communication of official statistics and other relevant information to data users is considered essential for all three directions of development.

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[1] Hong Kong SAR.

The European Statistical System's reaction to the statistical consequences of the financial crisis

Walter Radermacher and Roberto Barcellan[1]

1. Introduction

The ongoing financial crisis has generated a number of challenges for official statisticians. Financial, economic and political actors turned to statistics to describe the situation and to detect, assess and forecast these phenomena. Official statisticians have therefore been confronted by an increased number of requests for relevant statistical data in a timely and reliable fashion. The reaction of statistical authorities has been under scrutiny, as well as their capacity to face these challenges.

Unfortunately, the reaction capacity of traditional statistical production processes is very often limited by their rigidity and resource constraints. Moreover, the worldwide nature of the crisis has underlined the global dimension of economic and financial phenomena, the integration of financial markets and the speed of circulation of the information. All these aspects call for a global statistical vision. In addition, a rethinking of the conceptual macroeconomic paradigm underlining the framework for producing macroeconomic statistics could be initiated by the crisis. Hence, the main statistical consequence of the crisis is the recognition of the limits of the traditional approaches to statistical production and the importance of going beyond them.

The European Statistical System (ESS) has acknowledged these challenges and has started to speed up the changes already under way and rethink the production of official statistics through the modernisation of its business architecture.

2. The European Statistical System's reaction to the financial crisis

The exceptional evolution of the financial markets and its consequences on the real economy required the ESS to deliver an urgent and coherent reaction. The crisis has several statistical dimensions: statistical consequences on key selected statistical domains with special relevance at the European level (eg public finance); prompt availability of key short-term economic indicators for monitoring the impact of the crisis and the impact of the measures to counteract it; deepening of methodological issues; international coordination; and communication at different levels. The ESS's reaction to the crisis therefore had to be multifaceted to deal with all these different aspects. The overall framework for action has been fixed around three axes:

- the ESS Action Plan on the accounting consequences of the financial crisis
- the regular production of key short-term economic indicators
- a critical analysis of methodological and practical aspects related to statistical production.

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ESS Action Plan

The challenge: A key aspect of the ESS's reaction has been to ensure the appropriate and proper consideration of the statistical consequences of the financial crisis on key statistics used in the European Union for administrative purposes and for the assessment of public finance. In this domain, based on national accounts public finance statistics, it was important to ensure the consistency across time and countries of the statistical treatment of bank and other market support operations in full respect of the European System of National and Regional Accounts (ESA 95) rules.

The ESS's reaction: The ESS Action Plan on the accounting consequences of the financial crisis has been created and implemented to achieve this target and to support it by strengthening coordination among European statistical authorities and enhancing communication to users' and stakeholders.

The activation of the ESS Action Plan has proved to be successful in: streamlining the reaction of the ESS to the financial crisis, creating awareness of the statistical consequences, strengthening coordination and communication and, finally, supporting the ESS actions to handle the response to the crisis.

Lessons learnt: Some elements of the ESS Action Plan have proven to be more relevant than others, as events have unfolded. In particular, during the ongoing financial crisis, a broad range of major public sector initiatives aimed at stabilising financial markets and rescuing individual financial institutions have been implemented. While, to date, there are some common aspects to the initiatives, each national case has unique features which require careful analysis by statistical authorities. The diversity and complexity of national schemes grows each week as new difficulties are identified and addressed. Further specific technical investigations are then required to ensure the consistency of the statistical treatment of existing and possible new cases. Therefore a "case law" record, built on specific cases analysed on a case by case approach, has gradually taken precedence over the initial approach to fix general broad principles. Nevertheless, the exchange of views between statistical experts has lead to accumulated knowledge and corporate opinions that are relevant for the case-oriented approach. Further, the existing statistical instruments in this field (procedures of the Excessive Deficit Procedure associated to the EMU Stability and Growth Pact) have proven to be robust and have provided the necessary background to deal with the majority of cases brought about by the financial crisis.

Principal European Economic Indicators (PEEIs)

The challenge: One of the key aspects of the financial and economic crisis is to monitor the evolution of the situation through appropriate (existing) indicators and to monitor the impact of the measures undertaken to counteract the effects of the crisis itself.

The ESS's reaction: To meet these requirements, the ESS offers, through the PEEIs, a continuously updated overview of the effects of the crisis in EU member states and at the European level, notably from the macroeconomic point of view.

The PEEIs are key short-term macroeconomic indicators available in a harmonised way for EU member states, the euro area and the European Union (and, when available, major economic partners), disseminated via the PEEIs' website (a modern approach to the dissemination of statistical indicators). The PEEIs project is an example of a cooperative and forward-looking approach to statistics.

Since its inception in 2003, its aim has been to establish a dialogue between users and producers to identify the best set of indicators needed for economic and monetary policy purposes at the European level, complemented by quality requirements (notably timeliness) and a methodological background. Short-, medium- and long-term objectives supported by

continuous monitoring and concrete implementation plans formed the framework for the PEEIs.

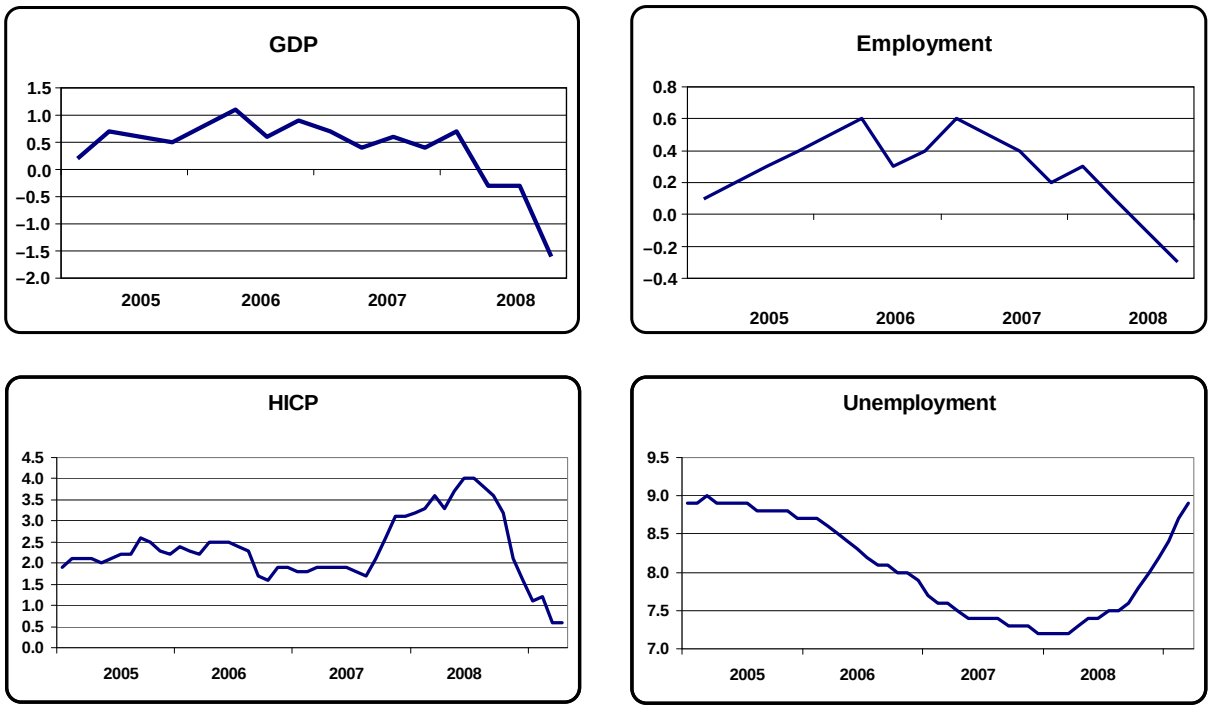
The PEEIs have successfully evolved over time and have, to a large extent, anticipated several requirements that became relevant during the crisis. Improvements in the timeliness and quality of the traditional macroeconomic indicators have been complemented by the development in recent years of housing statistics and integrated quarterly financial and non-financial accounts for institutional sectors (two key sets of indicators in the financial crisis context).

Because of their flexibility and efficiency in tracing economic movements, the PEEIs have been highlighted as one point of reference for the development of the Principal Global Indicators, the coordinated initiative of the Inter-Agency Group on Economic and Financial Statistics (BIS, ECB, Eurostat, IMF, OECD and the World Bank).

Lessons learnt: The PEEIs offer a relatively complete macroeconomic short-term view of the economy in an adequate timely fashion. Nevertheless, the financial crisis has highlighted some limits in this set of indicators, namely: the coherence of the global message emanating from different indicators; a rebalancing between timeliness, reliability and accuracy; and the lack of an adequate coverage of financial and housing indicators. The initiatives undertaken by the ESS are heading in the right direction (eg housing statistics) but have to be enhanced by the development of integrated financial indicators and by strengthening the coherence efforts between key indicators.

Figure 1

Selected PEEIs: Gross Domestic Product (quarterly), Employment (quarterly), Harmonised Index of Consumer Prices (monthly), Unemployment (monthly) – euro area: percentage change on previous period, seasonally adjusted



Communication

The challenge: The crisis called for an enhancement of communication between statistical authorities, policymakers and European institutions. At the same time, statistics were under the scrutiny of users.

The ESS's reaction: Communication has been paramount in the ESS's reaction to the financial crisis. Initially, efforts were concentrated on the implementation of the necessary actions to inform EU member states and international organisations about the ESS Action Plan in view of its full endorsement and implementation. Communication of the ESS Action Plan has been supported by a communication strategy set up and implemented by Eurostat. The strategy focused on different categories of users, information targets and dissemination tools, including a section dedicated to the financial turmoil on the Eurostat website. Finally, Eurostat actively participated and promoted international activities in relation to the statistical consequences of the financial crisis in strict cooperation with other international institutions, such as the Inter-Agency Group on Economic and Financial Statistics.

3. A modern business structure for the production of official statistics

The challenge: The financial turmoil has highlighted the need to transform the production system of official statistics into a modern and efficient tool, flexible enough to cope with increasing new requirements, time constraints, limited resources, communication aspects, the expected forthcoming new regulatory framework for financial markets and new rules for company accounting.

The ESS's reaction: The ESS has acknowledged these challenges and has started to speed up the changes already under way and rethink the production of official statistics through the modernisation of its business architecture.

Such a project establishes a vision for the next decade on the statistical production method in the European Union that goes beyond the current approach (a so-called "augmented stovepipe" model), which is no longer fully adapted to the changing environment – as demonstrated by the crisis – and emphasises the improvement of efficiency through a systematic collaboration between the different partners of the statistical system (new European systems method to statistics).

The vision of a modernised statistical production system is based on a holistic approach, rather than a fragmented one, and will imply replacing the current stovepipe model with a model which relies on the integration of datasets and the combination of data from different sources. At the country level, statistics for specific domains will no longer be produced independently from each other; instead they will be produced as integrated parts of comprehensive production systems (the so-called data warehouse approach) for clusters of statistics. These systems would be based on a common (technical) infrastructure, applying, as far as possible, standardised IT tools and making use of all available data sources of an appropriate quality. The direct implication of this approach would be that European statistics would no longer be produced domain per domain but would instead be produced together in an integrated fashion (horizontal integration). In addition, synergies would be developed within the ESS, and joint structures, tools and processes could be established or further developed through collaborative networks, involving both the national statistical authorities and Eurostat (vertical integration).

Several elements of the proposed integrated model imply a change in the professional paradigm of statistical offices from "data collectors" to "re-users of data". The implementation of the European statistical systems method relies on three components:

i. the first component remains Community legislation, which will continue to be mainly output-oriented and minimum standards for the production of statistics in a particular area should be set

ii. the second component concerns complementing product harmonisation by process harmonisation through the promotion of methodologies based on common tools

iii. the third component is the promotion of common values and the sharing of knowledge throughout the ESS (use of the intelligence and know-how available in the system – ie the human capital of the ESS).

This strategic direction will be complemented by improved communication both with users and stakeholders.

References

European Council and Commission (2003): *Joint report on eurozone statistics and indicators*.

European Council Economic and Financial Committee (2008): *Status report on information requirements in EMU*.

Further statistical work in the light of the financial crisis both within the IMF and with other international agencies[1]

Adelheid Bürgi-Schmelz[2, 3]

The integration of economies, as evidenced by the economic and financial crisis spreading through markets worldwide, has highlighted the critical importance of relevant statistics that are timely and consistent, both within, as well as comparable across, countries. The establishment over the past several years of a consistent economic statistics system covering traditional datasets (national accounts, balance of payments, fiscal and monetary statistics) and the data transparency initiatives, such as the IMF's Special Data Dissemination Standard (SDDS), have considerably advanced this agenda. Indeed, such datasets have provided warnings regarding, for instance, the surge in the ratio of gross cross-border assets and liabilities to GDP for industrial countries, as well as more broadly in global external imbalances.

Still, recent events have revealed further data needs. In response to the global nature of these data needs, in late 2008 the Statistics Department of the International Monetary Fund created, and chairs, the Inter-Agency Group on Economic and Financial Statistics (Inter-Agency Group) involving the BIS, the ECB, Eurostat, the OECD, the UN, and the World Bank. The work of the Inter-Agency Group is currently being informed by users, initially from within the agencies, but the involvement of a wider range of users is envisaged in the near term.

Three major outcomes have already emerged from these discussions: the launching of an inter-agency website on 21 April 2009, the identification of specific areas of data needs and, in March 2009, the endorsement of the new Inter-Agency Group by the Working Group 2 of the G20 economies. In addition, the G20 Working Group 2 recommended that the IMF and the Financial Stability Board (FSB) explore gaps and provide appropriate proposals for strengthening data collection before the next meeting of G20 Finance Ministers and Central Bank Governors. This work was endorsed by the IMF's International Monetary and Financial Committee (IMFC) at its April 2009 meeting.

The Principal Global Indicators website

Facing similar pressures from users, the Inter-Agency Group has recognised the importance of going beyond traditional statistical production processes, in more innovative ways, in order to obtain a set of timely and higher-frequency economic and financial indicators, at least for systemically important countries. In short, because of the global nature of the crisis, users are requesting more internationally comparable, timely and frequent data. Further, there is a need to improve the communication of official statistics.

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[1] The views expressed herein are those of the author and should not be attributed to the IMF, its Executive Board, or its management.

[2] Statistics Department, International Monetary Fund (e-mail: aburgischmelz@imf.org).

[3] Contributor: Robert Heath, Assistant Director, Statistics Department, International Monetary Fund.

In order to make high-frequency data available on a timely basis, the Inter-Agency Group launched the Principal Global Indicators website (PGI website) in April 2009, with an initial focus on the dissemination of data for the G20 economies. The PGI website brings together timely data available at participating international agencies covering financial, governmental, external and real sector data, with links to data from the websites of international and national agencies. The website is available at: http://financialdatalink.sharepointsite.net/.

The benefits of this inter-agency approach are that it mobilises existing resources, builds on the comparative advantages of each agency and supports data sharing in a coordinated manner. The international agencies have access to selected country datasets that they present in a manner which is broadly comparable across countries. For instance, the IMF maintains the International Financial Statistics (IFS) database, for which data are voluntarily reported by member countries. This approach is modelled to some extent on the experience of the Joint External Debt Hub, which successfully brings together external debt data from the BIS, the IMF, the OECD, and the World Bank. By focusing on the existing data of international agencies, the PGI website is a separate, but complementary, initiative to the SDDS, which focuses on the dissemination of standard datasets by individual economies.

Cooperation among the international agencies also helps to minimise additional requests for data from individual economies. However, in developing the site, it has become evident that not all data are as up to date as we would expect and, therefore, we will be encouraging the prompt supply of data under existing international arrangements where gaps exist.

Data needs

The crisis has also revealed a number of data needs, both in terms of filling gaps and addressing weaknesses. The Inter-Agency Group has identified four significant areas of focus arising from its consultations with users:

- The *financial sector* has a central role in the crisis; there is a need to enhance data availability, not least for those segments of the financial sector where the reporting of data is not well established, such as non-bank financial corporations. Those corporations have traditionally been less well covered than banks.

  Over recent years, a so-called “shadow banking system” has developed involving bank-type entities that are not subject to prudential regulation. The crisis suggests that the systemic importance of these other financial corporations may have been under-appreciated, not least with regard to their interconnectedness with banks.

- The importance of *sectoral balance sheets*, not just for the financial sector but also the non-financial corporate and household sectors (as well as government, as explained in the section below), has been highlighted by the crisis: the increased availability of the financial accounts and balance sheets would advance the analysis of the systemic risks and vulnerabilities, as well as the analysis of the interrelationship between real sector and financial sector activities. In order to advance the work on national balance sheets, better information is needed regarding the financial operations of non-financial corporations, particularly those that have significant links in national economies and across borders, so as to identify vulnerabilities, such as foreign currency exposures. Additional data for the household sector is also required. This initiative ties in with the ongoing work on the System of National Accounts implementation programmes and includes improving timeliness, frequency and country coverage.

  The external balance sheet of an economy is the international investment position (IIP). At present, quarterly reporting of these data is not widespread – just under 50 economies report quarterly IIP data to the IMF. But the crisis has focused

increased attention on vulnerabilities in the external position data, thereby complementing the more traditional focus on transactions data. Further, while financial statistics are compiled on an original maturity basis, ie the maturity at the time of issuance, the recent crisis has highlighted the importance of remaining maturity data to facilitate the liquidity analysis arising from the need to rollover or repay debt that is falling due in the short term.

- The impact of *house prices* on household net worth is highly relevant to the current crisis, but country practice in compiling these data is uneven. The availability of other *housing-related data*, such as housing finance, also varies across countries.
- There is a lack of information on *ultimate risk/credit transfer instruments*, indicating where the risks lie as well as their scale. While traditional frameworks remain relevant, the concepts of ultimate risk (including the use of off-balance sheet structures and special purpose vehicles) and credit risk transfers, including through structured products, need to be explored because the lack of information on where the risks lie and their scale is disguising the interconnections among and between economies. This issue is multi-faceted and includes developing conceptual frameworks by drawing on existing practice as far as possible.

The crisis has also highlighted data gaps and problems in the comparability of *government finance statistics*, with wide differences in coverage and definitions in national fiscal data. For example, for one country, data may cover only budgetary institutions, while for another, it may include extra-budgetary units and social security funds. The IMF's Statistics Department intends to pursue its work towards increased harmonisation in the presentation of data using the *Government Finance Statistics Manual 2001* – the internationally agreed statistical standard for compiling government finance data. While it is possible that, for national purposes, the coverage may vary among countries, depending on the way in which they undertake fiscal policy, the IMF needs comparable data that enable cross-country comparisons.

Further, the IMF Statistics Department continues to work on *financial indicators*. Regular reporting of Financial Soundness Indicators (FSI) has begun. However, in light of the crisis, the view is emerging that there is a need to reprioritise FSIs; for example, basic leverage ratios and measures of on-balance sheet liquidity mismatch proved reliable, while some risk-adjusted capital-to-assets ratios and non-performing loan ratios provided little predictive information.

G20 endorsement to move forward

The work of the Inter-Agency Group was referenced in the G20 Working Group 2 (Reinforcing International Cooperation and Promoting Integrity in Financial Markets).

