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The Irving Fisher Committee is part
of the International Statistical Institute

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What is the IFC?

The Irving Fisher Committee (IFC) is a forum for discussion on statistical issues that are of interest to central banks. The Committee, which derives its name from the great American economist and statistician Irving Fisher, is part of the International Statistical Institute (ISI).

Objectives

By providing a forum for discussion, the IFC aims at:
- participating in the discussion on adapting statistical systems to changing requirements;
- promoting the adoption of international statistical standards and methodologies;
- sharing experience on the development of new statistics and the implementation of new methods of collecting, compiling and disseminating statistical information;
- exchanging views between central bankers and academics on statistical methods and techniques;
- facilitating personal contacts between central-bank statisticians.

Strategy

To achieve its objectives, the IFC organizes conferences, which take place both inside and outside the framework of the ISI's biennial Sessions. The first "outside" conference – on the challenges to central bank statistical activities – is scheduled for summer 2002 at the Bank for International Settlements in Basle.

The conferences are supported by the publication of the IFC Bulletin, which contains the conference papers and other articles.

The IFC has a Web site (http://www.ifcommittee. org), on which an electronic version of the IFC Bulletin can be found.

What kind of topics are discussed?

Any kind of theoretical or practical statistical subject that has a relationship with the activities of central banks can be considered for discussion. The subjects will mostly be in the area of monetary, financial and balance of payments statistics.

Membership and Structure

In principle, the IFC has no personal members. Central banks and other institutions interested in statistical systems and statistical techniques that have a bearing on the collection, compilation and distribution of central-bank statistics can become members by simple application. So far, more than 60 central banks and a number of other institutions have applied for membership. Members are entitled to appoint delegates to participate in the IFC's activities and to contribute to its conferences by presenting papers.

The prime decision-taking body is the assembly of members' delegates at the "administrative meetings" that are organized during the conferences. Here the IFC's strategy is determined. At these meetings an Executive Body is elected, which is charged with the committee's day-to-day business and with the preparation of the "administrative meetings". Likewise, at the "administrative meetings" topics are proposed for future conferences, and a Programme Committee is elected to choose from these topics and to organize the conferences.

A Short History

The Irving Fisher Committee (IFC) was established on the initiative of a number of central banks statisticians who were attending the ISI Corporate Members Meeting at the 1995 ISI Session in Beijing.

In 1997, during the 51st ISI Sessions in Istanbul, the IFC held its inaugural meeting. At the "administrative meeting" held during that Session an Executive Body was established and it was decided to start publishing the IFC Bulletin devoted to the activities of the IFC. Two years later, at the 52nd ISI Session in Helsinki, the IFC's presence was further strengthened. In 2001, at the 53rd ISI Session in Seoul, the IFC presented a programme comprising an invited papers meeting on "Financial Stability Statistics" and several contributed papers meetings.

In 2002, a conference on "Challenges to Central Bank Statistical Activities" was organised in co-operation with the Bank for International Settlements, which hosted it at its premises in Basle. 160 statisticians representing 73 countries participated. Some 50 papers were presented.

IFC Bulletin

The IFC Bulletin is the official periodical of the Irving Fisher Committee. The Bulletin contains articles and the text of papers presented within the framework of the ISI Conferences. It also sees as its task the recording of interesting events concerning Fisher's life. Institutions and individuals active in the field of central-bank statistics can subscribe to the Bulletin free of charge.

Between Basle and Berlin

Basle

From 20 to 22 August 2002, statisticians from all over the world gathered in Basle to attend the IFC Conference "Challenges to Central Bank Statistical Activities". The conference was organised in co-operation with the Bank for International Settlements, which hosted it at its premises. The number of participants – more than 160 statisticians representing 73 countries as well as a few international organizations – has exceeded the most optimistic expectations. Some fifty papers were presented in five plenary sessions and five parallel workshops organized by senior experts in the field of collecting, compiling and disseminating statistical data. This was the first IFC conference organized outside the framework of the biennial Sessions of the ISI, to which the IFC is affiliated. It may be assumed that this successful experience will mark the beginning of a new tradition in which our Committee will be able to schedule conferences on practical statistical issues in the years in between the ISI Sessions.

During the conference, an Administrative Meeting was held, at which Marius van Nieuwkerk was succeeded by Almut Steger as chairperson, and steps were taken to broaden the geographical composition of the Executive Body. Much attention was devoted to the IFC's aspiration to become an official Section of the ISI. An application to acquire this status is presently under consideration. A short report of the Administrative Meeting can be found on page 8.