> "The Working Group also recognised that for effective early warnings data collection needs to be strengthened. The IMF is already seeking to enhance its collaboration with national authorities responsible for financial stability assessments to enhance data availability, including with regard to cross-border exposures. For example, an interagency group has been established to strengthen finance statistics, chaired by the IMF and including the BIS, ECB, OECD, Eurostat, the UN, and the World Bank. The Group recommends asking the IMF and the FSB to explore gaps and provide appropriate proposals for strengthening data collection before the next meeting of G-20 Finance Ministers and Central Bank Governors."

In April 2009, the IMFC welcomed the joint work of the IMF and the FSB in addressing data gaps.

In following up these endorsements, the IMF's Statistics Department is working with the FSB and other international agencies, as well as member countries, to address the requests of the international community.

Conclusion

Recent years have seen significant progress in the availability and comparability of economic and financial data. However, the present crisis has thrown up new challenges that call for going beyond traditional statistical production approaches in order to obtain a set of timely and higher-frequency real and financial indicators, and for enhanced cooperation among international agencies in addressing data needs.

Statistical needs emanating from the financial crisis and the ECB's initiatives for more comprehensive financial statistics

Steven Keuning[1, 2]

Introduction

"There cannot be a crisis next week. My schedule is already full." (Henry Kissinger)

Producing monetary and financial statistics is a key responsibility of the ECB.[3] In this context, the ECB, together with the Statistics Committee of the European System of Central Banks (ESCB), has always made substantial efforts to keep pace with financial innovation, assessing the statistical impact of innovations at an early stage and starting necessary amendments to its statistics in a timely manner. This has allowed the ECB to accommodate ex ante a number of specific needs which have become even more apparent during the ongoing financial crisis. The integrated approach to monetary financial institution (MFI) securitisation data and statistics on financial vehicle corporations is a good example in this respect. At the same time, work is ongoing to close some newly identified gaps in the ESCB's statistics, to contribute to relevant global initiatives and to foster improvements in the transparency of the financial markets.[4]

The first part of this paper focuses on the "demand" side and describes the development in policymakers' needs, especially those geared towards financial stability analysis. The second part describes the "supply" side, ie initiatives that the ECB is taking to fulfil these needs and to contribute to more transparent financial markets. Finally, in the third part, the paper describes the steps taken by the ECB to support global initiatives.

Statistical needs

The ECB's statistical framework has been subject to extensive development over the past 10 years, primarily to meet the requirements of the ECB's monetary policymaking. The MFI balance sheet statistics are crucial to both monetary and economic analyses and, hence, for assessing the risks to price stability. At the same time, they also support the financial stability analysis. The analysis of balance sheets has, among other things, provided an important "close to real time" insight into the behaviour of euro area MFIs. The financial crisis has heightened the importance of these statistics, with the monthly statistics on euro area MFI loans (by size, type, maturity and counterpart sector), credit conditions and banks' balance sheets being of particular importance. Moreover, the importance of the monthly MFI interest

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2 This paper reflects the main contributions of Violetta Damia, Patrick Sandars and Richard Walton.

3 Article 5 of the Protocol on the Statute of the European System of Central Banks (ESCB) and of the ECB together with Council Regulation EC no 2533/98 set out the ECB's responsibilities and regulatory powers concerning the collection of statistics.

4 See also the paper in IPM 68, "Creating a statistical framework for the measurement of credit risk transfer – the ECB experience".

rate statistics (for 48 types of deposits and loans, harmonised across the euro area) has further increased over the past couple of years, in particular to assess the transmission of monetary policy decisions. Efforts are now being made to further advance their timeliness.

The crisis has also underlined the importance of harmonised information for the purposes of financial stability analysis to which statisticians are responding in close cooperation with regulators and supervisors. A wide range of macroprudential and microprudential data is required in this context. The identification of the causes of (in)stability in the financial system, as well as the role played by the systemically important institutions, necessitate the compilation of more harmonised statistics on a consolidated basis (at EU level), including the measurement of leveraged positions and maturity mismatches in the financial balance sheets, risk concentrations by counterparty sector as well as by investor and instrument, and bilateral exposures in key markets (notably, interbank). Statisticians are well placed to support this work in view of their extensive experience in dealing with harmonised data collections and in following the strictest confidentiality requirements. Moreover, exploiting synergies between data requirements for monetary policy and financial stability purposes is essential to contain the burden on respondents.

The financial crisis has underpinned the need for an extension of financial statistics, in particular a better coverage of the entire financial system. Initiatives to extend the traditional data on banks' balance sheets (which began long before the crisis) are now leading to a better measurement of securitisations, including separate statistics on securitisation vehicles, investment funds – including hedge funds – and insurance corporations and pension funds. In addition, the need has arisen to better understand the behaviour of non-financial sectors – for example the financing patterns of households. Finally, there is a strong interest in receiving aggregate data that throw more light on the interlinkages between economic sectors.

Another key consequence of the crisis is that users consider the traditional statistical aggregates no longer sufficient to explain the latest financial developments or to map the size and concentrations of (tail) risks. Thus, there is a new demand for micro data, eg information on securities holdings and loans and related provisioning and risk capital weighting. The crisis has also put the spotlight on valuation issues, especially the need to "look through" complex asset-backed and structured securities in order to obtain a better insight into underlying loan portfolios.

The origin of the crisis in the housing sector has also generated new user demands for high-quality non-financial statistics to be provided in as timely a manner as possible. In particular, key gaps have been identified in housing statistics, concerning not only sufficiently harmonised residential property prices, but also more comprehensive and timely data on housing finance (eg mortgage credit), structural housing indicators (eg house sales and building permits), housing capital stock and households' housing wealth.

ECB's statistical initiatives, including those aimed at an enhanced transparency of financial markets

The ECB, together with the ESCB, is making considerable efforts to meet an ever growing demand for statistical information. In developing new data collections, including those to capture financial innovations, it is essential to be proactive and to anticipate the data needs long in advance, while recognising that new statistics are costly and take time to implement. To this end, the ESCB focuses on the reuse and/or extension of already existing reporting frameworks and data "warehouses".

The ECB's main ongoing initiatives are summarised below.

1. A quite complete *coverage of the financial sector* may soon be achieved through the recent development of new statistics on investment and hedge funds[5] and off-balance sheet securitisation vehicles (so-called financial vehicle corporations). The ESCB worked closely with market associations and participants to understand the increasingly complex securitisation structures so as to create a statistical framework which both appropriately captures the phenomenon as perceived by the markets and is consistent with international statistical standards. Furthermore, new breakdowns within the MFI balance sheet statistics will provide separate data on collateralised loans which will, in turn, shed more light on exposures to households and credit risk more broadly.

2. The ECB, together with Eurostat, the euro area National Central Banks (NCBs) and the National Statistical Institutes (NSIs), meets the requirements for a comprehensive and consistent monitoring of economic and financial developments through the regular supply of integrated financial and non-financial *quarterly economic accounts of the euro area*. These institutional sector accounts (comprising both flow accounts and financial balance sheets) provide evidence on the impact of the financial crisis, in particular on profitability, financing and financial investment of the institutional sectors. The aim is for these data to be available after 90 days, including from-whom-to-whom information. The latter should enable the identification of interrelationships between sectors and may thereby provide the basis for a systemic risk map of cross-sector exposures in the euro area financial system.

3. The role played by systemically important institutions may necessitate the development of a *formal definition of "large and complex banking/financial groups"* and the compilation of harmonised financial statistics on a consolidated basis, including, to the extent possible, the measurement of: (i) leveraged positions and maturity mismatches in balance sheets; (ii) risk concentrations by counterparty sector as well by investor and instrument; and (iii) bilateral exposures in key markets (notably, interbank). At the same time, and with a view to containing the reporting burden, the ESCB and the Committee of European Banking Supervisors (CEBS) are building bridges between supervisory data and macro statistics.

4. Collecting new information from non-financial corporations and households may, in some cases, be the only feasible solution. While *small- and medium-sized enterprises* (SMEs) are of high relevance for the euro area economy, the available information, especially on the financing conditions of SMEs, is comparatively scarce, generally available only with a substantial time lag, often of a rather structural nature, and heterogeneous across euro area countries. To assess their financial situation in the context of the monetary policy analysis, the ECB and the European Commission have thus initiated a collaboration to regularly monitor the financing conditions of SMEs through a biannual survey across the euro area.

On *households*, the Eurosystem NCBs, in collaboration with a few NSIs, are currently in the process of running the first wave of the euro area Household Finance and Consumption Survey (HFCS). The HFCS will provide the Eurosystem with micro-level data on euro area households' demographics, holdings of real and financial assets, debts, consumption/saving, income, employment, future pension entitlements, intergenerational transfers/gifts and risk attitudes. Household-level information allows differentiated analyses of the economic behaviour of specific subgroups of the population: the recent financial and economic crisis proves that relatively small fractions of households – eg those highly indebted, the wealthiest, etc – can have a major impact on market outcomes. This new information dataset will, in turn, open new lines of research which are expected to provide an extremely valuable input into a number of policy areas of the Eurosystem.

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[5] Please see Regulation ECB/2007/8 (OJ L 211).

5. For "real-time" analysis, there is a need to flexibly and quickly apply new classifications and definitions. This is increasingly done by the ESCB with the support of *micro securities databases*. As the prime example, the Centralised Securities Database (CSDB) provides "golden copies" of security-by-security reference data that permit a flexible overview of outstanding amounts, new issues and related price and income information for most (ad hoc-demanded) categories of securities. Furthermore, these data enhance the availability and quality of related aggregate statistics, such as investment fund statistics, balance of payments/international investment position statistics and financial accounts. In addition, the ESCB is working to improve the information on securities holdings (preferably on a security-by-security basis), which will thus enable statisticians to flexibly and quickly provide a better overview of financial risks identified in financial sectors' balance sheets and of exposures to non-financial sectors.

6. In addition, more *micro data on loans and credit lines are required*, including a better alignment of the content of national public and private credit registers, particularly concerning corporate loans. This would also serve to greatly improve macroprudential and financial stability risk assessments. Moreover, "looking through" asset-backed securities (ABS), in order to make available data on the underlying loans (at least some meaningful standardised classification of them) may also assist in reviving the ABS markets which comprise a significant share of the collateral accepted by the Eurosystem. In any case, it would facilitate the assessment of risk and the valuation of often illiquid instruments. The establishment of appropriate micro databases on loans or the expansion of existing credit registers may, moreover, require a substantial one-off investment and should therefore be carefully planned.

7. Finally, to enhance both transparency in financial markets and, ultimately, the quality of global statistics, several initiatives are being taken by the ECB. These include closely liaising with market associations responsible for improving transparency, especially in respect of securitisations. A particular need is to standardise and improve the quality of *securities reference data*. The ECB is promoting the development of a Securities Reference Data Utility,[6] which would standardise and store in a common database the reference data for securities provided by issuers. This would greatly improve their quality for public usage, which, in turn, would mean a great step towards the much-needed transparency of financial markets.

ECB's support of global statistical initiatives

In view of the global impact of the financial crisis and the specific G20 initiatives for early warning exercises, statisticians contribute to the global measurement of financial risks and to the development of early warning indicators, while also improving the communication of economic and financial data. The ECB supports these global statistical initiatives.

The ECB is chairing the Working Group on Credit Risk Transfer Statistics, mandated by the Committee on the Global Financial System (CGFS), which is working on proposals for an expanded set of regular statistics on credit default swaps that is intended, among other things, to provide a regular benchmark for the newly available, high-frequency, but lower coverage, information available from industry sources.

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[6] Please see the keynote address by Jean-Claude Trichet, President of the ECB, at the Committee of European Securities Regulators (CESR), 23 February 2009, available at: http://www.ecb.europa.eu/press/key/date/2009/html/sp090223.en.html

The recently launched "Handbook on Securities Statistics"[7] prepared by the BIS, the ECB and the IMF addresses a concern of the G20 about the need for better data on securities. The Handbook[8] develops a conceptual framework and serves to facilitate the production of relevant, coherent, and internationally comparable securities statistics for use in financial stability analysis and monetary policy formulation.

Globalisation and the accumulation of global imbalances require global statistics as a benchmark. The ECB supports the compilation of comparable and timely world aggregates (eg world quarterly GDP after 60 days) and a better communication of economic and financial indicators. The ECB is part of the Inter-Agency Group on Economic and Financial Statistics, which launched a new Principal Global Indicators website for economic and financial key indicators of the G20 economies, including data covering the euro area.

Summary and conclusion

Central banks should closely monitor significant financial innovations and structural economic changes to ensure that their regular statistical frameworks remain fit for purpose. Moreover, they should increasingly apply "agile" data collection approaches that are able to meet fast-changing user demands. In particular, the availability of more micro data on securities and loans would enable statisticians to reveal developments that are hidden within existing aggregate data.

In addition to more granular, timely and interrelated financial statistics, the crisis has also underscored the need to improve other key short-term economic indicators (particularly concerning services, labour markets and housing). Moreover, in general, the further development of official statistics on housing should be given due importance.

The relevant international agencies should address such data gaps in a coordinated and efficient manner. In this context, European statistics are typically the result of an intensive harmonisation effort across 27 member states, and could thus provide a useful input to more globally harmonised data, particularly if other key players are involved at an early stage.

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7 Please see: http://www.ecb.europa.eu/press/pr/date/2009/html/pr090513.en.html

8 The Handbook provides guidance on how to classify securities within international statistical standards such as the *System of National Accounts 2008* and the *IMF Balance of Payments and International Investment Position Manual*, sixth edition.

What have we learnt from the global financial crisis?

Dennis Trewin[1]

1. Introduction

I agreed to write this paper not from a position of great knowledge but rather from someone who had recently been appointed a Trustee (and Board Member) of a major superannuation (or pension) fund in Australia. Furthermore, I was also told that, in part, I was appointed a Trustee because "I understood probability". Therefore, I thought I should offer some preliminary thoughts on how the statistical community could assist those responsible for superannuation fund management.

What types of statistics are used by managers of superannuation funds? These are set out below, and in the following sections of the paper I will make suggestions for improvement.

a. Not surprisingly, macroeconomic statistics are used extensively to understand probable future economic trends. They are generally used indirectly by relying on the views of trusted economic forecasters. How effective were macroeconomic statistics in understanding the current global financial crisis?

b. One of the most important tasks of trustees is asset allocation, ie how much of the total funds available will be devoted to domestic equity, international equity, emerging markets equities, private equities, property, bonds, credit and other asset classes. Other important decisions are the extent to which hedging is used to mitigate against adverse currency fluctuations. These decisions are dependent on whether the investment strategy is to be conservative, balanced or growth. Risk analysis is a key part of the decision-making process; it involves a number of statistical constructs, particularly measures of volatility.

c. Large funds usually make their investments through fund managers after deciding on the asset allocation. Some large investments are made directly, particularly in the property component of the portfolio, but this is a relatively small share of the investments. The choice of fund manager is important; the objective is often to seek a "top quartile" manager, but this status can depend on the investment climate. For example, a "top quartile" manager in a bull market is not necessarily one in a bear market. Statistical analysis is extensively used to make decisions on fund managers.

d. Monitoring portfolio performance is crucial. It is always necessary to be prudent about asset allocations and fund managers so that changes can be made when necessary. We are seeking to maximise investment performance over a five to seven year period, so it is important not to overreact to short-term movements. Again, statistical analysis (eg trend analysis) is an important tool for effective monitoring.

For the rest of this paper, I will refer to the four uses of statistics described above as: (a) monitoring economic performance; (b) asset allocation; (c) choice of fund manager; and (d) monitoring performance.

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Given that the target audience for this paper is statisticians, most of whom will not have a detailed knowledge of fund management, I have only described the processes at a very broad level.

It is also important to recognise that the goal for superannuation funds is to know when to change investment strategy rather than to predict changes in the economy per se. For example, should equity market exposure be increased or decreased? Equity price movements lead movements in the real economy by about six months on average, so there cannot be reliance on coincident macroeconomic statistics only.

2. Monitoring economic performance

How effective have official statistics been in obtaining an early understanding of the global financial crisis? In terms of monitoring economic performance, it is clear that official statistics were not sufficient. Few analysts picked the start of the significant economic downturn. However, our Chief Investment Officer forecast it as highly likely towards the end of 2007, before the significance of the downturn was fully understood. What information did she use to pick this? The key information included: (i) especially high credit spreads; (ii) equity prices being more than two standard deviations above fair value based on historical price earnings ratios; (iii) increased volatility in equity markets; and (iv) decreasing *global* liquidity. None are standard macroeconomic statistics.

I also looked at the speeches of a number of economists at a Global Economic Forum held in May 2007. Very few picked the impending economic downturn and they were referred to as pessimists rather than realists. What information did they use to pick this? The most important were: (i) a significant decline in the net national savings rate; (ii) a large increase in the current account deficit; (iii) asset price bubbles (more than two standard deviations above fair price); (iv) high real interest rates; (v) higher than normal credit spreads; and (vi) reductions in *global* liquidity.

It may also be informative to look at the statistical information used by the optimists. By and large, they relied on standard macroeconomic statistics, such as GDP, the CPI, and business tendency surveys (which I believe largely reflect current sentiment). There is also a reliance on consensus, which runs the risk of “group think”.

It seems to me that there are a number of important indicators that are not part of the standard set of macroeconomic indicators. These are associated with the sustainability of the economy and whether the economy can withstand the pressures that are being exerted on it.

My own view is that much more attention should be placed on indicators that highlight problems with economic sustainability such as those mentioned above (eg credit spreads, equity prices above fair value). The data is readily available even if not compiled by national statistical offices. Also, note that some of the measures should be global rather than national (eg liquidity) given the global nature of the economy.

The main response of national statistical offices has been to increase focus on short-term economic statistics. Although admirable, these will be of more use in understanding what is happening now rather than the future, and are of limited use to those associated with investment management.

The papers by Adelheid Bürgi-Schmelz and Steven Keuning for this meeting outline a number of initiatives being undertaken by the IMF and the ECB respectively to upgrade the statistical information available to monitor the economy. These do seem worthwhile and they emphasise the importance of the whole financial system.

My concern is that such statistics may be difficult to compile for most countries and, even for those countries that can compile them, they may not be very timely. Therefore, I believe that we should also put some emphasis on proxy indicators that already exist.

The compilation of the statistics I am proposing is generally not the responsibility of national statistical agencies, although they could help to increase their profile by republishing some of the more important statistics in economic indicator publications and the like. They could also assist by ensuring that their methodology is sound.

3. Asset allocations

This is, to a large extent, a mathematical or statistical exercise to obtain a target return for the fund while minimising risk. There are other constraints, such as only expecting four negative return years out of 20. Asset classes have different expected returns and different risks (usually based on some measure of volatility). These important parameters can also change over time and with macroeconomic views.

The optimisation process also depends on the cross-correlations of movements in returns between asset classes. They can also change over time. One of the outputs is an optimal return/risk frontier. If your fund is not at the frontier, asset allocation is suboptimal and should be changed to increase the expected return for the same risk or to reduce the risk for the same expected return (or some combination of both).

In a static situation, the statistical theory and practice associated with asset allocation is very mature. Investment managers understand this very well: it is their bread and butter. It is when the dynamic nature of asset prices and risks has to be taken into account that it is less mature, although plenty of work has been done on developing methods. Sophisticated techniques such as chaos theory are used. Models have to take account of autoregression and heteroskedasticity. Monte Carlo analysis and scenario modelling are used extensively. These models and methods could no doubt be improved as a result of the lessons learnt from the global financial crisis.

Dynamic asset allocation is increasingly being used rather than the traditional once a year review. Statistical techniques are used extensively to determine whether the return/risk profile has changed significantly and whether the change is large enough to warrant the cost of an asset re-allocation. It should be kept in mind that superannuation funds are generally trying to maximise return over a five to seven year period.

Statisticians can best help to improve asset allocations by:

i. continually developing methods for dealing with the dynamism of markets and

ii. working as statistical advisers with fund managers.

My impression is that (i) is happening to a significant extent but (ii) does not often happen. Courses in investment science and risk management are quite popular but they do not necessarily result in a “professional” financial statistician.

4. Choice of fund manager

Superannuation fund managers talk about two types of return – alpha and beta. It is best to use equities to describe the concept. A beta return for equities is based on Share Price Index and the equity portfolio is allocated according to the weightings in the index. If fund managers do their job, the value of the equity portfolio will go and up and down according to the index. Alpha return is when you beat the index by choosing a prudent equity portfolio. In

reality, it is done through choosing “active” managers who specialise in this and have the necessary research skills and capabilities. Alpha returns may be negative if managers perform badly.

When choosing the fund managers to actively manage an alpha return, the stated goal is to try to select top quartile managers, and considerable effort goes into their selection. I think this is the wrong strategy. Rather, it should be to avoid the bottom quartile managers.

Why do I say this? My opinion is based on experience and conjecture rather than detailed analysis.

1. The distribution of the performance of fund managers is rather unusual. Most will be clustered around an average performance – some better and some worse. The distribution for these managers would be close to normal. However, there will be some extreme (negative) tail events. Some managers may even fold and have a zero result. For these reasons, the risk is managed by having a relatively large number of “beta” managers.

2. I am not convinced, from the data I have seen, that many managers consistently perform better than their peers in a statistically significant way.

I am not a great fan of seeking beta return. I think dynamic asset allocation is likely to be a far more cost-effective way of improving returns.

Statisticians understand probability and variability. These concepts are crucial to the choice of fund manager. Qualitative judgements are often involved and statisticians “on the spot” can help investment managers to make the right decision.

5. Monitoring performance

What should be monitored? There are many aspects, but some of the more important are:

a. actual return and risk against stated return and risk

b. peer review with other superannuation funds

c. the performance of asset classes in terms of return and risk

d. the performance of fund managers compared with their peers.

Valuations are important and this is not always straightforward. There are no problems for asset classes such as listed equities where market information is plentiful. However, it is more difficult for asset classes such as private equity and property where valuations have to be taken periodically. The practices across funds are uneven, which makes comparisons among them somewhat challenging, especially in times of volatile markets.

Again, statisticians with their knowledge of probability, have an important role to play in understanding where there are real differences in performance.

6. Conclusions

Lateral thinking has to be applied to the type of indicators that are needed to assess possible changes in direction for the economy. More attention should be paid to the statistics used by financial markets to guide their actions. After all, equity markets do have a good track record of picking upturns or downturns in the economy with a lead time of about six months.

These statistics should be brought into the field of official statistics in the sense that they are accessible to the general public and the meaning of changes in values is understood by a

broader class of users, not just those familiar with financial markets. Furthermore, the official statistical community should ensure that the methods used for compiling these statistics are robust and methodologically sound.

Financial statistics is a field of statistics that is reasonably well advanced. Yet, there is no doubt that there is considerable scope for improvement in methods, as investment vehicles become more sophisticated and the risks become less obvious. There must be considerable lessons to be learnt from the recent financial crisis which can be used to improve methods.

Financial statisticians seem to have a low profile with superannuation fund managers, at least in Australia. Their role seems to be to concentrate on teaching and research. Many decisions, with considerable money at risk, are based on information which is not precise. Statisticians with knowledge of probability and variability can add considerable value. There is a need to promote our strengths: this is best done through the professional associations.

It is interesting to note that statistics associated with financial management have a very low profile with bodies such as the ISI. Yet, this is clearly a very important endeavour. It might improve with the introduction of ISBIS to the ISI family, as long as it views this as an important part of its activities. There is an opportunity to take statistical leadership. It is pleasing to see that IPM63 is dealing with statistics in finance.

Discussant comments on session STCPM52: Lessons learnt for statistics from the current financial crisis

J Steven Landefeld[1]

The papers presented at this session are an illustration of the high degree of coordination and responsiveness of the international and national statistical agencies charged with producing macroeconomic statistics. The responses outlined in the IMF, ECB and Eurostat papers represent their commitment to meeting policy and business needs for up-to-date and relevant statistics that accurately monitor the evolving state of the economy and provide information on emerging risks and imbalances.

The responses outline a complete five-step programme for responding to the financial crisis: (i) coordinating and improving access to critical data through tools such as the Principal Global Indicators (PGI) website, the Principal European Economic Indicators (PEEIs) and the quarterly economic accounts of the euro area; (ii) improving timeliness, consistency, and coverage of existing data as part of reinvigorated implementation efforts for the System of National Accounts (SNA), the Balance of Payments and International Investment Position Manual, the Government Finance Manual (GFS) and the IMF's General Data Dissemination System (GDDS) and Special Data Dissemination Standard (SDDS); (iii) fully exploiting existing data through leverage and other ratios as presented in the IMF's Financial Soundness Indicators (FSI); (iv) monitoring and assuring key estimates which reflect changes in the economy and accurately portray its state: although this is largely the responsibility of national statistical agencies, by developing micro databases and leading change in the international statistical system, the international organisations can play an important role; and (v) initiating work on the next steps in improving timeliness and coverage by identifying gaps in coverage such as those discussed in the papers and those to be identified by the G20 exercise.

All of these efforts are clearly important, but from the perspective of the financial (and housing) crisis, the last three are key. Response (v) is well covered by the IMF and ECB reports, which highlight that one of the biggest gaps identified by the financial crisis was the absence of consistent and comprehensive data on the institutions that played a large role in the crisis. Major gaps include coverage of hedge funds, private equity funds and structured investment vehicles. There is also a critical need for more detailed data by type of instrument, maturity, valuation by type of instrument, by ultimate owner rather than counterparty, as well as detailed data on leverage by institution and by type of instrument. Hopefully, these new data needs can be addressed in a coordinated fashion with new regulatory requirements to maximise the utility of the data to regulators interested in individual firms and to macroprudential regulators and investors interested in emerging aggregate and industry-specific trends and risks.

Responses (iii) and (iv) were alluded to, but less well covered, in this session's reports. These include using ratios and other existing information to identify bubbles and assess the sustainability of trends. Such information ranges from GDP and profits to financial asset and price data, business and household sector leveraging, sources of saving and net investment. Also, in assessing economic recovery, as households rebuild their balance sheets it will be

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important to have more complete data on the household sector including data that will help in understanding households' capacity to spend and consumer confidence. Such data include cash income, discretionary income, detailed leveraging ratios, asset value to income ratios, data on the distribution of income, and more comprehensive and consistent data on housing and other household assets.

Special Topics Contributed Paper Meeting 62

Data issues related to the financial crisis

Papers:

Onshore spread and swap spread: Chilean money market liquidity indicators
Felipe Alarcón and Nicólas Malandre, Central Bank of Chile

Fixed income investments: evolution in a liquidity shortage episode
Liliana Cavieres and Luis Opazo, Central Bank of Chile

Using high-frequency data to monitor developments in the banking sector – the case of the Czech Republic
Petr Vojtíšek, Czech National Bank

Credit risk transfer – dealing with the information gap
Luís D'Aguiar and Filipa Lima, Banco de Portugal

Discussant: Satoru Hagino, Bank of Japan

Onshore spread and swap spread: Chilean money market liquidity indicators

Felipe Alarcón[1] and Nicólas Malandre[2]

Introduction

Over the last few years, the Chilean derivatives market has reached a greater level of sophistication and development, in line with a larger and open capital market. Under this scenario, it is possible to obtain derivative prices and rates that are useful for liquidity analysis, among other purposes. In this paper we analyse how the information contained inside exchange and interest rate derivative prices can be used. We chose these two underlying assets because it is possible to find, in the data available, significant information in terms of quality, data length and periodicity. This price information, together with other related financial variables, enables us to build two money market liquidity indicators: the US dollar onshore spread and the swap spread. In practice, they have proved to be a useful complement to other market indicators, especially when they are not providing clear information about the illiquidity sources or their origins.

For such purposes, we use the data provided by Bloomberg, la Bolsa de Comercio de Santiago (local stock exchange), the local banking system and some brokers, as well as data collected by the Central Bank of Chile. The majority of the database is publicly available.

The rest of the paper is structured as follows. The first section describes the data used in this paper. The second section looks at the onshore spread, reviewing its evolution, with special attention given to the current financial crisis and the differences in onshore spread behaviour by comparing the indicator with alternative rates and price sources. The third section explores the swap spread concept, its evolution and some of its characteristics, as well as a comparison of the local swap spread with other economies. The fourth section concludes.

1. Data description

1.1 Onshore spread data

In the onshore spread construction we use: dollar-peso forward rates for 90, 180 and 360 days; the spot exchange rate; the time deposit rates (CLP); and Libor also for 90, 180 and 360 days. We have daily series from 2006 onwards. The start date is determined by the CLP swap rate availability. Prior to 2006, the Chilean interest rate swap market did not show minimum liquidity and development levels, so the previous 2006 rates are not market representative.

The data sources are: Bloomberg, the Central Bank of Chile, the local banking system and the British Bankers' Association. For time deposit rate series, the central bank conducts a daily survey of local commercial banks, in which they indicate time deposit information such as amounts, rates and terms captured. This information, which is not publicly disclosed, is

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[2] Central Bank of Chile, Financial Operations Division (e-mail: nmalandr@bcentral.cl).

then tabulated to obtain weighted average time deposit rates. These rates are called *prime* rates.

On the other hand, the central bank can, alternatively, use Chilean peso rates (nominal) taken from the overnight index swap (OIS) market.[3] This is a useful funding benchmark for non-commercial banks (investment banks), due to the fact that the prime rates are non-observable to them. For the purposes of this document, the source of the CLP OIS rates is Bloomberg.

We will demonstrate below how an onshore spread is calculated using both rates, and how, in certain periods, there is a significant divergence between them (turmoil periods).

1.2 Swap spread data

Conversely, swap spread construction is much easier than onshore spread construction: we only use nominal (CLP) and real[4] (CPI-linked) OIS long-term rates (two, five and 10 years), and nominal (BCP) and real (BCU) bonds, also for two, five and 10 years. The data periodicity is daily and without lags. The series also began in 2006 and the data sources are Bloomberg, local brokers, la Bolsa de Comercio de Santiago and the Central Bank of Chile.

Despite the simplicity of the series construction, it contains several interesting details which should be highlighted. In the OIS rate series, there is asymmetric liquidity between nominal and real rates; while the nominal OIS rate market has a fine liquidity, the real OIS rate market frequently experiences problems such as wide bid-ask spreads or no rates for specific terms (especially for terms up to two years). This asymmetric liquidity is a consequence of the market participants, where most are offshore players who deal mainly in nominal OIS. In fact, one reason for the OIS market creation was to facilitate the participation of offshore agents in the local fixed income market. The current tax regulation on capital gains creates a disincentive for the presence of these kinds of players (derivatives such as OIS do not need capital).

Through derivatives, they can speculate about future monetary policy rate movements[5] or hedge interest rate positions. Moreover, this tax condition generates another important issue: the inability of offshore agents to arbitrage significant differences between bonds and OIS rates. This issue and its consequences are discussed in further detail by Alarcón and Bernier (2009).

Another interesting point is that the local market trades OIS with terms of up to 20 years, while the common financial market trades OIS only for terms of up to one year. For longer terms, the underlying OIS is usually one- or three-month time deposits (interbank).

Meanwhile, in terms of relative liquidity, the local bond market is the exact opposite: it has greater liquidity than the nominal bond market. The explanation for this is the long tradition of Chilean inflation, which has encouraged capital market development based on CPI-linked assets. Nevertheless, with the economy nominalisation process, which began in 2001, most money market operations (up to one year) are nominal (CLP). Longer-term operations (fixed income) are still dominated by CPI-linked instruments.[6]

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[3] The underlying OIS is the official interbank overnight deposit rate published daily by the Central Bank of Chile. The OIS floating leg is then determined by the average overnight rate between the beginning and the end of the agreement.

[4] Real OIS or bond rates are instruments denominated in UF, which is a CPI-linked unit account.

[5] Monetary policy, conducted by the Central Bank of Chile, is made through a nominal target rate (overnight).

[6] Including: the Central Bank of Chile, government and corporate bonds, and mortgage-backed securities.

2. Onshore spread

According to Alarcón et al (2008), the onshore spread is the difference in rates between the local market dollar rate, implicit in the forward exchange rate operations (CLP/USD), and Libor. The implied rate on US dollars is obtained from the non-arbitrage condition or covered parity rates, a condition in which the forward exchange rate is quoted by the market. Equation (1) describes the non-arbitrage condition. We assume that there are no restrictions, intermediation margins or risk premia:

$$F_T = S_t \frac{\left(1+i_{T-t}\right)}{\left(1+i^*_{T-t}\right)} \tag{1}$$

Where: F_T is the CLP/USD forward rate at time T, S_t is the CLP/USD spot rate at time t, i_{T-t} is the CLP T-t term interest rate and i^*_{T-t} is the implicit US dollar T-t term rate.

Separating i^*_{T-t} from (1) gives the Chilean market implied US dollar rate:

$$i^*_{T-t} = \frac{S_T}{F_T}\left(1+i_{T-t}\right)-1 \tag{2}$$

The onshore spread will then be the difference between (2) and Libor, at the same term.

$$i^*_{T-t} - i^L_{T-t} \tag{3}$$

As background information to this article, Alarcón et al (2008) show the theoretical patterns in which the onshore spread should move. Those patterns include taxes, external spreads and other frictions. Alarcón et al also include an analysis of the effects on the onshore spread following the increase in the external investment limit for local pension funds. Furthermore, Opazo and Ulloa (2008) analyse the speed at which this indicator is in line with their theoretical patterns, comparing it with other external references.

A quick historical data review shows some periods during which the US dollar onshore rate departed significantly from its natural benchmark, the Libor. These episodes are discussed in the next section.

2.1 Onshore spread behaviour: swap rates vs prime rates

As discussed above, the onshore spread can be calculated with two different CLP rates: prime rates and OIS rates. Prime rates are more useful in determining the US dollar onshore rate for commercial banks that use prime time deposits to finance part of their normal operations (loans). On the other hand, OIS rates are useful in estimating the onshore spread for investments banks, whose time deposit market share is insignificant or non-existent. Additionally, investment banks tend to be active OIS market players. Therefore, prime rates are not their relevant benchmark for CLP funding or onshore spread calculation. Finally, prime rates are not publicly available, thereby making this variable non-observable to all market participants.

The onshore spread evolution, calculated with both interest rates, is very similar, showing differences only in terms of level (basis points), but their movement pattern is normally the same (Figure 1).

Figure 1 shows some illiquidity episodes reflected by onshore spread increments; the first began in August 2007, when the Central Bank of Chile decided to increase the external investment limit for local pension funds (PFs). In practice, this measure meant a liquidity tightening in CLP and US dollars. As a result of this new limit, PFs quickly unwound positions invested in time deposits, increasing prime rates. At the same time, they bought US dollars (spot) in the exchange market and simultaneously sold forward similar amounts, in order to

hedge their new positions invested abroad.[7] This last movement forced banks (PF counterparts) to take short positions in US dollars (short-term liabilities) so as to keep their foreign exchange balance, causing an increase in the US dollar onshore spread.

A second illiquidity episode, also shown in Figure 1, was associated with the sharpening of the subprime crisis, when international and local US dollar liquidity fell quickly. The peak of this episode was closely related to the Lehman Brothers collapse (September–October 2008), an event which affected a significant part of the US banking system. In line with this issue, the illiquidity transmission channel to the local market was via a freezing of short-term credit lines by US banks to local banks,[8] forcing local banks to seek alternative US dollar funding and pay higher onshore spreads over Libor.

The tighter US dollar liquidity was reflected in terms of onshore spread increases (right-hand grey area of Figure 1), which were even higher than during the PF episode. However, this time, the onshore spread calculated with prime rates was significantly higher than when calculated with OIS rates.

The gap between both spreads was explained by significant CLP time deposit sell-offs carried out by mutual funds, which, together with PFs, are the most important source of short-term banking funding. In line with this, CLP prime rates jumped more than 250 basis points in only one week (Figure 2), while CLP OIS rates fell.[9] Following equation (2), the local implied US dollar rate is higher if CLP rates are also higher (ceteris paribus), and prime rates that are greater than OIS rates imply a higher onshore spread.

Another way to explain the differences between both onshore spread indicators is through the prime-OIS spread[10] approach, an indicator which also helps to estimate money market liquidity. When there is low liquidity in this market, in other words, a high prime-swap spread, the deviation between the two onshore spread indicators is also high (Figure 2).

Figure 1

US dollar onshore spread: prime vs OIS rates

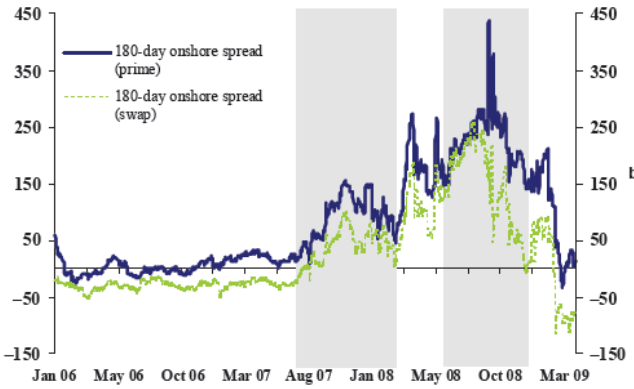
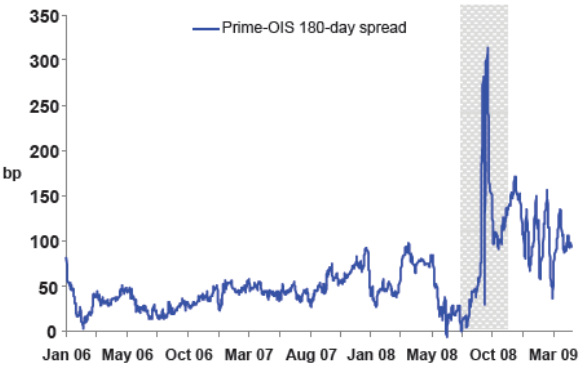


Figure 2

Prime-OIS spread



Sources: Central Bank of Chile; local banks; Bloomberg.

[7] Pension funds must, by law, hedge a fixed portion of their foreign exchange exposure.

[8] Even though the funding share in US dollars of the total local bank funding is small.

[9] By this time, the market began to expect cuts in the MPR.

[10] In Chile, the interbank market of uncollateralised debt is not deep. The prime-swap spread is a better proxy to the Libor-OIS spread of the US market.

In such cases, investments banks have access to lower implicit US dollar rates than commercial banks because they do not use cash to perform their activities (prime rates) – they mainly use derivatives.

The onshore spread depends not only on US dollar liquidity conditions, but also on CLP liquidity conditions (prime rates) or expectations over future monetary policy rate (MPR) movements (OIS rates). Finally, the use of either rate will depend on the bank type: commercial banks (prime rates) or investment banks (OIS rates).

After October 2008, the onshore spreads began to converge towards pre-crisis levels, even though the gap between both onshore spread indicators remained high (explained by the prime-OIS spread).