The Proceedings of the Basle conference are published in the IFC Bulletin, and are also accessible on the IFC Web site *(http://www.ifcommittee.org)*. In view of the great number of papers, the conference documents will be spread over several issues of the Bulletin. In the present issue, documents relative to Sessions One and Two as well as the Keynote presentation are reprinted.

Berlin

Until recently, the Executive Body and the Programme Committee had to give prime attention to the Basle conference, but meanwhile their focus has shifted to the 54th ISI Session to be held in Berlin next year. The contribution of the IFC to this event will basically be structured along the same lines as in Istanbul (1997), Helsinki (1999) and Seoul (2001), which means that a number of meetings will be organized by persons representing our Committee. Some preliminary information on these meetings is presented on the next page.

Since September, the web site of the ISI Session *(http://www.isi-2003.de)* contains practical information and offers the possibility to register interest in participation or in presenting a paper.

Meetings of the IFC at the 54th ISI Session, Berlin, 13-20 August 2003

The IFC has been scheduled to organize two Invited Papers Meetings (IPMs) and three Contributed Papers Meetings (CPMs).

- IPM52: *"The Use of Hedonic Methods for Quality-adjusted Prices "*, organized by Bart Meganck

  Papers:

  (1) Mick Silver (Professor, Cardiff University, UK)

  (2) David Fenwich (Head of price statistics, ONS, UK)

  (3) Geoff Kenny (Principal economist, ECB)

  (4) Brian Newson (Head of unit, Eurostat)

- IPM85: *"Use of Statistics in Developing Monetary Policy"*, organized by Armida San José

  Papers:

  (1) The Role of Statistics in the Conduct of Monetary Policy in Albania
  by Governor Shelquim Cam and Gramos Kolasi, Bank of Albania)

  (2) Use of Statistics in the Monetary Policy of the Czech National Bank:
  The Case of a Country in Transition
  by Ivan Matalik (Czech National Bank) and Josef Arlt (Czech National Bank, University of Economics, Prague)

  (3) Labour Market Indicators and Macroeconomic Modeling in the UK
  by Craig Lindsay (UK Office for National Statistics)

  (4) The use of statistics in Monetary Policy in Cambodia
  by Phousnith Khay (Central Bank of Cambodia)

  (5) The new Interest Rate Survey in the Euro-zone: the case of Germany
  by Stefan Brunken, (Deutsche Bundesbank)

Regarding the CPMs, the following topics have been accepted by the ISI:

"Trade in Services – a Challenge to Statisticians",
to be organized by Almut Steger (Deutsche Bundesbank)

"The Sectoral and Geographical Allocation of Holdership of Negotiable Instruments",
to be organized by Gunter Kleinjung (Deutsche Bundesbank)

"The Use of Surveys in Financial Statistics",
organizer to be determined.

Any person, wanting to submit a paper at one of the contributed papers meetings organized on behalf of the IFC are requested to observe not only the procedures and deadlines laid down by the ISI on its web site, but also to heed the following **recommendations**, which should allow the IFC to properly prepare the meetings and enable publication of the conference documents in the IFC Bulletin and on the IFC Web site:

- Inform the IFC Secretary *(rudi.acx@nbb.be)* as soon as possible about your intention to present a paper at a contributed papers meeting.

- Submit the final version of your invited or contributed paper as soon as possible, but **not later than 14 April 2003** to both the IFC Secretary *(rudi.acx@nbb.be)* and the Editor of the IFC Bulletin *(wucwo@wxs.nl)*.

While, according to the ISI rules, papers should not exceed 4 pages (invited papers) or 2 pages (contributed papers), the IFC encourages authors to submit a more **comprehensive version** of their papers for publication in the IFC Bulletin and on the IFC Web site. Extended versions should be made available to the Editor of the IFC Bulletin immediately after the conference at the latest.

Moreover, the IFC would be pleased to receive **abstracts** of papers – containing 150-300 words – at an early stage, but ultimately on 14 April 2003. These abstracts will be published in the IFC Bulletin and on the IFC Web site before the conference.

To facilitate the reprinting in the IFC Bulletin any documents should be made available in the Word for Windows format; use of colours, particularly in graphs, should be avoided.

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Short Report of the IFC Administrative Meeting, Basle, 20 and 22 August 2002

Within the framework of the IFC Conference on "Challenges to Central Bank Statistical Activities", Administrative Meetings took place on 20 and 22 August 2002.

First part of the meeting

On 20 August, chairman Marius van Nieuwkerk opened the meeting at 6:00 pm. He specified a number of issues, which had been addressed at the Administrative Meeting in Seoul (2001):
- the organization, in co-operation with the BIS, of the first independent IFC Conference;
- further globalization of IFC membership;
- the status of the IFC within the ISI;
- the contribution of the IFC to the ISI Session 2003 in Berlin.

The independent IFC Conference

With respect to the latter item, the chairman expressed his gratitude to all participants and contributors, who had helped to make the conference a success. He noted that the event would not have been possible without the substantial support of the BIS and the IFC Secretariat in Brussels. He felt confident that this conference would mark the beginning of a new tradition in which the IFC would be able to schedule an "independent" event in between the biennial ISI Sessions.

Further globalization of IFC membership

The chairman noted that it remained a major objective of the IFC Executive Body to diminish the initial quantitative preponderance of European membership of the IFC. It would be useful if conference participants from central banks that were not yet IFC members could check within their institution whether there would be any interest in signing up to the Committee; membership is currently free and non-committal in terms of resources. The chairman added that the Executive Body was keen to improve its own geographical composition and to broaden its basis by adopting the concept of an Incoming and an Outgoing Chair. In order to facilitate the communication with the organizers of the ISI Sessions, it was intended to link the selection of the persons filling the chair to the central bank of the country hosting the respective ISI Session. As a first step to realize the new structure, the chairman proposed the nomination of Almut Steger (Deutsche Bundesbank) as chairperson until the Berlin ISI Session in 2003. According to this set-up, the chair should be occupied by an Australian in 2003, by a Swiss in 2005 and by an American in 2007.

The chairman noted that he would welcome candidates from other countries wishing to become members of the Executive Body in August 2003. He also invited candidates for the Programme Committee. For both functions contact should be taken with Rudi Acx, IFC-Secretary.

Status of the IFC within the ISI

The IFC had recently applied to become an ISI Section alongside the current five Sections. The Director of the ISI's Permanent Office, Dr. Marcel van den Broecke, explained that an important motive for an ISI committee to become a Section was the much greater influence it could exert on the programme of ISI Sessions. He noted, however, that not all attempts of committees to transform to an independent Section had been successful. The Executive Committee of the ISI, which decides in the first instance on applications, wants to exclude any risk of fragmentation. Developments in some national statistical societies had demonstrated that the greater the number of sections, the less these sections tended to care for their mother organization. Dr. Van den Broecke added that the Executive Committee had also reasons to fear that actions organized by the Sections might have negative financial consequences for the ISI.

The chairman noted that the ISI Executive Committee would discuss the IFC's application on 2 September. He emphasized that becoming an official Section might bring changes to the IFC in

terms of membership, structure and functioning. With respect to membership, he suggested that the IFC – while restricting its official membership to central banks – would accept associate personal members from the academic world, national statistical institutes and the private sector. This should, however, not mean that the IFC's area of interest would change. Decision-making should remain with the central banks as institutional members.

With respect to the structure and functioning, the following issues would have to be addressed: statutes, membership fees, funding and accounts.

Finally, consideration should be given to the question whether the present name of the Committee was the most suitable to indicate its area of interest.

The contribution of the IFC to the ISI Session 2003 in Berlin

The 54th ISI Session would be held in Berlin from 13 to 20 August 2003. The IFC had been scheduled to organize two Invited Papers Meetings (IPMs) and three Contributed Papers Meetings (CPMs). The organizers and some of the contributors had been found for the IPMs:

- IPM52: *"The Use of Hedonic Methods for Quality-adjusted Prices "*, organized by Bart Meganck

- IPM85: *"Use of Statistics in Developing Monetary Policy"*, organized by Armida San José

Regarding the CPMs, the following topics had been accepted by the ISI:

- *"Trade in Services – a Challenge to Statisticians"*.
- *"The Sectoral and Geographical Allocation of Holdership of Negotiable Instruments"*.
- *"The Use of Surveys in Financial Statistics"*.

The chairman invited participants to attend the continuation of the Administrative Meeting on 22 August to discuss the issues raised and to decide on the proposed occupation of the chair and the composition of the Executive Body and the Programme Committee. The meeting was adjourned at 6:15 pm.