2.2 Other relevant economies: a comparison

For simplicity purposes, we have chosen only two relevant countries for Chile: Brazil and Colombia. In general terms, the shape of the onshore spreads is dissimilar between the three countries, which is explained by the local US dollar availability in each economy (flows). However, when US dollar liquidity is globally thin, as in the current financial crisis, onshore spread behaviour should become equivalent. We find that, up to April 2008, there is no great coincidence in the spread evolution, but with the sharpening of the financial crisis, the peaks and dips tend to occur at the same time, especially between Chile and Brazil.

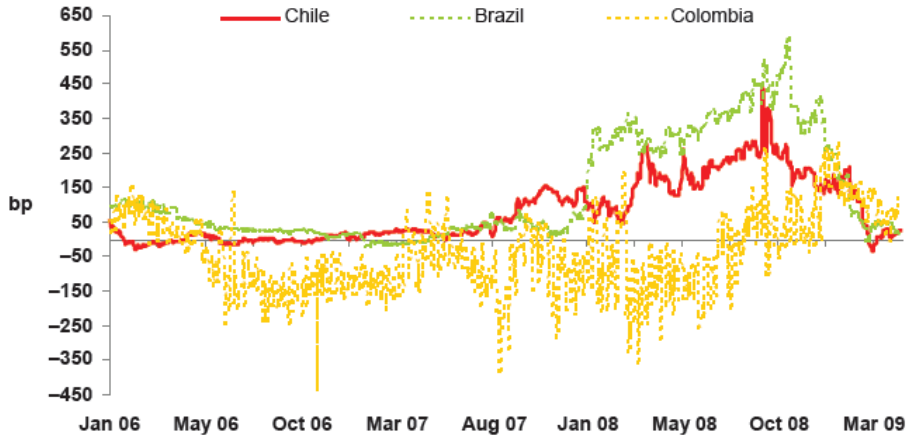
In the case of Colombia, the onshore spread level is different compared to Chile and Brazil, but during the crisis period the maximum and minimum levels tend to coincide.

Figure 3 shows the onshore spread behaviour of Brazil, Mexico and Chile. In general terms, the onshore spread volatility shows a strong increase in the period between April 2008 and February 2009.

In Chile, as a way of mitigating the low US dollar liquidity, the Central Bank implemented a USD 500 million weekly facility for foreign exchange (FX) swap operations, with terms from 30 to 180 days, where banks could obtain US dollar liquidity with CLP as collateral, and with the possibility of periodical rollover. Until complete, this facility offered a maximum amount of USD 5,000 million. In practice, however, the total FX swap outstanding has not exceeded USD 900 million. Nevertheless, this measure provided the market with an explicit liquidity guarantee, causing a fast drop in the onshore spread, from a maximum of 438 basis points (October 2008) to levels of around 20 basis points (April 2009).

Figure 3

US dollar 180-day onshore spread



Sources: Central Bank of Chile; Bloomberg.

3. Swap spread

We define the swap spread as the difference between a swap rate and a bond rate, which is usually risk-free.

Regarding the swap spread literature, Lang et al (1998) suggest that the level of this indicator is influenced by changes in the relative demand for hedging instruments (eg swaps), the spread of corporate bonds and the economic cycle. In a supplementary analysis, Duffie and Singleton (1997) show that the variation in the swap spread is attributable to credit risk and liquidity. Liu et al (2002) achieved similar results and concluded that most swap spread volatility is associated with changes in the liquidity premium of risk-free bonds (treasuries).

In the local swap spread case, this is defined as the difference between the OIS rate and a bond rate issued by the Central Bank of Chile, for a similar term. There are two types of swap spread: nominal (CLP) and real (UF).

$$Swap\,spread\,UF = r_{0,t}^{OIS} - r_{0,t}^{BCU} \tag{4}$$

$$Swap\,spread\,CLP = i_{0,t}^{OIS} - i_{0,t}^{BCP} \tag{5}$$

With $t \geq$ 2 years for both equations.

Where $r_{0,t}^{OIS}$ is the real OIS rate at time 0 for a t term, $r_{0,t}^{BCU}$ is the real bond rate at time 0 for a t term, $i_{0,t}^{OIS}$ is the nominal bond rate at time 0 for a t term and $i_{0,t}^{BCP}$ is the nominal OIS rate at time 0 for a t term.

As BCU and BCP are risk-free bonds and the OIS are not, the swap spread should aim, at least theoretically, at positive values over time, and its size should be closer to what is considered a market-participant systemic risk (mainly banks). In practice, however, BCU and BCP implicitly contain other kinds of risk (inflation, liquidity, etc) that may lead the swap spread to negative values. Besides, market imperfections, such as taxes and hedge flows, can also produce distortions in swap spreads.

$$r_{0,t}^{BCU} = r_{0,t}^{SPC} - \phi \quad \wedge \quad i_{0,t}^{BCP} = i_{0,t}^{SPC} - \phi \tag{6}$$

Where ϕ is the systemic and other risk premia.

3.1 Swap spread: evolution over time

Empirical evidence shows that equation (6) was valid for periods prior to December 2007. However, subsequent periods show a significant decrease in the real swap spread, even reaching negative values, and staying in the negative area for several months (Figure 4). On the other hand, nominal swap spreads have also reached negative values, but have tended to return to positive values (Figure 5).

Consequently, and according to the swap spread literature, by the end of 2007 some of the variables that affect the swap spread could have led it to levels beyond its fundamentals: demand for hedging instruments, credit risk, liquidity, etc. Once again, PFs played an important role.

Figure 4

Real swap spread (UF)

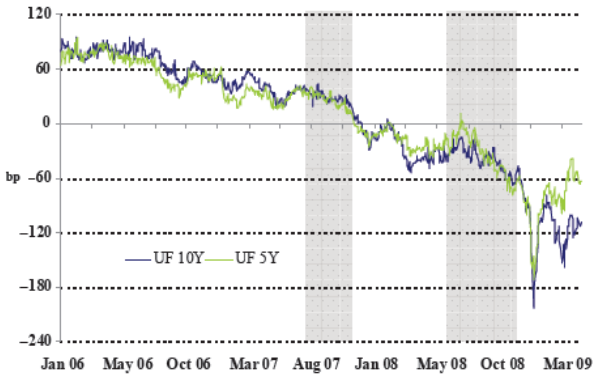
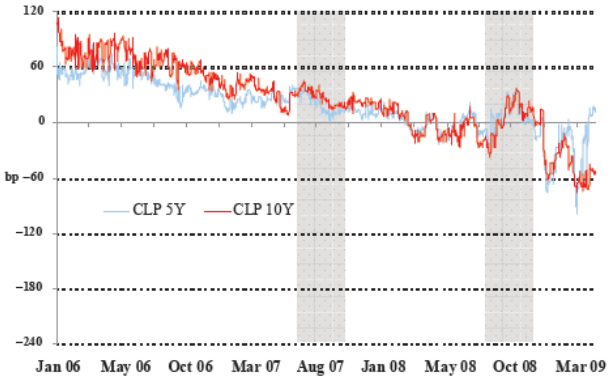


Figure 5

Nominal swap spread (CLP)



Sources: Central Bank of Chile; local stock exchange; Bloomberg.

At that time (left-hand grey area of Figures 4 and 5), PFs and some insurance companies decided to invest part of their portfolios in foreign corporate bonds, in order to obtain better returns than local bonds. But these investments needed foreign exchange and interest rate hedging, resulting in a sharp fall in OIS rates, even beyond bond rates. The swap spread most affected was the UF swap spread, due to the fact that PFs conduct a large part of their investments in this unit of account. In this episode, the fall in the UF swap spread was explained mostly by the demand for hedging – other factors, such as changes in liquidity conditions, were not present.

A second significant episode was during the current financial crisis, where both swap spreads, nominal and real, showed an important fall (right-hand grey area of Figures 4 and 5). The problem was also associated, in part, with demand for hedging, but not from PFs. This time local corporations decided to issue bonds locally in order to obtain spreads lower than the external market. But a significant part of these problems were created by corporations whose assets are denominated in US dollars (exporters); they had to carry out hedge operations to match their balance sheet, pressing UF OIS rates to lower values than BCUs, resulting in negative UF swap spreads which were even lower than during the first episode.

This was followed by a fall not only in UF swap spreads, but also in nominal (CLP) swap spreads. On that occasion, the greater demand for hedging, combined with a strong fall in CLP liquidity conditions (already described in Section 2.1 above), caused higher bond rates than OIS rates, due to the increase in cash cost. Agents prefer to take positions over the yield curve through derivatives (OIS) rather than bonds because derivatives do not need capital. Finally, both swap spreads fell to negative values (Figures 4 and 5).

The description of these two episodes reveals the relative fragility of the swap spread as an exclusive liquidity indicator, because there are many factors or variables affecting swap spread behaviour, not just liquidity. An important conclusion would be to combine this indicator with other liquidity indicators in order to get a better liquidity signal.

3.2 Swap spread: Chile vs selected countries

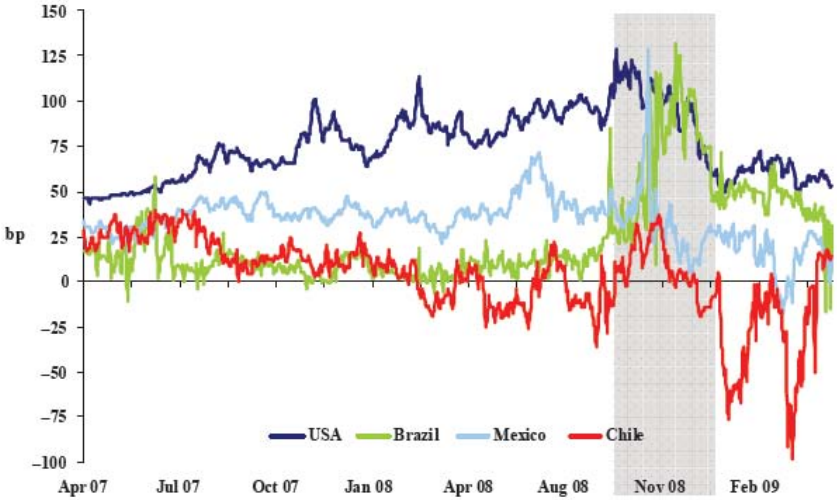
As already noted in the data description (Section 1.2 above), local interest rate swaps (IRS), which are used to build swap spreads, are derivatives whose underlying asset is the average of the interbank overnight rate. This issue is quite important when we compare local swap spreads with others economies because, in most countries IRS are used, whose underlying assets have a longer-term maturity; consequently, these swap rates should include a spread comparable to those commonly observed in operations between different maturities, affecting

swap spreads to a greater extent in those economies where the underlying asset maturity is longer.

This is an important topic which could explain some difference in the swap spread shape among selected countries. Indeed, Figure 6 shows the swap spread (five years) for Chile (nominal), Brazil, Mexico and the United States. It is possible to observe a clear difference in terms of level: Chile and Brazil tend to have lower values than Mexico and the United States. Chile and Brazil have an overnight underlying asset, while Mexico and the United States have a one- and three-month underlying asset, respectively.

Figure 6

Swap spread: Chile, Brazil, Mexico and the United States



Sources: Central Bank of Chile; local stock exchange; Bloomberg.

On the other hand, the behaviour of each swap spread does not appear to have a common pattern, except when the financial crisis reached its maximum impact (grey area in Figure 6): at this point the swap spreads tend to fall, but with high volatility. The reasons behind this behaviour are not easy to explain because the variables (liquidity, credit risk, demand for hedging changes, bonds issues, etc) affecting swap spreads are not clear.

Summary

The aim of this paper has been to demonstrate how to obtain useful financial information from the local derivatives market and how to transform this information into liquidity indicators. We have considered two indicators: the onshore spread and the swap spread, describing their construction, evolution and background. In this regard, we have discovered several issues concerning the databases used, which are closely related with local market characteristics. In general terms, both indicators have strengths and limitations, especially when they are used alone with no other relevant information.

The onshore spread has proved to be a very useful indicator for liquidity proposes (US dollar liquidity), but it is highly sensitive to other variables such as local currency liquidity. Nevertheless, this issue can be fixed by using OIS rates.

The swap spread seems to experience even more problems as a liquidity indicator, because it depends on more variables which are difficult to measure or find.

An important conclusion to be drawn is that a better liquidity signal can be obtained by combining this indicator with other liquidity indicators.

Finally, we emphasise the importance of maintaining a database with good-quality information, along with a full understanding of its characteristics.

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Fixed income investments: evolution in a liquidity shortage episode[1]

Liliana Cavieres[2] and Luis Opazo[3]

1. Introduction

During the last decade, the Chilean fixed income market has shown impressive growth in terms of liquidity and deepness.[4] At the same time, institutional investors such as pension funds and mutual funds have systematically increased their presence in this market, to a share of 40% and 14% of total Chilean fixed income assets as at December 2008, respectively. The monitoring of financial stability could therefore be improved with supplementary statistics on the portfolio decisions of such investors, which could be especially valid in light of the financial turbulence during the last quarter of 2008. In this regard, the goal of this paper is to describe how fixed income holdings evolved during this period and to analyse whether they can provide complementary information to the monitoring of financial markets.

More concretely, the information on asset management is a useful complement to the Central Bank of Chile's (CBC) monitoring for several reasons. First, the information content of prices becomes very difficult to analyse during periods of financial turmoil – basically, it is hard to disentangle the incidence of credit and liquidity factors, among others. Second, even though the markets are not necessarily experiencing an episode of financial distress, the dynamics of asset holdings could complement the overall picture to help understand asset prices.[5] Last, but not least, this is relevant because while the conventional belief is that markets stall during financial crises, the empirical evidence about what actually happens in the secondary markets during periods of financial distress is very limited.[6]

In this context, we use data provided by the Depósito Central de Valores (DCV) since June 2008 at a weekly frequency. The DCV processes, collects and registers the holdings of all domestic fixed income assets traded in the Chilean market, ie the stock exchange and the over-the-counter (OTC) market, which implies information on approximately 48,000 instruments each week.[7] This dataset contains detailed information on the value of the outstanding assets, as well as on the issuer, holders, currency denomination and maturity of each instrument.

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4 For instance, the ratio of trading volume over outstanding public bonds (CBC and Treasury) has increased from close to 1.5 to 2.9 between 2002 and 2007. Source: Larrain & Vial.

5 For instance, Evans and Lyons (2007) show that the low explanatory power of macro news on the DM/USD exchange rate at a daily frequency – close to 10% – can be substantially improved by including order flows – close to 30%. In other words, roughly two thirds of the total effect of macro news on the DM/USD exchange rate is transmitted via order flow.

6 Levi-Yeyati et al (2008) provide an overview of secondary markets during episodes of financial crisis in emerging markets.

7 This figure corresponds to the average number of instruments from June 2008 to March 2009.

The rest of the paper is structured as follows. The next section describes the data provided by the DCV. The third section reviews the evolution of fixed income holdings with special attention to the last quarter of 2008 and the fourth section concludes.

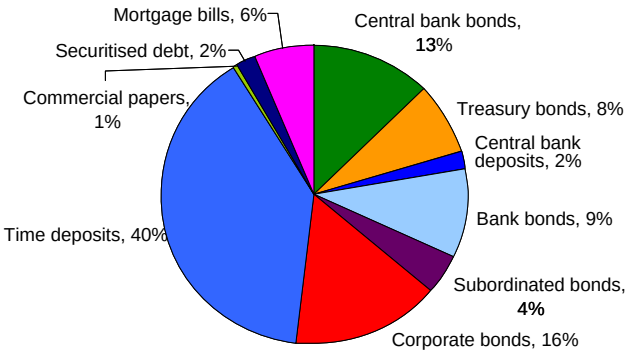
2. Depósito Central de Valores (DVC): general background and data description

The DCV is a public corporation established under Law no 18876 in 1993. Its main purposes are, among others, to provide custody services, management, compensation and liquidation of securities. These securities include time deposits, stocks and bonds – public and private – and the like. In general terms, the DCV accounts for the total holdings of fixed income assets issued by domestic agents, which were equivalent to USD 117,039 million in outstanding assets as at December 2008.[8] While the DCV collects information on both variable and fixed income instruments, the CBC receives and analyses only the information concerning fixed income instruments.

By category, the most important fixed income instruments are time deposits with 40% and public bonds (CBC and Treasury bonds) with 21% (Figure 1). It is important to clarify that the time deposits registered at the DCV are those issued by banks and held by institutional and large private investors registered at the DCV, ie traders in the secondary market; time deposits held by households and firms are not registered at the DCV and are therefore excluded – these small investors represent around 40% of the time deposit market. With respect to the asset holders, pension funds, banks, insurance companies and mutual funds represented, respectively, 40%, 20%, 15% and 14% as at December 2008 (Figure 2). Recall that the DCV registers all market positions in the Chilean fixed income market; thus, these figures represent the universe of domestic asset holdings traded on the secondary market and, therefore, the quality of the analysis is not restricted by potential caveats related to the characteristics of the sample data, such as biases to some classes of agent or types of asset.

Figure 1

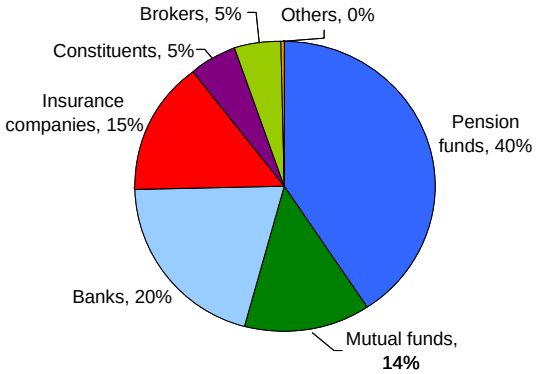
Assets by category – December 2008



Source: DCV.

Figure 2

Composition by holder – December 2008



Source: DCV.

[8] The DCV does not produce information on the volume of transactions, but reports the end-of-day position of each holder.

For each asset registered at the DCV, the CBC receives the following data every Monday:

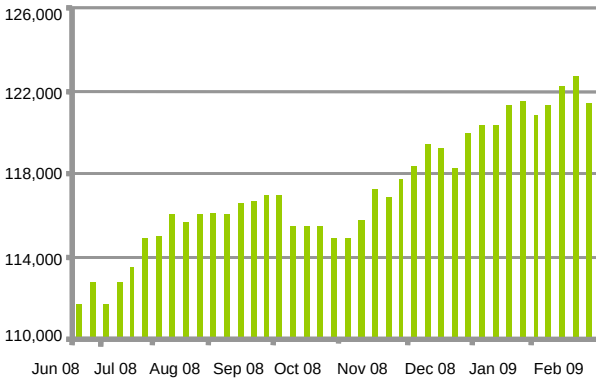
(a) *Ticker*. This corresponds to the identification code of each instrument, and allows the issuer of each instrument to be specified.

(b) *Value*. The data is expressed in terms of face value or, equivalently, does not consider any adjustment by any revaluation mechanism. Figure 3 shows the evolution of the total value of assets outstanding reported by the DCV, which increased from USD 112 billion to USD 121 billion between June 2008 and March 2009, where roughly 80% of the instruments are issued by the private sector, while the remaining 20% is public, mainly from the CBC (Figure 4).