Second part of the meeting

On 22 August, the chairman reopened the meeting at 1:30 pm. He announced that meanwhile at least three persons had shown interest in organizing the CPM on the Use of Surveys in Financial Statistics. Almut Steger explained that the three subjects for the CPMs had been fixed by the ISI and that no other subjects could be added at this stage. Dr Van den Broecke added that subjects not fitting into these categories could be presented in other CPMs held at the ISI Session.

Decisions taken

The chairman noted that he had received several suggestions with respect to the broadening of the composition of the Executive Body. These would be considered as well as suggestions to adopt a structure for the chair identical to that of the ISI. Bart Meganck noted that persons interested to become a member of the Executive Body or the Programme Committee would not need to worry about travel cost. Experience had shown that contacts could be adequately maintained by teleconferences and e-mail.

Almut Steger expected that becoming a Section of ISI would necessitate a more formal approach of the dealings of the IFC. It seemed advisable to mandate the Executive Body to set up some rules. Bart Meganck noted that first the decision of the ISI Executive Committee should be awaited, as any rules depended on the question whether or not the IFC would become an official Section. Dr Van den Broecke added that the Sections have a high degree of autonomy. The IFC might consider to adopt the rules of the existing Sections. In particular, it seemed to be advisable to adopt the custom to elect an incoming chair two years before he or she succeeded the actual chairperson.

Subsequently, Marius van Nieuwkerk proposed that, no other candidates being nominated, the meeting should confirm Almut Steger's nomination as chairperson for the period up to the ISI Berlin Session in 2003 and he should be nominated in the newly created function of Outgoing Chair as member of the Executive Body for the same period. Both proposals were carried by the meeting. Marius van Nieuwkerk said he felt satisfied to be able to step down at such a fortunate moment in the Committee's existence and he invited Almut Steger to assume the function of chairperson.

Almut Steger thanked the outgoing chairman for the many important initiatives he had taken during his term. She considered the function to which she had been called not only an honour but also a burden, the more so because many weighty decisions had to be taken in the coming period. She mentioned in particular the questions of how to open-up the IFC to non-central banks and of how to structure the Committee's relations to the ISI and to other bodies with which it had mutual interests. In her view, serious attention should be given to drawing up statutes. However, much would depend on the outcome of the Committee's application for Section status in the ISI: Almut Steger emphasised that she had to rely on the support of the members of the IFC in general and on her colleagues in the Executive Body in particular.

The meeting was closed at 2:00 pm.

Proceedings[1]
of the Conference on
"Challenges to Central Bank Statistical Activities"
Basle, 20-22 August 2002

Keynote presentation

Session 1:
Central bank statistics and monetary stability

Session 2:
Central bank statistics and financial stability

Workshop A:
Constraints on central bank statistical activities

Workshop B:
Co-operation with national statistical offices

Session 3:
Improving the use(fulness) of central bank statistics

Session 4:
Developments with respect to statistical analysis at central banks

Session 5:
Central bank co-operation on statistical issues

Workshop C:
Issues relating to balance of payments compiling

Workshop D:
Monetary and financial statistics and international accounting standards

Workshop E:
Deriving information from financial market data

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1   The Keynote presentation and the documents concerning Sessions 1 and 2 have been reprinted
     in the present issue of the IFC Bulletin. Documents of the remaining Sessions and Workshops
     will be reprinted in forthcoming issues. All documents are available at the IFC Web site
     (http://www.ifcommittee.org).

Searching for Price and Financial Stability:
Challenges for central bank statistical services

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Keynote Address

William R White (BIS)[1]

1. Introduction

As the Economic Adviser and Head of the Monetary and Economic Department of the Bank for International Settlements, I would like to extend a very warm welcome to participants at this conference organised by the Irving Fisher Committee. When Paul Van den Bergh and Marius van Nieuwkerk approached me about the possibility of the BIS contributing to such a conference, I was very enthusiastic for at least three reasons.

The first of these is my respect for the work of Irving Fisher; in effect, friends of Irving Fisher are friends of mine. Indeed, I have just been rereading his classic Econometrica article of 1933 entitled "The Debt Deflation theory of Great Depressions" and found it full of illuminating if sometimes disquieting insights. One of these, which might be thought less than amusing in light of the recent Enron affair and other corporate governance scandals, has to do with the various phases through which people are encouraged to take on heavy debt levels, which eventually become unsustainable as the deflationary process unfolds. The first phase starts with "the lure of big prospective dividends and gains in the remote future", and the last one involves "the development of downright fraud, imposing on a public which had grown credulous and gullible". Does it not all sound very familiar?

My second reason for wanting to welcome you here reflects the fact that I now have over 30 years of experience in this business of central banking. Over those years I have become steadily more convinced of the need for good data and for good statistical analysis. We must, of course, begin with some theoretical construct as to which hypotheses we wish to test. But the choice of the particular data that might shed the greatest light on the validity of those hypotheses is also extremely important. In effect, as statisticians and economists, we should always ask ourselves "What are these data for?" And by the same token, we should also be prepared to change the data we collect in response to changing requirements. The simple logic of "rubbish in, rubbish out" surely applies with respect to the empirical testing of hypotheses. Unfortunately this insight continues to be missed by many economists and econometricians. They often seem fearful of questioning their data, perhaps because it might throw doubts on the validity of their results and, of course, the likelihood of publication.

My third reason for wanting to support this conference is that data issues are a major preoccupation for many central banks. As an institution set up explicitly to support central bank cooperation at the international level, the BIS has a natural interest in such endeavours. While we have in fact already done a great deal in this area, a subject to which I will return at the end of my presentation, I feel strongly that we could do more. So again I welcome you all today and hope that I will have the opportunity to do so again in the future.

In my presentation today, I will try to provide a broad overview of the challenges inherent in the statistical activities of central banks. As I do so, I am conscious of how much I have forgotten since

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the eight years I spent during the 1980s on the National Income Advisory Committee to Statistics Canada. In contrast, I hope that I have learned some new things at the BIS. The one constant we all face in this area has been our ultimate objective. What we are interested in as central bankers, whether statisticians or economists or policymakers, are better policies to support sustainable growth and living standards over time.

What has changed almost continuously, however, has been our perception of the principal threat to achieving this constant objective. In the 1960s, policymakers first became aware of the dangers posed by inflation produced by excessive demand. In the 1970s, the problems of dealing with inflation were exacerbated by supply side shocks, largely resulting from increases in oil prices. In the 1980s, the debt crisis in the emerging market economies focused the attention of policymakers on the extent to which creditor banks in the industrial countries could themselves be hurt by debtor defaults. Since then, there have been successive financial crises affecting Mexico (1994), East Asia (1997), Russia (1998), LTCM (1998), the Nasdaq (2000 onwards) and Argentina (2001). Still more recently, there have been financial pressures in Brazil and other emerging market economies and the ongoing collapse of stock prices around the world. Looking forward, there seems to be a growing recognition that these crises may not have independent origins but may rather be manifestations of some underlying global processes that might not yet be fully played out.

In the time I have available, I will deal in turn with the statistical challenges faced by those concerned with price stability, those concerned with financial stability and then briefly with the nexus between the two. I will finish with a "paid political contribution" about the actual and potential contribution of the BIS in this area.

2. Challenges related to price stability

This area is what I would call "traditional" postwar macroeconomics. Even so, there have been enormous changes in the way in which monetary policy in particular has been conducted over the last 30 years. Most of these changes have had to do, not with the day-to-day implementation of monetary policy, but rather with altered views about the framework conditioning those day-to-day decisions. In my view, there are three essential elements to this framework: the institutional, the philosophical and the empirical. Before getting to the third of these, likely to be of the greatest interest to this audience, let me say just a few words about the other two.

The *institutional* framework comprises the mandate, powers and accountability of central banks. In every respect, enormous changes have taken place in recent decades. As to the mandate, there has been a growing preference to give central banks a mandate to establish and maintain price stability. Sometimes this mandate has been very explicit, particularly in the case of countries with poor track records in this regard, but in other cases an implicit mandate has been no less influential. As to powers, more and more central banks have been given sole authority over the application of the instruments of monetary control. Indeed, this is what most central banks now recognise to be the essence of their so-called independence. Finally, most central banks are now behaving in a much more transparent way so that their performance can be judged by both the political authorities and the financial markets. A crucial requirement for this accountability is the provision of relevant information, both statistical and of other sorts.