Figure 3

Outstanding assets reported by the DCV

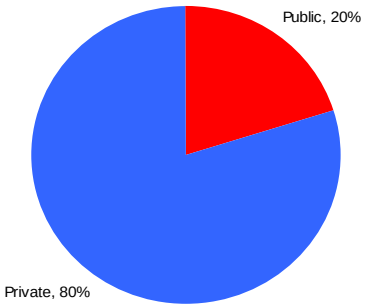
(millions of US dollars)



Source: DCV.

Figure 4

Privately and publicly issued assets – 2008



Source: DCV.

(c) *Currency*. The DCV reports the currency denomination of each instrument. The alternatives are: (i) domestic currency in nominal terms (31.5%); (ii) foreign currency (4%); and (iii) domestic currency and CPI-linked (64.3%) (Figure 5).[9]

(d) *Maturity*. The DCV provides information with respect to the residual term of the outstanding instruments. Figure 6 presents the share of outstanding assets by maturity term. This figure suggests that the composition of assets by maturity is distributed homogenously across categories. In effect, the shortest-term instruments (< 90 days) account for 18% of total assets, the category between 90 and 360 days also represents 18%, the category between one and five years is equal to 27% and, finally, the assets maturing in over five years account for 37%.

(e) *Holder*. The holders are reported in generic groups. This means that, for each asset, it is possible to know the share held by the pension funds as a whole but not the share held by each fund. Holders are classified into: (i) pension funds; (ii) mutual funds; (iii) banks; (iv) insurance companies; (v) brokers; (vi) private investors; and (vii) others.[10]

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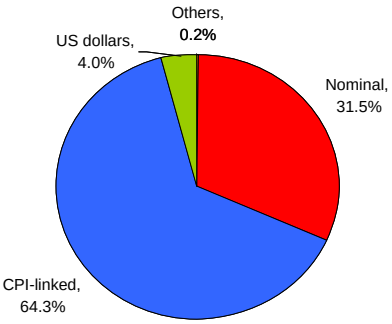
9 The CPI-linked instruments use, as a reference, the so-called Unidad de Fomento (UF). The UF is a unit of value adjusted on a monthly basis according to the CPI.

10 The share of each type of holder is presented in Figure 2.

Figure 5

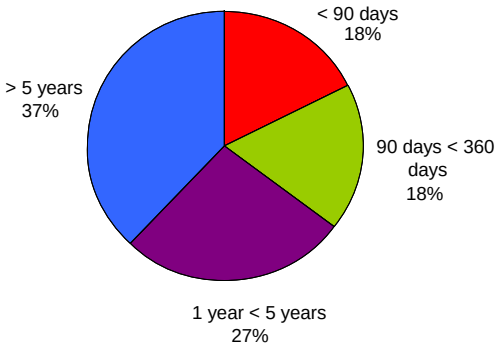
Composition of issues by currency – 2008



Source: DCV.

Figure 6

Composition of assets by maturity – 2008



Source: DCV.

The available data is from June 2008 up to March 2009, allowing us to inspect in detail how fixed income portfolios behaved during the liquidity stress event in late 2008 and to determine if potential changes could help to complement the monitoring of financial markets conducted by the CBC. It is worth noting that the available data allows the *net change in asset holdings* to be calculated, which summarises both passive and active decisions – ie some assets reaching their maturity (passive), and the buying/selling of assets (active). However, it could be argued that the option of compensating passive changes is an active decision per se and, therefore, this measure could be used as a good proxy for portfolio management decisions.

Finally, it is worth mentioning that the data reported by the DCV is continually checked against the data available at the CBC. Specifically, the internal balance of the outstanding instruments issued by the CBC is compared with the data reported by the DCV, and on only a couple of occasions have some small differences been detected.[11]

3. Fixed income assets: June 2008 to March 2009

The events that characterised the Chilean market during the last quarter of 2008[12] can be summarised as follows. The short-term mutual funds – particularly type 1 funds[13] – were revalued at the end of September to the market rates, which caused a negative average daily return of 0.49% on the day of such adjustments, a value highly unusual for this type of fund. This led private investors to sell off their mutual fund shares, causing a liquidity shortage for those institutions. Additionally, the interbank market virtually shut down during those few days and only resumed more normal functions following the announcement of longer repo operations by the CBC on 10 October.[14, 15]

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[11] On those occasions, the CBC communicated the differences to the DCV, which corrected them in almost three days.

[12] For a more detailed discussion, see Central Bank of Chile (2009).

[13] Type 1 funds: the portfolio of type 1 funds only includes assets with duration lower than 90 days.

[14] Because of the complexity of this period, it is hard to explain the exact root of the interbank market shutdown. However, there are some analyses that attribute the reduction in interbank activity to precautionary reasons.

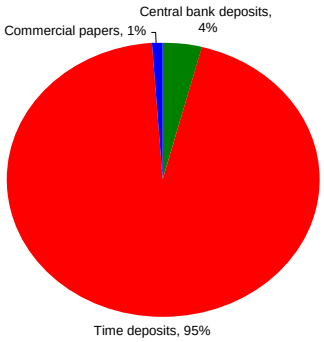
In order to study the dynamics of fixed income assets during the event described above, the assets were classified into the two following categories:

(i) *Money market instruments*.[16] Most of the assets in this category have a maturity of less than one year – eg time deposits and commercial papers – the exception being CPI-linked time deposits with an average maturity of around 18 months. Figure 7 presents the composition of this segment by asset class, where time deposits accounted for 95% of this market as at December 2008.

(ii) *Long-term fixed income market*. As its name suggests, this category contains the fixed income instruments with maturities longer than one year, which basically implies bonds issued by the Treasury, the CBC and the corporate sector (Figure 8).

Figure 7

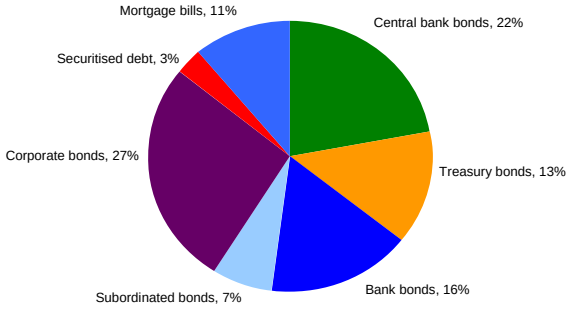
Composition of money market assets – 2008



Source: DCV.

Figure 8

Composition of long-terms assets – 2008



Source: DCV.

This segmentation is intended to capture the potential differences between the roles of these instruments. In effect, the money market segment is more closely related to the instruments employed to manage liquidity, while the longer-term instruments are more closely related to investment opportunities and buy and hold investment strategies. This point is partially validated by the relatively higher turnover of the money market. In effect, the ratio between the traded volume and the outstanding money market assets was 5.6 in 2008;[17] by contrast, the turnover of longer-term instruments was 2.2.

The main elements behind this conclusion are the robustness of capitalisation and the liquidity indicators of commercial banks (they reduce the feasibility of systemic risk). The commercial banks started to use the permanent deposit facilities at the CBC in an unusual way, ie they deposited substantial amounts at the CBC (which runs counter to the liquidity shortage of commercial banks), and the spreads of interbank rates moved in the same direction and magnitude across banks (which runs counter to the idiosyncratic shocks at the bank level).

15 The details of this announcement can be downloaded from www.bcentral.cl.

16 This category is also known as "financial intermediation assets".

17 The turnover was calculated using the annual trading volume of each market and the outstanding instruments as at the last week of December 2008. Sources: DCV; Superintendencia de Valores y Seguros.

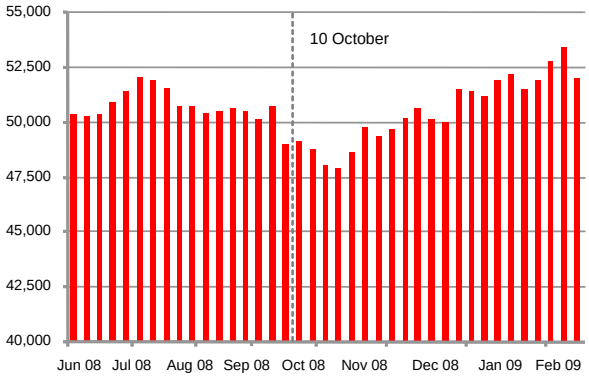
3.1 The money market

Figure 9 shows the weekly holdings of money market instruments. The aggregate asset holdings show a contraction of just 3% during the week of 10 October (the dotted line in the figure), recovering to their previous level a few weeks later. In other words, the aggregate holdings of money markets did not show a significant drop during the liquidity stress episode, and the level observed before the event was reached in a short period. However, the changes in the money market began two weeks prior to that, on 3 October. In effect, a more detailed and focused analysis on time deposits – the main asset in the money market category – shows important changes in terms of the holders during that week (Figure 10). Specifically, the holdings of this instrument by mutual funds and private investors were highly responsive, while the holdings of pension funds showed a steadily decreasing trend without major fluctuations.[18] In fact, the share of mutual funds decreased by around 4.6% in the first week of October, which was partially compensated by a higher demand for time deposits by private investors – its share increased by 3%.[19] In other words, private investors reduced their direct exposure to mutual funds,[20] but they compensated their portfolios through a direct exposure to time deposits.

Figure 9

Money market instruments

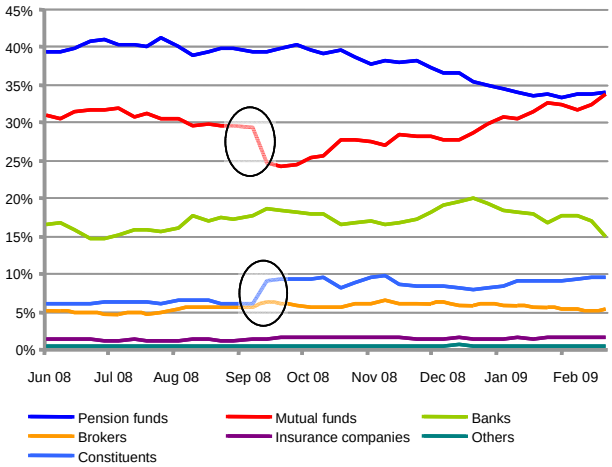
(millions of US dollars)



Source: DCV.

Figure 10

Time deposits by holder



Source: DCV.

With respect to interest rates, even though the aggregate quantities did not move very much, the 30- and 90-day interest rates jumped 263 and 278 basis points one week after the rebalancing of time deposit holders (Figure 11).[21] Given the short sample period, it is virtually impossible to formally establish a sequence of causality. Nonetheless, this apparent precedence is consistent with dynamics potentially observed during periods of liquidity shortage where sellers struggle to find buyers, and prices therefore fluctuate beyond their fundamentals due to such frictions. In this sense, the precedence of the portfolio shift

[18] The smooth reaction of Chilean pension funds is consistent with findings provided by Raddatz and Schmukler (2008).

[19] The category "constituents" corresponds to private investors.

[20] Recall that during the last week of September, private investors ran against mutual funds.

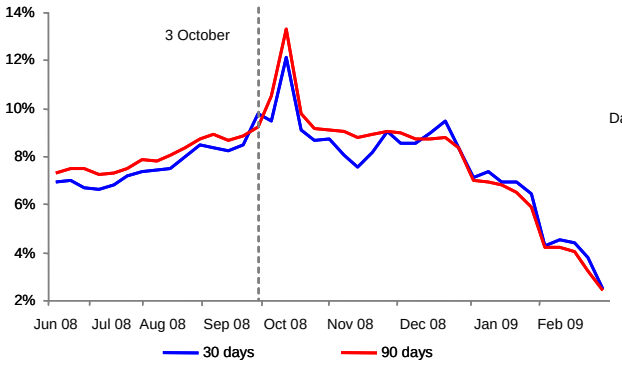
[21] The evolution of longer interest rates is close to the path of 30- and 90-day interest rates.

suggests that monitoring the composition of portfolios could help to improve the monitoring of financial stability by the CBC.

Another dimension to analyse is the maturity of time deposits. The average maturity of the outstanding time deposits exhibits a systematic reduction from around 312 to 246 days without significant fluctuations (Figure 12). This finding highlights another aspect of the time period under analysis: the flight to liquidity. The maturity is a characteristic related to the liquidity of assets, thus, its reduction is clearly a consequence of higher demand for liquidity. Figure 12 also shows the evolution of maturity for large- and medium-sized issuing banks,[22] where the trend is similar across both categories.

Figure 11

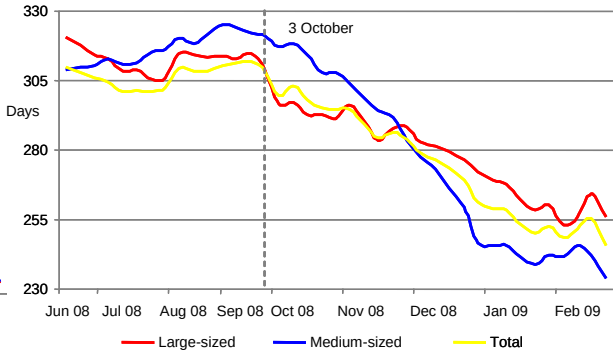
Interest rate of time deposits



Source: DCV.

Figure 12

Maturity of time deposits



Source: DCV.

From the issuers' perspective, the changes in maturity and interest rates seem to be related to the exposure of each institution to mutual funds. Figure 13 plots the initial exposure of each issuing bank to mutual funds, measured as the percentage of time deposits of each bank held by mutual funds as at the week of 17 September, and the change in the time deposit interest rates between 26 September and 17 October. The relationship between these variables seems to be positive, meaning that higher exposure to mutual funds (ie the agent with liquidity problems) has a greater effect on the interest rate of issued instruments. Figure 14 shows a similar scatter with the change of maturity of time deposits at the bank level, and the relationship is positive (ie lower exposure, lower maturity reduction). In other words, the potentially less-affected banks reduce the maturity, which suggests the prevalence of supply over demand factors.[23] Obviously, these relationships involve both supply and demand factors, but beyond stating the relevance or link between these factors, these kinds of dynamics at the bank level reinforce the idea of analysing micro-level data during liquidity events.

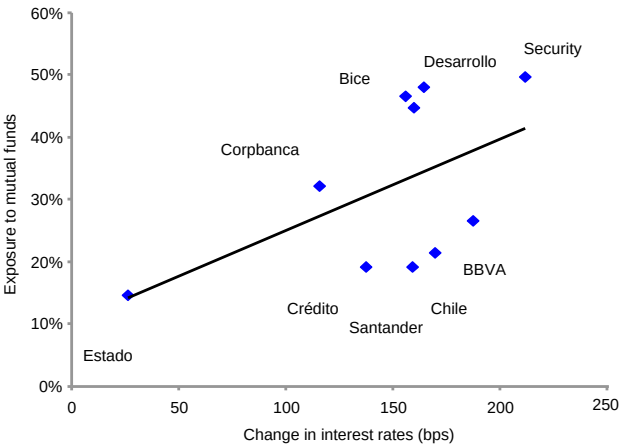
As the sample period is short, the findings highlighted in this section are therefore preliminary, and their robustness is conditional to constructing a longer dataset. Given the previous disclaimer, the main preliminary findings are that changes in asset holdings seem to precede interest rate movements, and that both aggregate dynamics and portfolio changes are relevant.

[22] This classification is based on a cluster analysis and is reported by the Central Bank of Chile (2008).

[23] In effect, given the spike of interest rates and the uncertainty about their future path, the less exposed banks could be better placed to avoid the issuance of longer-term deposits, and vice versa.

Figure 13

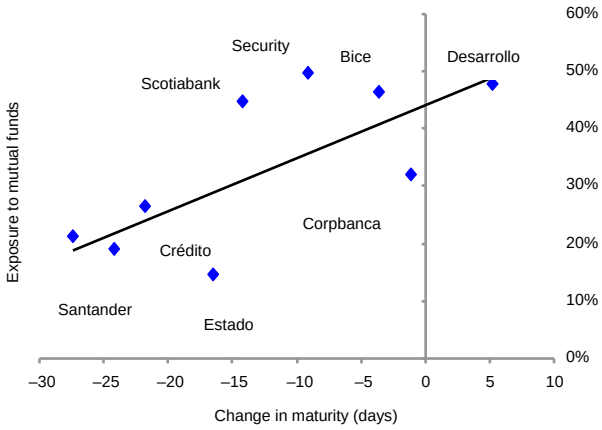
Change in interest rates and initial exposure to mutual funds



Source: DCV.

Figure 14

Change in maturity and initial exposure to mutual funds



Source: DCV.

3.2 The long-term market

The case of long-term fixed income instruments has a distinctive feature with respect to money market instruments. Their issuance is greatly determined by the CBC – which accounts for 20% of the issuance of these instruments – where the decision about how much to issue is more related to monetary policy goals than to investors' demands (ie the supply is more exogenous than in the money market). Therefore, the analysis in this case is more focused on the following portfolio decision: how do the agents rebalance their portfolios between nominal and CPI-linked instruments?[24] The relevance of this point lies in the fact that CPI-linked instruments are more liquid than nominal instruments in the Chilean market (Jervis (2008), Mendoza (1992)), therefore, it would be plausible to expect that agents rebalance their portfolios towards CPI-linked instruments during episodes of liquidity stress. However, it is difficult to disentangle the potential effect of liquidity from other factors such as inflation risk. In fact, based on a standard time series analysis, the conditional volatility of the CPI forecast shows an increase at mid-year 2008.

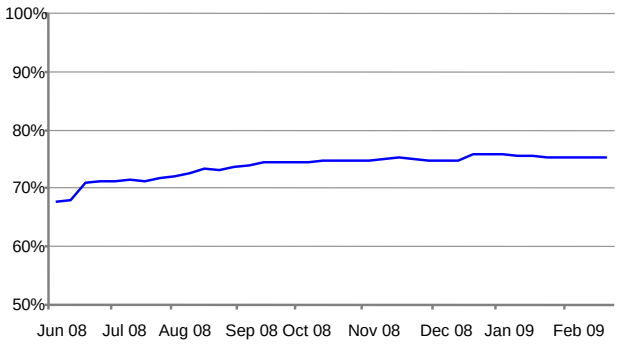
Figures 15 and 16 present the share of CPI-linked instruments issued by the CBC as a percentage of the outstanding value of total instruments issued by the CBC and the share of CPI-linked instruments held by each type of agent, respectively. In aggregate terms, the total share of CPI-linked instruments increased steadily from 68% to around 76% between June and September 2008 (Figure 15). However, the decomposition by agent suggests wider and heterogeneous fluctuations among investors. On the one hand, there is virtually no change in the portfolios of pension funds, which is consistent with evidence on the tendency of these institutions to buy and hold assets (Raddatz and Schmukler (2008)). On the other hand, banks tend to systematically increase their portfolios of CPI-linked instruments from values in the range of 50% to 70%; the portfolio of longer-term instruments held by commercial banks was tilted towards CPI-linked instruments. The portfolio adjustment of commercial banks had, as a counterpart, the lower exposure of mutual funds to CPI-linked securities: the share of these decreased from 65% to somewhere in the range of 40%. In general terms, the

[24] We avoid the comparison of interest rates (CPI-linked and nominal), because the changes in inflation expectations and liquidity premiums during this period cannot be discarded.

observed adjustment could be summarised as a rebalancing towards liquid instruments by relatively liquid agents (banks) having as a counterpart the sale of those instruments by the less liquid agent (mutual funds).[25] Meanwhile, the buy and hold investors' type (pension funds) does not react greatly to liquidity events.