The *philosophical* framework refers to how policymakers approach the uncertainties and the trade-offs inherent in the process of making policy decisions. While inflation targeting now has greater importance as an objective, concerns about other aspects of economic performance must continue to carry at least some weight; the level and volatility of output and unemployment, the movement of the exchange rate and so on. The particular complication caused by concerns about financial stability is one I will return to. Moreover, decisions have to be taken in the face of conflicting statistical and anecdotal evidence about underlying economic processes. Finally, there is the issue of whether policymakers should be following a maximising strategy, to squeeze out all the benefits possible from the economic system, or a minimaxing strategy of avoiding really bad outcomes. Looking at the actual conduct of monetary policy in various jurisdictions, differences of view can be observed as easily as changes in view over time.

Returning more directly to the interests of this audience, the conduct of monetary policy in the pursuit of price stability also requires an *empirical* framework. That is, we must have some idea of the transmission mechanism that relates what central banks can control, the various aspects of the central bank balance sheet, to the ultimate inflation objective. This was not always recognised. Montagu Norman, Governor of the Bank of England for much of the prewar period, once told his Economic Adviser "your job is not to tell me what to do but to explain to me why I have done it".

Today, whether the authorities use a one-equation model in the governor's head, or a 500-equation macromodel with satellites of various sorts, some idea of cause and effect is deemed necessary.

A schematic diagram for first year undergraduates might have the following form. Bank reserves set daily by the central banks affect interest rates, the exchange rate and other financial variables over some longer horizon. In turn, over some still longer period, these affect the level of spending on domestically produced goods and services. In turn, this affects the "gap" between aggregate demand and the productive potential (supply) of the economy. Finally, "gaps" affect the rate of increase of wages and prices, which is what the policymaker is ultimately aiming at. At first glance this all seems quite straightforward. This is true even when we pass on to the practical question of how this process might be operationalised. We choose a target level for the inflation rate. We rely on the National Income Accounts (NIA) and other sources for our data. We estimate econometrically our macro models and use them to forecast whether the current policy settings are consistent with our objectives. And finally, we constantly update our forecasts and our policies in the light of incoming information. So what is the problem?

In fact, the potential problems were flagged as far back as the 1940s in a series of exchanges between Jan Tinbergen, the Dutch inventor of econometric modelling, and John Maynard Keynes along with their respective disciples. These issues were subsequently highlighted in a book published in 1968 entitled "On Keynesian economics and the economics of Keynes". In his book, Axel Leinhofvud asserts that Keynes agreed that the IS-LM model, devised by Sir John Hicks, did capture the interaction between the various functional forms referred to in Keynes' General Theory. This model subsequently became the basis for "Keynesian economics". However, Keynes, or at least many of his disciples at Cambridge, England, denied that these functional forms could ever be estimated empirically. The fundamental problem with each, and also with the transmission mechanism that relies on such estimates, is that expectations about the future are central to all economic decisions. This is the essence of "the economics of Keynes". These expectations are both hard to measure and essentially ephemeral. This fundamental problem, along with a number of others, continues to bedevil the application of the empirical framework today.

Let me be more specific about some of the other statistical challenges facing those pursuing the goal of price stability. Perhaps the first issue is that of which index to target. In principle, we should be trying to measure the costs associated with aggregate price movements, and should then try to stabilise the index which best represents those costs. In practice, this is never done. Indeed, in most jurisdictions it has simply been assumed that stabilising some variant of the CPI is appropriate. This, of course, still leaves us with many choices, not least that of how the index is to be created (the weights issue), the choice of caveats and exemptions (commonly food and energy prices) and the distinction between first-round and subsequent effects of shocks (like tax increases) on measured price movements. I note, in passing, that stabilising the CPI implicitly assumes that productivity gains over time will show up as increases in nominal wages. Going back to prewar days, there was in fact a lively debate as to whether this was sensible or not.

When we turn to the transmission mechanism, perhaps the most important empirical questions have to do with estimating the supply side potential of the economy. This in turn impinges on our capacity to measure "gaps". The recent experience of the United States is instructive in that measures of potential growth were first revised sharply upwards, but have more recently been revised partially back down. In a sense, there is nothing new in this. Measures of potential based on factor inputs into production functions have always revealed that the "unexplained residual" was by far the biggest contributor to growth. In the same vein, statistical measures of potential based on detrending have always been highly dependent on the precise methodology used. But a more novel element in the recent US experience is the role played by the choice of hedonic price indices to deflate nominal expenditures in the IT area. To some degree, this has affected the perceptions of productivity growth differentials with Europe, where such indices are not in widespread use. The use of hedonic indices also invites the question of how gains in measured productivity can increase profits (and support stock markets) when the vehicle for this is lower prices. As an aside, it is also worth noting that estimates of potential are crucial for distinguishing cyclical from secular changes in the government's fiscal balances. As governments increasingly worry about the medium term sustainability of their fiscal stance, this issue gains in importance.