Figure 15

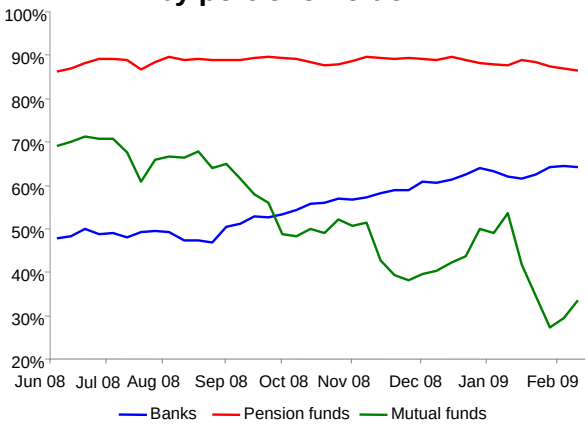
Share of CPI-linked assets



Source: DCV.

Figure 16

Share of CPI-linked assets by portfolio holder



Source: DCV.

Summary

The purpose of this paper was to provide an overview of the DCV database as a complementary source of information to monitor the financial stability of the Chilean market. This dataset contains information on asset holdings that account for the entire domestic fixed income market, providing detailed information about the issuer, nominal value of each asset, maturity and class of agent that holds each asset (banks, mutual funds, pension funds, insurance companies, etc). This information is available from June 2008 to March 2009 at a weekly frequency.

Even though the sample period is relatively short, it covers the liquidity stress period of September–October 2008, and thus the analysis could be useful to understand the dynamics during these types of events. Obviously, the analysis should be enriched to the extent that the database considers more observations. In this sense, this paper constitutes a first step towards a deeper and more detailed analysis focused on portfolio management decisions.

Given the above, the main points are the following. The institutions that were more greatly affected initially by the liquidity contraction (mutual funds) reacted by abruptly reducing their more liquid assets (time deposits) – this asset sale preceded a more generalised response of the aggregate interest rates of these instruments, and the effect at the bank level seems to be related to the initial exposure to mutual funds. Also, and just as importantly, the rebalancing of portfolios in longer-term assets shows that the banks increased their exposure to CPI-linked instruments, which was compensated by a lower exposure of mutual funds to these instruments, while pension funds exhibited a more stable pattern.

[25] Mutual funds were one the most affected agents during the liquidity stress event at the end of September 2008 (Central Bank of Chile (2009)).

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Using high-frequency data to monitor developments in the banking sector – the case of the Czech Republic

Petr Vojtíšek[1]

Introduction

The structure of data collection should always follow the users' requirements. The way in which respective countries are affected by the financial crisis determines the users' requirements and ultimately the data needs. The financial crisis, which turned into a global recession, has provided a good opportunity to carry out a stocktaking exercise in the area of data availability. In the case of the Czech Republic, it was a relatively comprehensive exercise since the Czech National Bank (CNB) acts as a monetary authority, integrated supervisor and statistical institution, thereby creating many synergies. This paper discusses the impact of the financial crisis on the Czech economy, the data collection stemming from the new requirements and the lessons learned from this collection.

The position of the Czech financial sector prior to the financial crisis

The Czech Republic has benefited from a unique combination of features stemming from the fact that its economy was in transition and is still in the process of catching up with the more developed countries of the European Union. The financial sector was privatised relatively recently, in the 1990s, and all major financial institutions are already in private hands. An even more important factor regarding the position of the financial sector is that the balance sheets of the privatised institutions had been cleared before they were privatised. A special bank, which later turned into a non-bank agency, was established in 1991 to deal with bad loans transferred from banks. Its role was fulfilled and the agency was dissolved in 2007.

Economic activity in our country has been relatively high in recent years. We have benefited from the privatisation of the majority of our economy, which is particularly true in the case of strong foreign shareholders. They have brought not only capital and know-how to our country, but also market contacts. This has resulted in high GDP growth at the macroeconomic level (around 6% annually in 2005–07) and a number of fruitful projects at the microeconomic level. The strong demand for credit allowed banks to carry out their normal business – to provide financing to the non-financial sector and households. The banks were in such a good position that they did not need to look for further investment opportunities and, therefore, their exposure to exotic assets, which have become toxic, was very limited (the share of bad loans was also very limited prior to the financial crisis).

There is one further feature that should be mentioned: the Czech currency. The Czech koruna has been an attractive currency with an appreciating trend for many years. This trend, enforced by systematically low interest rates that have been at some point lower than those in the euro area for some time now, has not encouraged clients – either businesses or

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households – to borrow in foreign currencies. Therefore, our clients do not face the problems associated with exchange rate risks.

The funding of banks is based mainly on primary deposits, which exceed loans by more than 20%. This means that banks have no particular need to look for funding in the financial market or abroad. There is a significant surplus of liquidity in the money market, putting the central bank in a position to permanently withdraw the liquidity from the market. This overall surplus represents approximately one third of primary deposits or one tenth of GDP. Nevertheless, the liquidity is not equally distributed among the financial institutions. There are also some institutions whose business is based on refinancing in the market, but they do not rank among the biggest ones.

All the above-mentioned factors mean that the financial sector in the Czech Republic was in relatively good shape prior to the start of the financial crisis. However, the financial market is sufficiently developed and has an international character. The problems which the Czech economy is facing are not of domestic origin, but are almost exclusively imported. There are no obvious problems stemming from pressure on balance sheets.

Impact of the financial crisis on the Czech economy

The first signs of the global financial crisis were detected in the interbank market in autumn 2008. The normally smoothly operating market displayed a more cautious approach, with institutions maintaining a liquidity surplus. The main cause for this was a lack of confidence among banks probably spreading from abroad, resulting in their preference to hold more liquidity than usual. In spite of the fact that there has long been a significant surplus of liquidity in the Czech money market, this lack of confidence caused a deterioration of the proper functioning of the market. The CNB launched liquidity-supplying repo operations with maturities of two weeks and three months in October 2008. Czech Republic government bonds were made eligible as collateral in those operations. The CNB thus supported the smooth functioning of the government bond market. This technical measure was aimed at preventing the potential spread of problems from foreign financial markets to the Czech financial sector. In fact, the liquidity-supplying repo operations have been used by banks only to a very limited extent. Nevertheless, the developments in the financial market have been reflected in the level of interest rates. While there had been a 0.3 percentage point spread between the three-month interbank rate and the CNB repo rate before the period of turbulence, it temporarily increased to 1.5 percentage points at the end of 2008 and has remained at a somewhat higher level (0.6 percentage points.) compared to the period before the crisis.

Due to the potential or real problems of parent companies or headquarters abroad, transfers of profit or liquidity and the exposure of Czech banks to them were the main potential threats that needed to be monitored. The country was also affected by an increase in risk aversion to the whole of central and eastern Europe, mainly due to the real problems of countries which required external financing. The Czech Republic is among the countries that provide loans to some of them or participate in lending schemes organised by international institutions such as the International Monetary Fund. The financial crisis itself has had only a limited impact on the Czech financial market – an increased spread between money market and policy rates has been the most visible effect.

The financial crisis has led to a significant decrease in global economic activity. The Czech economy is very open and export-oriented; the loss of demand from major trading partners is affecting domestic economic activities. Weak foreign demand might be the most severe impact stemming from the global financial crisis for the Czech economy. The fall in GDP represents 5% in y-o-y terms in the first half of 2009. These developments have been

reflected in a weaker domestic demand in both business and household sectors and banks have become more cautious in providing them with credit.

Information collected beyond the standard reporting framework

After detecting the first signs of potential problems in the financial market in October 2008, additional information began to be collected. While a set of information was prepared once a week, a substantial amount of information was collected on a daily basis.[2]

Liquidity

Development in liquidity was the first area to be monitored. Banks and branches of foreign banks were required to report the following information on a daily basis:

(a) volume of highly liquid assets

(b) volume of deposits broken down into deposits on demand and term deposits

(c) expected transactions which might significantly decrease the highly liquid assets

(d) bank exposures vis-à-vis the group of the foreign parent bank

This set of information revealed the actual liquidity situation and was a good indicator of the functioning of the market. It monitored the positions of major players in the money market and also the potential flows between the Czech banks and related companies abroad since Czech banks belong to international groups. Cross-border exposures are a very important indicator in monitoring the potential spread of problems from foreign to Czech banks.

Money market

The figures collected from banks were supplemented by information from the money market. The CNB carries out open market operations, thereby allowing the mood of the market to be monitored.

Cash operations

A lot of information in the media about the spread of the financial crisis from abroad to our country created nervousness not only in the financial markets but also in businesses and households. This was reflected in a higher than usual preference for cash. The CNB gathered daily information on the overall deposits and withdrawals of cash carried out by banks at CNB branches. Claims on cash were broken down into those required within the standard regime and additional ones, if they arose. Bank drawings exceeding a specific amount were monitored on an individual basis.

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[2] Due to the improved situation in the financial market, most of the additional data has ceased to be collected since June 2009.

Credits

Daily information on the volume of outstanding loans was reported by selected banks representing more than 80% of the market. It is necessary to take account of the fact that the outstanding volume represents something akin to gross information since it is the result of providing new credits and repayments from those provided in the past. In addition, they are influenced by non-transaction changes such as exchange rate movements or write-offs. This information is easily available and based on accounting, and was considered a leading or early warning indicator regarding bank lending activity.

New businesses

The volume of new credits and the interest rates imposed on them according to European standards are the variables that accurately describe the actual situation with regard to lending. There are two kinds of interest rates on credits in the statistics of the CNB (which is also the case in other member states of the European Union): (i) on the outstanding volume; and (ii) on new business. They are different in the way that they reflect the up-to-date level of interest rates. The interest rates on outstanding amounts bear a great burden from the past. In particular, loans with a long-term maturity do not reflect the present level of interest rates. The harmonised European methodology (reflecting the most up-to-date interest rate levels[3]) defines new business as credits newly stipulated in the respective month. The volumes of these newly stipulated credits are entered as weights in compiling interest rate statistics.

Two measures were applied to these statistics: the earlier provision of information and a more detailed structure of new business. With regard to the former, the CNB agreed with selected banks to shorten the timeliness for the standard reporting of these statistics: the information was available one week earlier than the statistics for the whole monetary financial institution sector, and served as a leading indicator. As regards the latter, detailed information on the structure of new credits and their respective interest rates were reported. The information was broken down according to sector (non-financial and households), the volume of credit provided to non-financial institutions (below and above approximately EUR 1 million equivalent) and the purpose of the credit in the case of households (for dwellings, consumer credits). In addition, all this information was monitored according to different banking groups: large, medium and small banks; branches of foreign banks; and building societies. This more detailed information enabled the identification of potential changes in the behaviour of different banking groups in their lending activities and changes in their approach to different clients' demands.

The above-mentioned information can be divided into two groups: for supervisory or financial stability purposes and for monetary purposes. The first group, which includes liquidity indicators, money market and cash information, monitors the impact of the global financial crisis on the Czech financial market. Although some effects have been reflected in the Czech economy, eg wider spreads along the yield curve, the overall impact has so far been limited. The second group, which includes information on credits and interest rates, is of a

[3] There also used to be a third kind of interest rate on credits in the statistics of the CNB: for newly provided credits. They were compiled before the harmonised interest rates on new business were introduced in 2003. The only difference was the methodology of weights. The newly provided credits in a respective month were used as weights instead of the newly stipulated loans. It meant that the interest rate statistics were also affected by the conditions stipulated in the past. From this point of view, the harmonised European methodology most accurately reflects the up-to-date level of interest rates.

macroeconomic character and monitors the impact of the slowdown of economic activities. This is having a more significant effect on the Czech economy.

Lessons learned and concluding remarks

As mentioned above, an integrated supervisory body is located at the central bank. Supervisory information is added to statistical information which is usually available at the central bank. Certain data, both standard and those provided as a result of the global financial crisis, are collected mainly for supervisory reasons, whereas other data are collected for monetary purposes, but together they provide the policymakers with a more comprehensive set of information than if these two functions had been separate. In addition, the statistical and regulatory concepts have interacted more closely as a result of the new data collection. The breaking down of loans by volume of individual cases in the statistics is a good example. The unified data collection system is also an advantage. The integration of a regulator at the central bank has thus proved successful during this turbulent period.

The CNB always discusses new reporting requirements with banks prior to their implementation. The feedback provided by banks is appreciated mainly with regard to the designing and structure of statements. The same approach was applied in the case of higher-frequency data collection and tougher timeliness. The banks have been cooperative, and have suggested several improvements, eg shortening the timeliness. On the other hand, they have explained their procedures while completing the standard reporting, which was also of general interest. Having received these explanations, the CNB has ceased its intramonth collection of interest rate statistics and turned its attention to shortening the timeliness of data provision in the case of the most significant banks. The quality of the intramonth data would not have been reliable since the quality checks are carried out in several waves and are finished just before the standard timeliness. This cooperative approach has resulted in a better quality of data and has thus been confirmed as the best practice.

The need for more timely data showed that there is still some room for improving the timeliness. Reserves have been found both at banks and at the CNB. This is also an important outcome, since the timeliness of reporting to the ECB will be tougher for the Czech Republic after joining the euro area.

Stating that statistics have been “discovered” is of course an exaggeration. Nevertheless, the statistics, particularly those concerning new business, have released their potential. In addition, new requirements or requirements for more detailed information within the standard statistics have appeared, eg figures on credit broken down by economic branch, all of which have been a very useful resource.

The media, even professional publications, published articles based on figures that were not entirely relevant, or on data that were not interpreted in the correct way. The main problem was that the whole region (central and eastern Europe) was assessed as a block without distinguishing among individual countries. This was an incentive to check whether any information was missing from the CNB website or whether any information could be released on an earlier basis. We have found at least one piece of information which has not yet been published: an amortisation schedule for long-term debt by creditor and debtor broken down by principal and interest and by years. This information has been included on the balance of payments section of the CNB website.

The last remark concerns the developments of harmonised statistics in the European System of Central Banks. Phenomena such as the wider use of mortgages, the lending provided by non-bank financial institutions to households or the securitisation of loans are being captured by statistics. The regulation on statistical reporting requirements as regards securitisation has recently entered into force. The securitisation of loans and their transfers to specialised

institutions was identified as an important phenomenon at least two years ago when the regulatory work began. The financial vehicle corporations engaged in securitisation have not yet been identified in the Czech Republic, but they exist in other countries. This regulation enables the monitoring of transfers of loans or credit risks from the balance sheets of banks.

Credit risk transfer – dealing with the information gap[1]

Luís D'Aguiar[2] and Filipa Lima[3]

1. Introduction

In the years just prior to the financial market turmoil that hit the world economy in the summer of 2007, credit risk transfer (CRT) instruments experienced an extraordinary growth. Market survey data published by the International Swaps and Derivatives Association (ISDA) show that, for instance, the notional amount outstanding of credit default swaps (CDSs) at end-June 2007 (US$ 45.5 trillion) was more than eight times larger than at end-June 2004, with an average annual growth rate well above 100%. Another type of CRT instrument, collateralised debt obligations (CDOs), reveal a similar pattern: data disclosed by the Securities Industry and Financial Markets Association (SIFMA) on global CDO issuance in the first half of 2007 was five times that of the same period in 2004, with the average annual growth rate above 70%. Impressive as they may look, these figures are probably merely hinting at the true significance of global CRT activity, which remains largely uncovered by official statistics, in spite of its likely relevance in relation to the efficiency and stability of financial systems, and do not necessarily depict the amount of credit risk effectively transferred outside the banking system. Still, it seems safe to say that the widespread use of CRT instruments has profoundly changed the global financial landscape and was central to the recent credit market turbulence.

The paucity of suitable statistical data about these products, together with their intrinsic complexity and opaqueness, give reason for the ongoing efforts by financial sector authorities worldwide, including international standard setters, to monitor CRT activity more closely and to mitigate the information gap associated with the more complex CRT products – an issue that combines, on the one hand, limited or no access to relevant information by some market participants and, on the other hand, the ability of market players to fully understand the information provided.

We argue that the way forward to build knowledge in this field should not necessarily rely only on gathering new information on CRT activities or on restraining these activities through heavier regulation, but rather on exploring the largely unused statistical potential of already existing data sources – including, in particular, administrative micro data. They are certainly not *the* solution, but they should be part of it.

2. CRT can take different forms

Banks need to manage the credit risk exposure inherent in their portfolios as well as in individual transactions. Credit risk may be defined as the possibility that the value of a loan will decrease due to a change in the borrower's ability to make payments, whether that change is an actual default or a change in the borrower's probability of default. For a variety

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1 The analyses, opinions and findings of this paper represent the views of the authors, which are not necessarily those of the Banco de Portugal.

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of reasons (see Section 3 below), banks have an incentive to transfer those risks to other parties more willing or able to assume them and earn the associated return. Transferring credit risk by way of, for instance, financial guarantees, surety bonds or credit insurance is a well-established feature of financial systems. The same may apply to loan syndications and traditional (true sale) securitisations, which have been used by banks for many years for similar purposes and are, by and large, the principal way Portuguese banks use to shed credit risk (see Section 3). At least in principle, those CRT instruments should be easily tackled, contrary to more innovative products – namely credit derivatives and structured products such as asset-backed securities (ABS) and CDOs – whose risks and valuation are difficult for most investors and rating agencies to assess. Recent growth of CRT activity has been mostly concentrated in these more complex instruments, which justify a brief reference to some of their central features.

Credit derivatives

Unlike techniques that involve the transfer of loans, credit derivatives isolate credit risk from the underlying loan and allow it to be traded. A liquid market for credit derivatives did not emerge until July 1999, when the ISDA succeeded in establishing further standardisation for these instruments. CDSs, total return swaps and credit-linked notes are commonly transacted forms of credit derivatives, particularly with loans as underlying.

Asset-backed securities

ABS are bonds or notes backed by non-mortgage loans. The financial institutions that originate those loans turn them into marketable securities through (true sale) securitisations, whereby pools of loans are sold to a special purpose vehicle (SPV), whose sole function is to buy such assets in order to securitise them. The securities sold generally benefit from some sort of credit enhancement to make them more attractive to investors. SIFMA estimates that more than US$ 2.6 trillion of ABS were issued from 1985 to 2003.

Collateralised debt obligations

CDOs are another type of structured product, similar to ABS. In a basic CDO transaction, the reference credits are sold to an SPV, which then issues a variety of securities with differing degrees of repayment risk, to appeal to investors with different risk appetites. Typically, the SPV will issue three layers of securities: the first comprises the senior tranches and is rated from A to AAA; the second receives ratings from B to BBB; and the third layer (the equity tranche) retains most of the credit risk and is usually unrated. The originator of the CDO usually retains some of the equity tranche to signal its confidence in the transaction. Included under the generic designation of “CDO” are a great variety of financial products, corresponding to, for example:

(i) the aim of the transaction (balance sheet CDOs; arbitrage CDOs)

(ii) the way in which the credit risk is transferred – true sale (cash CDO) or synthetic securitisation (synthetic CDO)

(iii) the composition of the underlying portfolio – bank loans (CLOs), bonds (CBOs), CDSs (single-tranche CDOs) and structured products (“CDOs-squared”; ABS CDOs; etc).

3. Implications of banks' involvement in CRT activities

Credit risk shedding and/or risk-taking are typically the driving force behind banks' involvement in CRT activities. The motivations behind securitisation operations will be given particular attention in this article due to the prominent role of these types of operations in the Portuguese financial market.

The benefits of securitisation include, inter alia:

- realising the value of the assets, particularly where a business is unable to raise money against it
- increasing liquidity, by means of the influx of cash brought about through the securitisation
- transferring the risk element in the underlying assets to the investors as the assets are sold to the SPV
- removing the assets from the balance sheet of the originator for accountancy and regulatory purposes, allowing, for example, the freeing up of regulatory capital.

Additionally, there could be possible benefits of using an offshore structure, derived from the flexibility, ease of administration and tax advantages provided by the relevant offshore legislation.

Furthermore, this phenomenon is not neutral in terms of monetary policy. According to Stark (2007), the emergence of securitisation and credit derivatives are likely to have led to a change in bank lending dynamics, possibly leading to an increase in bank loan supply. Hence, the advances in CRT instruments, by expanding the breadth of the credit markets, are likely to have reduced the effectiveness of the bank lending channel in normal circumstances.

4. Collecting the data

National central banks have at their disposal a huge amount of financial data. However, recent developments have proved that there is an urgent need for initiatives to improve the availability of information on credit markets and to overcome possible statistical shortcomings. These initiatives should be twofold: allowing for a better understanding of the past and, more importantly, providing statisticians and analysts with inputs to prevent similar situations and/or to better tackle them beforehand.

For these purposes, the availability of databases on micro data, covering different areas of the economy and the financial markets, which allow for cross-checking of the data, seems to be of high importance.

In particular, micro data as a set of administrative individual registers present an enormous potential for statistical use. In general, this approach is technically easy to implement with relatively low associated costs.

Another significant advantage of such databases is a very good coverage of the population (in most cases). A single database may produce inputs, thus augmenting the uses of administrative data sources. Registration data are useful in building and maintaining lists of units as the starting points for surveys. Transaction data can be used for:

(i) new statistical products

(ii) quality control when cross-checking with other statistics

(iii) additional details of already existing statistics.

The Banco de Portugal has been following this approach for some time, with proven results, and has also been exploring the statistical potential of various sources of information, including a number of different administrative databases.

Securities Statistics Integrated System (SIET)

Since 1999, the Statistics Department has been managing this security-by-security (s-b-s) and investor-by-investor database. SIET has the advantage of gathering, in a single database, all the information concerning securities (excluding financial derivatives), which is then used in the compilation of various statistics for which the Banco de Portugal is responsible. Both stocks and transactions are collected on a monthly basis. Information is acquired by ISIN code and is then classified according to ESA 95 (European System of Accounts) financial instrument classification. Structured instruments are not identified separately; however, the subcomponents of these instruments that take the form of securities are individually reported to our s-b-s system. The database contains registers of around 45,000 shares, 75,000 debt securities and 5,000 mutual fund shares/units. The number of entities (issuers and investors) is over 154,000. On a monthly basis, we process over 200,000 registers regarding portfolio data. The usefulness of having such a database was apparent following the failure of Lehman Brothers, namely so as to assess the exposure of Portuguese entities to the bankrupt firm. In the near future, information from the Centralised Securities Database (CSDB) managed by the European System of Central Banks (ESCB) will be integrated with our s-b-s system, replacing data currently obtained from commercial data providers, thus improving quality and coverage. Another possible future enhancement concerns the inclusion of financial derivative instruments.

Central Credit Register (CCR)

The CCR was created in 1978 by the Banco de Portugal with the purpose of providing credit-related information to the participants and helping them in their assessment of the risks attached to extending credit. In 1999, it came under the responsibility of the Statistics Department. This allowed for new uses of what was formerly a purely administrative database, such as:

(i) statistics (business register, data quality control, complementary data, and separate statistical outputs)

(ii) banking supervision and regulation (assessment of credit risk and concentration of risk exposure both at micro and macro level; improvement of on-site inspection practices, etc)

(iii) economic research and policy (structural analysis, monetary policy, etc).

Loans are classified according to a set of predefined variables which harmonise risk assessment requirements and statistical criteria. Monthly credit balances are reported for each individual borrower (mostly private individuals and corporations). The reporting threshold is very low – a minimum of €50 per credit balance. In terms of data coverage as a percentage of adults we rank first, with 76.4%, followed by China (58.8%), according to *Doing Business* (World Bank (2009)).

We have recently introduced major changes to this database, which relate to the reporting of additional variables: the type and purpose of the loan; the status of the loan; the type of liability of the borrower; the original and residual maturity; the number of days the loan is overdue (in case of default); the currency; the country where the loan was granted (to cover loans granted to residents by foreign branches of Portuguese credit institutions); the type and value of the collateral or guarantee securing the loan (where applicable); and the value of monthly repayments (only for private individuals and certain types of loans). Special flags are

used to identify securitised loans, syndicated loans and loans used to back mortgage bonds, etc.

Simplified Corporate Information (IES)

Formally created by Decree-Law no 8/2007 of 17 January, IES allows companies to fulfil separate obligations to four public entities simultaneously through a single electronic submission. IES is the system for the electronic submission of accounting, fiscal and statistical information that companies must normally provide to the Ministry of Justice, the Ministry of Finance, Statistics Portugal and the Banco de Portugal. IES requires the submission of a comprehensive set of information, and includes a cover page, concerning the general aspects of the company and the data, and 13 annexes to be filled in with annual data. The annexes typically reflect: the different types of companies (non-financial, financial and insurance); the nature of the data (non-consolidated and consolidated); and the type of content (the company as a legal entity or each establishment of one company). With regard to the reporting of data for non-financial corporations on a non-consolidated basis, it includes the official information defined in the Chart of Accounts as well as some additional details for statistical and fiscal purposes. The Banco de Portugal requested the inclusion of a few additional details considered to be very important for balance of payments (BoP), international investment position (IIP) and financial accounts purposes. Prior to the implementation of IES, we received data from around 15,000 non-financial corporations covering around 600 items; we currently receive data from nearly all companies (financial and non-financial) operating in Portugal (around 300,000) covering over 1,800 items.

Prudential supervision data

The Banco de Portugal has a long-standing tradition of fruitful cooperation between the Statistics and the Banking Supervision Departments. Individual data are easily interchanged for quality and consistency purposes; in particular, the Statistics Department has access to the accounting data submitted for supervisory purposes, which allows the compilation of statistics that, besides complementing the existing ones (including statistics on non-monetary financial institutions) serve as an additional means of cross-checking their internal consistency.

In addition to exploring the statistical potential of available administrative databases, institutional cooperation among the relevant supervisory authorities both at national and international level plays a pivotal role in this context.

In July 2007, the Ministry of Finance of Portugal, the Banco de Portugal, the Portuguese Insurance and Pension Funds Supervisory Authority and the Portuguese Securities Market Commission signed a Memorandum of Understanding (MoU) for the creation of the National Financial Stability Committee. This forum represents a policy commitment at the highest level for cooperation among the relevant supervisory authorities in order to improve financial supervision. It aims to face the challenges presented by financial markets, namely financial innovation and rising financial integration, in order to reap the corresponding benefits. The MoU promotes the activation of cooperation mechanisms should a crisis with a systemic impact over the national financial market occur; the mechanisms include exchanges of information, an assessment of the nature and impact of the crisis, and the corresponding appropriate and coordinated action to be taken. The committee is essential in the coordination with other European financial supervisory authorities in the context of the MoU on EU cross-border financial stability. It is expected that such initiatives will enhance our level of preparedness and allow us to deal more efficiently with possible future financial crises.

Finally, at European level, several noteworthy initiatives have been put forward by the ECB/ESCB:

- enhancing the ESCB statistical framework (eg new regulations on investment funds and financial vehicle corporations engaged in securitisation transactions; changes to existing regulations to cope with the lack of information on securitisation, etc)
- tailored use/enhancement of internal databases
- supporting enhancements of BIS over-the-counter (OTC) derivatives data
- pooling national supervisory data
- supporting market initiatives for greater disclosure
- use of commercial data and clearing house data.

5. Concluding remarks

The US subprime crisis of the summer of 2007 and the ensuing financial turmoil highlighted a generalised lack of relevant information as regards CRT activities; financial authorities worldwide were unprepared to deal with their complexity, extensiveness and implications.

Moreover, the complex and opaque nature inherent to CRT instruments together with prospects for high returns, under a set of very favourable circumstances, led to a demise of responsibility – due to a lack of incentive – to adequately monitor the borrower's ability to make payments, particularly on the part of the loan originators. Concomitantly, there was a blind reliance on ratings as the sole criterion for assessing risk on the investor's side, which favoured the widespread use of these products.

We are facing a global challenge that demands a global response. This, in turn, calls for a stronger commitment at the highest level for cooperation among financial authorities both at national and international level, considering the interlinkages between financial sectors. The key elements in this strategy are, inter alia:

(i) the exchange of information among the relevant partners

(ii) the definition of coordination mechanisms, setting up practical procedures for the involvement of all relevant parties in a crisis situation based on the existing legal responsibilities, and building on existing networks of authorities.

It is our belief that such a commitment will put financial authorities in a better position to face the challenges brought about by financial markets, namely CRT-related financial innovation, so that we can fully reap their benefits.

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Discussant comments on session STCPM62: Data issues related to the financial crisis

Satoru Hagino[1]

Filipa Lima from the Bank of Portugal explained in detail the measurement of credit risk transfers. Several international initiatives triggered by the financial turmoil are about to come to fruition. Data reporting on securitisation by banks and financial vehicle corporations will soon begin in the euro area. Their gross positions/flows in financial derivatives will be identified. The BIS statistics already contain some derivative data but new statistics on the credit default swap data will also be compiled.

Filipa Lima expressed the view that the way forward should not necessarily rely only on gathering new information about credit risk transfer activities or on restraining those activities through heavier regulation, but rather on exploring the largely unused potential of existing data sources, such as administrative micro data.

Data collected for on-site monitoring could be potential data sources for financial statistics. In light of the financial crisis, data on the holdings of structured financed products have been collected in many countries. Those data, however, cannot easily be used for the purpose of compiling statistics due to their confidential nature. In addition, there is a lack of momentum in compiling comprehensive statistics for financial vehicle corporations and the securitisation market due to resource constraints. International initiatives appear to be a very useful tool in creating such momentum. Otherwise, most useful data remains unpublished or unprepared.

The Bank of Portugal holds large databases, namely the security-by-security database, the central credit register and simplified corporate information. The cost of maintaining such databases might be a concern; in particular, the security-by-security database seems to be very expensive. In other countries, credit register databases could be operated by associations or private companies, and corporation statistics could be compiled by the central government. It will be interesting to see how much labour is necessary for the Bank of Portugal to develop and maintain its databases.

Liliana Cavieres from the Bank of Chile explained the use of databases provided by the Central Securities Depository. The institutional arrangement between the Central Securities Depository and the Bank of Chile appears to be quite relevant. The Bank of Chile receives data on ticker, value, currency, maturity, and holders every Monday. The data on the composition of holders are very comprehensive, and the data on the composition of assets by maturity, as well as that of issues by currency, are extremely useful.

At the previous International Statistical Institute (ISI) session in Lisbon, participants from the IMF advocated the use of the balance sheet approach. This approach is based on the matrix of an economy's intersectoral asset and liability positions, which appears very similar to a stock table of flow of funds accounts or financial accounts. The information gap between the traditional flow of funds analysis and the balance sheet approach is the breakdown of currency and maturity. That breakdown is not available in enterprises' balance sheet data and, therefore, is generally not incorporated in the flow of funds accounts. In Chile, such information is provided by the Central Securities Depository. This would facilitate the use of the balance sheet approach.

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[1] Bank of Japan.

With regard to the data of the Central Securities Depository, I would like to ask the following questions. First, to what extent is cross-classification feasible, for example, the cross-classification of holders and currency, as well as of holders and maturity? Second, are there nominee companies among the holders? For instance, if nominee companies are included in banks, the true holders might be non-residents or residents other than banks. Third, how should securities be evaluated? If they are recorded at face value, how are they converted into the book or market value?

Finally, I would like to point out that central securities depositories around the world have recently begun to exchange information and collaborate on projects. It might be useful for the group of central bank statisticians to discuss with the group of central securities depositories the issue of data needs for policy purposes.

Special Topics Contributed Paper Meeting 77

Institutional cooperation and technical assistance – steps towards developed statistical systems

Chair: João Cadete de Matos, Banco de Portugal

Papers: A contribution to developed statistical systems in developing countries – the experience of the Banco de Portugal
José Sérgio Branco and Filipa Lima, Banco de Portugal

Handling systems challenges from the compilation of flow of funds – the case of South Africa
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Chairman summary of session STCPM77: Institutional cooperation and technical assistance – steps towards developed statistical systems

João Cadete de Matos[1]

The statistical systems of the developing countries have experienced significant changes in recent years. However, the growing importance of statistical information for the decision-making process both at national and international level, in an increasingly globalised world, combined with the fact that statistics are a public good, pose very demanding challenges for those countries. The purpose of this STCPM was, on the one hand, to present to the international statistical community the work done so far by a group of developing countries, namely the Portuguese-speaking African countries, in terms of developing their respective statistical systems and, on the other hand, to share their main concerns in order to meet the challenges ahead, while benefiting from the experiences of other developed countries.

Four papers were presented, covering practices in both developed and developing countries, and were ably discussed by Ms Adelheid Bürgi-Schmelz (International Monetary Fund), together with a thorough description of the IMF's General Data Dissemination System's (GDDS) purposes and main features, as well as of the benefits that national statistical authorities may reap by adopting the GDDS framework. The discussions that followed the presentations of the papers furnished useful inputs for further work.

Mr António Ramos da Cruz (Banco Nacional de Angola) made a presentation about oil production in Angola, which was described as the most important economic activity in the country, accounting for 90% of exports and 80% of GDP. The paper discussed the legal and practical arrangements put in place by the Banco Nacional de Angola for the compilation of balance of payments (BoP) statistics, highlighting the fact that raw data from the oil-producing companies are used as inputs to compile the BoP and also to generate other statistics, such as the aggregated accounts of the oil production branch of activity and the geographic breakdown of production.

Mr Jamal Omar (Banco de Moçambique) explained in his paper that the monetary policy in Mozambique is currently based on a money targeting regime, a framework that has shown some weaknesses due to the structural breaks associated with several deep financial system reforms that Mozambique has witnessed during the last decade. This issue seemingly undermines the effectiveness of the monetary policy and calls for an alternative framework. The paper describes the current statistical challenges for the development of a forward-looking framework for conducting effective monetary policy based on a standard New Keynesian model, a type of model broadly used by countries under inflation targeting regimes. However, the implementation of such a model poses a huge challenge in the field of data limitation (eg small sample, time series with gaps, data unavailability and low coverage), which highlights the importance of technical assistance in this context.

Ms Filipa Lima (Banco de Portugal) also spoke about the increasingly demanding challenges faced by the producers of statistics, in light of the growing importance of statistical information for the decision-making process, indicating institutional cooperation as a key factor in successfully meeting those challenges, given that international cooperation is a

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means to exchange experiences, share good practices, and improve the quality of statistics. The paper describes the Banco de Portugal's involvement in international statistical cooperation, both in multilateral forums and through bilateral relations, as well as the aims pursued in this respect, which are twofold: improving internal practices and organisation by learning from other countries' experiences; and sharing its own knowledge and skills with institutions facing new challenges. The paper also explains the activities in which the Banco de Portugal has been engaged in the field of statistics in terms of international cooperation and assesses the main benefits that can be reaped for all parties involved.

Mr Zeph Nhleko (South African Reserve Bank) addressed the problems posed by the compilation of Flow of Funds (FoF) in South Africa, stressing the fact that the challenges presented by statistical systems increase the complexity of putting together a useful set of FoF matrices. The paper seeks to analyse how South Africa has dealt with systems challenges during the compilation of FoF while continuing to produce good statistics. The paper aims to share South Africa's FoF compilation experience while highlighting the importance of liaising with other institutions in order to learn from them.

A contribution to developed statistical systems in developing countries – the experience of the Banco de Portugal

José Sérgio Branco[1] and Filipa Lima[2]

1. Introduction

The production of statistics is a social responsibility. Therefore, the statistical system must be organised in the most efficient way possible, ie by providing good-quality data to the public at the minimum social cost. Cooperation is a way of improving efficiency. This paper presents the experience of the Banco de Portugal in the framework of statistical cooperation and assesses the main benefits that can be reaped for all parties involved. The Banco de Portugal has a long experience in the field of statistical cooperation, which has traditionally involved countries from the Community of Portuguese Language Countries (CPLP)[3] and, more recently, the acceding countries to the European Union.

The activities of the Banco de Portugal in this domain take different forms: visits of foreign institutions to the Bank; technical assistance missions to foreign institutions; initiatives of international organisations with the support of the Bank; multilateral meetings; and seminars. The role of multilateral activities has been increasing in recent years in comparison with bilateral training efforts.

In the next section, we will describe the main aspects of cooperation, including the motivations and the main benefits. The third section summarises the different forms of cooperation activities in which the Banco de Portugal has been engaged. We conclude with some final remarks in the fourth section.

2. General features

The basis of cooperation lies in the need to work together to achieve common goals. The motivation behind the Banco de Portugal's cooperation efforts lies in the notion that international cooperation is a means to exchange experiences, share good practices, and improve the quality of the service of central banks. The statistical function is an increasingly important function of central banks around the world. From original statistical areas of money and banking statistics and balance of payments compilation, many central banks have also acquired experience in other fields of economic statistics: national accounts, statistics on non-financial corporations, central credit registers or pension funds. The Banco de Portugal has itself experienced this widening of the scope of statistical provision in the last few years, and was formally recognised in 2008 as a Statistical Authority by Portuguese Law.

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[1] Statistics Department, Banco de Portugal.

[2] Statistics Department, Banco de Portugal.

[3] The CPLP is an international organisation which includes the following eight countries: Angola, Brazil, Cape Verde, Guinea-Bissau, Mozambique, Portugal, São Tomé and Príncipe and East Timor.

The cooperation activities of the Banco de Portugal in the field of statistics have been chiefly focused on two main groups of countries. The first group concerns the countries of the CPLP with which Portugal shares a common history and language and which have traditionally been special partners in the Portuguese cooperation policy. The cooperation with these countries focuses predominantly on the improvement of statistical capacities, in particular in the application of international statistical standards and the exchange of know-how. In the specific case of Brazil, there is an agreement of technical cooperation and assistance between the Banco de Portugal, the Central Bank of Brazil and the Foundation of the Brazilian Institute of Geography and Statistics (IBGE), with an emphasis on national financial accounts.

The second group is composed of countries in the process of acceding to the European Union. In the framework of this process, countries should take steps to develop their statistical systems and align their data with European and international standards. The experience of Portugal in the development of its own statistical system, before and after its accession to the European Union, provides a very good input to the new EU member states. Seven countries were involved in collaboration with the Banco de Portugal: Cyprus, the Czech Republic, Latvia, Lithuania and Slovenia, which acceded to the European Union in 2004, and Bulgaria and Romania, which acceded in 2007. The cooperation activities do not end after accession; we also have cases where we have shared experiences with other EU member states. Additionally, outside the CPLP and the European Union, the Banco de Portugal has had very fruitful collaboration with other countries, namely, Chile, Israel, Japan, Malaysia, South Africa and Morocco.

There is a mutual gain from cooperation: the sharing of good practices, an increase in the comparability of statistics, the exchanging of experiences and an improvement in relations between countries. In addition, the fact that cooperation with those countries (especially CPLP countries) is regular, consistent and continuous strengthens the bonds between them.