Closely related to this particular measurement problem is that of estimating the "natural rate" of unemployment or the NAIRU. Not only are there questions about the conceptual basis for these calculations, but there are also many practical difficulties. One approach is to back out these numbers from structural estimates of the equations determining wages and prices. I recall thinking about this when I was Chief of the Research Department at the Bank of Canada and being horrified by some of the underlying statistical assumptions. The dependent variable in the wage equation was not contract data at a given moment in time, but changes in average earnings, the cumulative effect of years of contract negotiations in the distant past. Among the explanatory variables were

potential growth and inflationary expectations, both of which suffered from severe measurement problems. Finally, an estimate of the actual level of unemployment was assumed to condition wage pressures, in spite of the fact that participation rates were also subject to very wide swings in response to market conditions. Given these circumstances, which still exist today, it is not surprising that estimates of the NAIRU are subject to wide margins of error.

A more general problem facing policymakers is that of structural change. In transition and emerging market economies, this can be the product of deregulation and technological changes, among other factors. Another issue is the so-called Lucas critique, which notes that a change in the behaviour of policymakers will induce changes in private sector behaviour. A good example here has to do with the reaction of exchange rates to domestic inflation. If the policymaker is not expected to resist the inflation, the exchange rate should weaken. Conversely, if the policymaker is expected to tighten policy to resist inflation, the exchange rate might well strengthen. The bottom line here is that measures of tensions will change over time, as might the estimated effects (even the signs) of those tensions. These possibilities do not make the policymakers' use of the empirical framework any easier.

Finally, the application of an empirical framework in the pursuit of price stability often suffers from significant data revisions. As someone once said: "What with the revisions to the National Income Accounts, the past has now become as uncertain as the future". Recent revisions in the United States have revealed that the recession was three quarters rather than one quarter long. More importantly, they have implied that productivity growth and NIA profits were in fact somewhat lower than earlier thought. Of course, one could question the importance of this revision since, until very recently, no one was looking at the NIA profits measures in the first place. Rather, the measure receiving all the attention in the markets was the profits measure produced by Standard and Poor's, which had the great attraction of continuing to rise while other measures were falling. Indeed, as a share of GDP, NIA profits have been falling since 1998. In sum, empirical measures can be revised. But revisions to how we freely choose to focus on the data may be more important still.

Faced with these kinds of empirical problems, which were as endemic in the 1970s as today, policymakers have often turned to other indicators to guide their conduct of monetary policy. Financial indicators such as exchange rate developments and growth rates for monetary and credit aggregates have traditionally been popular. Unfortunately, they also pose empirical problems. A monetary authority choosing a fixed exchange rate regime must still decide: fixed against which currency? And if a basket of currencies is to be chosen, which ones should be in it and with what weights? As for monetary and credit aggregates, choices must be made between alternative aggregates since they cannot all be controlled simultaneously given the limited range of central bank control instruments. Moreover, the criteria for making such choices are still not very clear. Finally, with structural change in the financial system, the demand functions for such aggregates can swing wildly and provide policymakers with all sorts of inappropriate signals for action. It was just such developments that prompted Gerry Bouey, Governor of the Bank of Canada, to declare that "the Bank did not abandon monetary targets, they abandoned us".

I have made these comments to this particular audience to underline two points. First, a great deal of work still needs to be done to better refine the data and the models we use in the conduct of monetary policy. This applies even when we are pursuing such a traditional objective as price stability. My second point relates to the first one. We need to be modest about what we know and the limitations of our metier. Overpromising and underachieving is the easiest way to lose credibility, though it must be admitted that being unambitious in the pursuit of policy objectives can also lead to the same outcome. Being transparent about the shortcomings in our data, and our capacity to analyse the data, may incline the public to be generally more forgiving about perceived shortfalls in our performance. It may also lead to a greater willingness to provide resources to improve both our data and our analytical capacities. Both are sorely needed.

And as if this were not enough for statisticians to worry about, a number of challenges have arisen in recent years as regards the pursuit of financial stability. Let me now turn to this issue.