3. Forms of cooperation

The cooperation activities of the Banco de Portugal in the field of statistics can take the following forms: visits of foreign delegations to the Banco de Portugal; technical assistance missions; multilateral meetings; support to international organisations; and seminars. The involvement of the Banco de Portugal in multilateral activities has been a relatively new feature in its cooperation activities. These multilateral activities complement the bilateral missions as they lead to the creation of an international community of statisticians.

3.1 Visits to the Banco de Portugal

The Banco de Portugal frequently receives, in its offices, the visits of colleagues of other central banks and national statistical institutes. These visits can consist of a complete tour of the Statistics Department or one of its units: National Financial Accounts and Securities Statistics; Balance of Payments and International Investment Position Statistics; Monetary and Financial Statistics and Central Credit Register; and Central Balance Sheet, Statistics Audit and Statistics Dissemination.

This type of cooperation has the advantage that the practices of the host country can be learnt at first hand. In fact, when implementing new statistics, the Banco de Portugal also visits countries or institutions which already have experience in the specific field.

Table 1 shows the evolution of this form of cooperation by country from 2001 to 2008.

Table 1

Visits to the Banco de Portugal in the framework of cooperation in the field of statistics

Unit: days x participants

Year	CPLP						New EU member states							Other countries	Total
	AO	BR	CV	MZ	ST	TL	BG	CY	CZ	LT	LV	RO	SI		
2001			19.0	12.5		2.0			6.0						**39.5**
2002	15.0			9.5		1.5			1.5				4.0	2.0	**33.5**
2003			18.0	16.0	1.0					6.0	6.0	14.5			**61.5**
2004			20.0	25.0		15.0			15.0			65.0			**140.0**
2005	20.0						4.0	20.0						1.0	**45.0**
2006	19.0		5.0	4.0										6.0	**34.0**
2007			1.0	2.0	6.0									4.0	**13.0**
2008	20.0	6.0				10.0	1.0		10.0	6.0					**53.0**
Total	**74.0**	**6.0**	**63.0**	**69.0**	**7.0**	**28.5**	**5.0**	**20.0**	**32.5**	**12.0**	**6.0**	**79.5**	**4.0**		**406.5**

Country codes: AO – Angola; BG – Bulgaria; BR – Brazil; CV – Cape Verde; CY – Cyprus; CZ – Czech Republic; TL – East Timor; LT – Lithuania; LV – Latvia; MZ – Mozambique; RO – Romania; SI – Slovenia; ST – São Tomé and Príncipe.

3.2 Technical assistance missions

Another form of cooperation is the organisation of technical assistance missions, which consist in the visits by experts of the Banco de Portugal to institutions in partner countries. These missions are usually aimed at the implementation of specific projects. Some of the missions are organised in the framework of IMF projects. Table 2 measures these missions by country and by year.

Table 2

Technical assistance missions

Unit: days x participants

Year	BR	CV	ST	ZA	Total
2002		10.0			10.0
2003			10.0		10.0
2004	10.0	40.0	15.0		65.0
2005	10.0				10.0
2006					0.0
2007			10.0		10.0
2008				5.0	5.0
Total	**20.0**	**50.0**	**35.0**	**5.0**	**110.0**

Country codes: BR – Brazil; CV – Cape Verde; ST – São Tomé and Príncipe; ZA – South Africa.

3.3 Multilateral meetings

The Banco de Portugal has participated in the meetings of the central banks of Portuguese-speaking countries on the national statistical systems, which take place since 2000 every two years (as a general rule). These meetings are held in different locations and are a unique opportunity to reinforce mutual contacts and exchange knowledge, which is especially beneficial for the host country. Table 3 provides the list of these meetings.

Table 3

Meetings on the national statistical systems of the central banks of Portuguese language countries

Year	**2000**	**2002**	**2005**	**2006**	**2008**
Location	Portugal (Lisbon)	Mozambique (Maputo)	Angola (Luanda)	São Tomé and Príncipe (São Tomé)	Cape Verde (Praia)

3.4 Support to international organisations

The Banco de Portugal also supports the organisation of IMF courses in Lisbon. The courses usually include speakers from both the IMF and the Banco de Portugal. They cover balance of payments statistics, monetary and financial statistics and the General Data Dissemination System (GDDS), as shown in Table 4.

Table 4

IMF courses with the support of the Banco de Portugal

Unit: days x participants

System	**Year**	**AO**	**BR**	**CV**	**GW**	**MZ**	**ST**	**TL**	**Total**
Balance of payments statistics	2001	15	15	15	15	15	15	–	90
	2007	10	–	10	10	10	10	10	60
General Data Dissemination System	2002	10	–	10	–	10	10	–	40
Monetary and financial statistics	2002	15	15	15	15	15	15	15	105
	2004	15	–	15	15	15	15	15	90
	2005	10	–	10	10	10	10	10	60
	2007	10	–	10	10	10	10	10	60
	2008	20	–	20	20	20	20	20	120
	Total	**105**	**30**	**105**	**95**	**105**	**105**	**80**	**625**

Country codes: AO – Angola; BR – Brazil; CV – Cape Verde; TL – East Timor; GW – Guinea-Bissau; MZ – Mozambique; ST – São Tomé and Príncipe.

3.5 Seminars

In addition, the Banco de Portugal has also participated in recent years in seminars in Angola, Cape Verde and Mozambique. This is an additional way of bringing together experts from the Banco de Portugal and other countries and of exchanging practices and knowledge.

4. Final remarks

Statistical producers face increasingly demanding challenges, mainly derived from the revision of both the System of National Accounts and the IMF's Balance of Payments and International Investment Position Manual, which call for closer cooperation among compilers.

Among the various driving forces of good-quality statistics that include adequate human, financial, technological and legal resources, we argue that institutional cooperation at the international level in the field of statistics is a key factor to improving the quality of statistics. The Banco de Portugal is highly committed to this task through the use of various instruments. The way forward in this area is to proceed along the path we have been paving, which involves the exchange of knowledge in bilateral actions and the reinforcement of multilateral contacts.

Handling systems challenges from the compilation of flow of funds – the case of South Africa[1]

Zeph Nhleko[2]

1. Introduction

The flow of funds (FoF) is a financial analysis system that shows the uses of savings and other sources of funds as well as the borrowings of funds by institutions to finance real or financial investment through financial instruments. It is a systematic recording of financial transactions between different sectors of the economy. Its main aim is to assist policymakers to assess the financial position of the national economy and that of the various sectors of the economy. The South African Reserve Bank (SARB) is the official compiler of South Africa's FoF.

This paper intends to share South Africa's FoF compilation experience while highlighting the importance of liaising with other institutions to learn from them. The FoF theoretical framework and the analytical uses of FoF are beyond the scope of this paper. The paper begins by defining the compilation framework of FoF in South Africa. An account of systems challenges and the solutions preferred is then made. FoF compilation lessons from other institutions are then briefly outlined before concluding.

2. FoF compilation framework in South Africa

The FoF framework used by the SARB is in line with the one suggested by the IMF in the System of National Accounts (SNA) and the Monetary and Financial Statistics Manual (MFSM). The main difference is that the SARB analyses its data using the balance sheet approach as opposed to the transaction approach. The balance sheet approach calculates flows based on changes in balance sheet positions of institutions, while the transaction approach calculates flows based on detailed transactions data.

The data are presented in terms of sources and uses of funds. These data pieces are seldom equal, hence the need to process individual data pieces during compilation. Since June 2009, the SARB has published the quarterly FoF tables every quarter with a lag of two quarters, and the full preceding year is published every June. Only the flow data as opposed to the stock data are currently published. The South African FoF structure consists of five main economic sectors (A–E in Table 1), which are subdivided into 22 institutional groupings or 11 sectors (1–11 in Table 1) of the economy. It covers 32 non-financial and financial transactions. Source data formats include hard copies, spreadsheets, time series and electronic reporting systems.

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[1] Paper prepared for the Irving Fisher Committee on Central Bank Statistics (IFC) Special Topic Contributed Paper Meeting no 77 held at the Durban International Convention Centre from 16 to 22 August 2009.

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Table 1

A	B									C		D		E
FOREIGN	*FINANCIAL INTERMEDIARIES*									*GENERAL GOVERNMENT*		*CORPORATE BUSINESS ENTERPRISES*		*HOUSEHOLDS*
1	2		3			4	5			6				7	8	9	10	11
Foreign sector	*Monetary authority*		*Other monetary institutions (banks)*			*Public Investment Corporation (PIC)*	*Insurers and retirement funds*			*Other financial institutions*				*Central and provincial governments*	*Local governments*	*Public sector*	*Private sector*	*Household sector*
	South African Reserve Bank	Corporation for Public Deposit	Land bank	Private banks	Mutual and Post Office savings banks		Long-term insurers	Short-term insurers	Public pension funds	Private pension funds	Trust companies	Unit trusts	Finance companies	Participation bond schemes	Public sector financial intermediaries	Central and provincial governments	Social security funds				

South Africa's financial system[3] consists of several institutional sectors. Institutional units in the non-financial sector consist of private and public incorporated companies and quasi corporations. For the purposes of compiling the FoF, economic activity and transactions between resident and non-resident units are recorded. The rest of the world is defined as the foreign institutional sector, while resident institutional units are grouped into the private sector and the public sector. The private sector consists of resident institutional units not controlled or owned by institutional units in the general government sector. The public sector consists of institutional units in the general government sector, and corporate institutional units in the financial and non-financial sectors owned or controlled by units in the general government sector. The public sector therefore consists of the public financial corporate sector, the public non-financial corporate sector and the general government sector.

A contra-entry accounting method is used to record transactions. Each of the 22 institutions is first balanced within itself before processing. The balanced individual institutions are consolidated into the 11 sectors. The data is then transferred manually to a final processing Excel spreadsheet. The final processing spreadsheet is a semi-automatic macro-driven tool of aligning transactions and making alterations to figures that may have been wrongly recorded in the database from source files. Visual basic code is used to drive the macros in the spreadsheet.

Processing involves making sure that corresponding sectors have the same sources and uses by using the macro-driven spreadsheet. In order to balance the data between any two sectors for any transaction, the following information should be taken into account:

i. Which of the compared sectors is actively involved, as part of its main business activity, in the transaction in question?

ii. How much is the deviation of each sector's data piece from the guide figures as published in the SARB *Quarterly Bulletin* balance sheets? (A guide document with specific item-by-item notes and reminders is used during the data processing phases.)

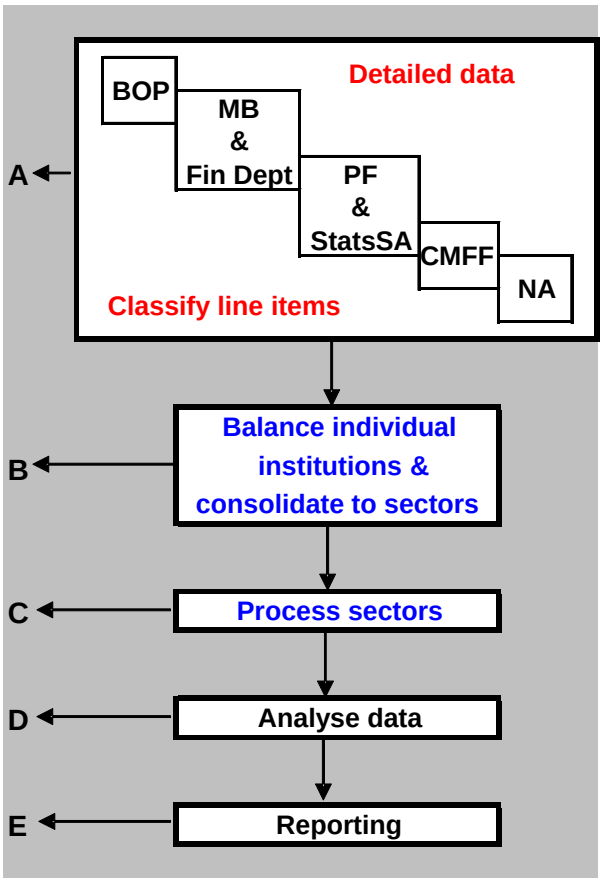
iii. Since it is impossible to have a perfectly balancing economy due to many factors, including timing in reporting and general errors, the data may need to be adjusted using financial market performance trends, the source data integrity of the sectors and the economic intuition of the compiler(s).

The processing involves entering savings and investment data, as taken from the national and production accounts, into the final spreadsheet. This represents the real sector data or the top-down calculation of the net lending/borrowing position. The financial sector data represents the bottom-up calculation of the net lending/borrowing position. There are always some discrepancies between these two data sets which are always addressed by discussing with the respective source divisions. The discrepancies have historically been corrected in the financial sector data.[4] The compilation of FoF consists of five steps (A–E in Figure 1).

[3] "Financial system" refers to the financial institutions, processes, rules and regulations forming the South African financial sector.

[4] This is not cast in stone – the error can be corrected on either side of the flows.

Figure 1



Legend to data sources:

BOP: Balance of payments

MB: Money and banking

Fin Dept: Financial services

PF: Public finance

Stats SA: Statistics South Africa

CMFF: Capital market and flow of funds

NA: National accounts

3. Systems challenges from FoF compilation

There are several challenges that are encountered during the processing of the FoF. Some are inherent and may not be detected or may only be picked up late in the processing stage. These challenges may reveal that the data used is incomplete or incorrect, eg accuracy of data and reporting timing. Some challenges may be resolved and/or reduced before or during processing. The main compilation challenges are discussed below.

3.1 Sources of data

Sources of data refer to the raw input provided to the Capital Market and Flow of Funds Division (CMFF) for FoF compilation purposes. Data providers are mostly divisions within the Research Department of the Bank (see Figure 1). Very often, the data provided or the methods of collecting the data affect the calculation and ultimate analysis of FoF. The various data formats are converted into Excel spreadsheets. Both application and human errors occur from time to time. For example, Excel may misread data from other systems (numeric versus text) and numbers do get wrongly keyed in from hard copy sources.

The practical solution to this is to enter and store data at an adequate level of detail, and the system should support a hierarchy of database setup. The SARB currently uses Oracle for that purpose and is developing a new database system under the Research Department's project Equilibrium.

Some data issues are much more difficult to resolve. For example, there are several possible reasons for the large and unexplained jumps in data; one is timing of reporting. Large and unexplained jumps or omissions in raw data make the interpretation of FoF very difficult. Visits to respondents should be ongoing and regular. This normally helps compilers to have a feel for the numbers while at the same time aiding the judgment that goes into deciding an acceptable magnitude of an unexplained deviation.

3.2 Preparation of data

The preparation of data refers to the conversion of files into the desired Excel format, the classification of balance sheet line items and both the identification and correction of artificial flows (ie movements in assets not caused by transacting). The automatic classification of transactions for FoF purposes in Excel may be challenging. Excel sometimes misreads data from other systems, eg when searching for a code XR005A, a space before the letter X will render this code invalid and cause Excel to ignore it. Although it is acknowledged that it may be impossible to identify wrong classifications by respondents, eg recording a wrong counterparty for a share buy/sell transaction in a survey form, the practical solution here is to have simple and incorruptible classification criteria that are based on the source data.

3.3 Compilation of matrices

The extent of automating FoF compilation processes is sometimes a subject for debate. The compilation process of FoF involves judgmental processing; computer algorithms can be designed to mimic such judgments. However, this becomes problematic and may not be easy to detect if the situation for which those algorithms were designed changes and requires different approaches. The practical solution is to avoid too much automation and have human intervention instead, which is critical for processing.

3.4 Analysis and reporting

The current practice in FoF analysis in South Africa consists of drawing comparison tables and graphs of various sectors and publishing findings in the *Quarterly Bulletin*. FoF reporting may be affected by the size of the tables and increase the frequency of reporting. In order to generate interest for the usage of FoF, it is advisable to reduce the size of the tables published as well as the frequency. The SARB is currently working on reducing the size of the FoF tables published in the *Quarterly Bulletin* and has, since June 2009, started to publish the FoF tables and analysis on a quarterly basis with a two quarter lag.

4. FoF compilation lessons from other institutions

A very important aspect of FoF compilation is that it is crucial to constantly liaise with other compilers and learn how they deal with compilation challenges. This has helped the SARB in various ways over the past decade. A number of discussions on compilation methodology were held with compilers from London, Sweden, Canada, the United States and Portugal. Some of the lessons learned are highlighted below.

4.1 Office for National Statistics (ONS)

The FoF unit specialises in coordinating the data received and not collecting and preparing data. The structure of the tables is in line with the structure of the source data forms – this helps to streamline the processing. Their processing system is tailor-made for the ONS and

geared towards flows. Several meetings involving all parties concerned are held to decide reconciliations and to view the stories behind large data movements. Lessons include:

i. if compilers are only involved in analysing the data and compiling the flows, they have enough time to do a thorough economic analysis

ii. constant communication with other divisions involved ensures that the same interpretation of the data is reached. This also helps to search for discrepancies in all areas

iii. it is easier to collect data if institutions are compelled by law to supply such data.

4.2 Statistika Centralbyrån (SCB)

Several people in the FoF unit process and publish parts of the data. Some industries are sampled while others are fully covered. Institutions are compelled by law to submit information and may even lose their licences if they refuse to do so. All source items are coded and calculations on the data can be updated if desired. Note, however, that the system used is not so flexible; therefore, it may take some time to update data. Data processing takes place mostly in Excel. Although discrepancies between the financial and real sectors are not corrected, the national accounts data is accepted as official. Residuals or balancing items are only calculated in the yearly tables and not quarterly. A lesson is:

i. if various people perform different activities, it may take some time to coordinate all the tables.

4.3 Statistics Canada (STATCAN)

The FoF unit specialises in coordinating the data received. Data are presented in annual and quarterly tables. The economy is split into approximately 30 sectors. The naming of sectors in this system is kept short and simple. Updates are easy, fast and online. The data is processed in a system called FAME. The balancing of sectors in the master database depends on the credibility of data sources: items in which there is certainty are done first. Several meetings involving all parties concerned are held to confirm data. Adjustments can be made on either side of the data (financial or real). A lesson is:

i. a flexible database system enhances the analysis because changes and results are effected quickly.

4.4 Board of Governors of the Federal Reserve System

The FoF unit specialises in coordinating the data received, mostly from other areas such as the Department of Treasury, the Department of Commerce and the Census Bureau. Processing takes place mostly in Excel and FAME. The data are accessed through the Statistical Data and Metadata Exchange (SDMX) system. Data are presented quarterly by sector and by instrument. A lesson is:

i. it is always advisable to create FoF compilation systems in-house.

4.5 Bank of Portugal

The FoF unit specialises in coordinating the data received. The in-house security-by-security database greatly enhances sector identification. There are also some legislative arrangements with other institutions, such as the national statistical office (Instituto Nacional de Estatística), that assist in compelling respondents to submit information. Data processing takes place in a system developed in-house called MASCOT. Estimating counterparty

information is an important aspect of the compilation. The data are presented in monthly, quarterly and annual tables. A lesson is:

(i) instead of having gaps, it may be useful to find other sources of data to estimate counterparty information.

5. Conclusion

The FoF compilation process lends itself to many systems challenges due to its complexity. The compilation framework of the South African FoF is informed by international best practice. Systems challenges can be addressed by consulting other compilers and there are many lessons to be learned in that process. FoF compilation systems in general have limitations and cannot solve all FoF compilation challenges.

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