3. Challenges related to financial stability

I will turn in a moment to the issue of what kinds of information we need to make assessments of the expected costs (in the statistical sense) of financial crises. Clearly, we need some combination of measures of the changing probabilities of financial crises and the costs of those crises should they occur. But before turning to this issue, a few words seem warranted about the dynamic economic processes which seem to give rise to financial instability. Note that none of this is in your

standard IS-LM model or its many descendents. Rather, the analytic framework has more in common with mid-European analysis of business cycles prior to World War I, abetted on the down side of the cycle by the work of Irving Fisher to which I referred just a few moments ago.

The cycle begins in a wave of optimism, often associated with some innovation such as new technology, the opening up of some new markets or desirable changes in economic policy. These events provide the basis for expectations of profit growth well above prevailing rates of interest on fixed-term instruments. While initially based on sound foundations, this justified optimism turns imperceptibly into unjustified optimism. Not uncommonly, this process unfolds with inflation maintained at low levels, as heavy levels of investment ensure that supply potential increases pari passu with demand. However, at a certain point, profits begin to decline, either in the light of over-expansion (and an inability to raise prices) or because costs begin to mount. This is followed by an investment "bust" which, in the limit, can lead to financial distress, subsequent headwinds affecting the real economy and even deflation. The financial distress arises from the fact that the investment expansion is normally financed with excessively cheap credit expansion, which rebounds on the lender. The tendency to deflation arises from the fact that inflation was already low when the bubble burst.

This characterisation of the financial cycle was first based on observations in Europe and the western hemisphere in the period prior to World War I. However, more recent crises also seem to have been rather similar in character. The Great Depression in the United States, the experience of Japan in the 1990s and the East Asian crisis all are reminiscent of this story. Recent experience with the Nasdaq bubble in the United States, and the associated IT investment cycle, also seems similar in some respects although the reliance on market-based rather than bank financing is a material difference from earlier episodes.

Identifying potential problems arising from financial instability has been rendered more difficult in the current world by the major structural changes that have taken place in the world financial system over the last three decades. Three major changes can be identified: securitisation, globalisation and consolidation. Each has aspects that could make financial stability more likely or less likely. *Securitisation* refers to the growing tendency, most marked in the English-speaking countries, for credit to be provided directly through market processes as opposed to indirectly through financial intermediaries. On the one hand, this might help reduce financial instability since exposures are much more widely spread. Moreover, since the banking system is less involved, potential threats to the functioning of the payment system would also be reduced. On the other hand, markets are much less interpersonal than is "relationship banking" and could be much more volatile, particularly when under stress. *Globalisation* refers to the process through which all markets, both national and international, are becoming much more tightly linked. On the one hand, this might reduce financial instability since the impact of shocks can be much more widely dispersed. On the other hand, there might also be new dangers. The capacity to finance "excesses" may now be greater, with an associated danger of sudden changes of view about debt sustainability. An associated possibility is that individual countries may now be more subject to "runs" if (and this is a big assumption) foreigners prove more skittish than local investors. *Consolidation* refers to the growing degree of concentration in many financial markets. On the one hand, financial instability may be reduced since bigger firms tend to be better diversified and might be presumed to have better risk management capabilities. On the other hand, concentration could have systemic implications should a big firm fail, and the possibility of herding in markets might also be increased. The bottom line is that all of these structural changes make it harder to identify where there might be emerging vulnerabilities in the operations of the financial system.

Given how hard it is to identify emerging problems in the financial system, there has been a growing recognition of the need to approach this problem in a multifaceted way. For this reason, internal governance of financial institutions, along with public sector oversight and market discipline, are all expected to provide incentives to encourage prudent behaviour on the part of *individual* participants in the financial system.[1] Note, however, that for each of these incentive systems to function properly, there must be adequate information to allow judgments to be made about the various risks being taken and the prices being charged for doing so. Note, moreover, that information about the health and exposure of financial institutions must also be based on adequate information about the health of those to whom they have lent.

All three of these incentive systems to encourage prudent financial behaviour require good data both from non-financial corporations and from financial institutions. That is why the recent

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1 *For example, this was the primary motivation for the decision by the Basel Committee on Banking Supervision to rely on the three pillar approach (capital standards, supervisory oversight and market discipline) in setting out the New Basel Capital Accord.*

corporate accounting scandals are so worrisome. They threaten the integrity of all of the more aggregated information systems which rely on such data as inputs. At the level of the financial institutions themselves, we also need more accurate measures of risk exposure, in particular of problem loans and non-performing loans. One shortcoming in the measurement of credit risk in particular is that credits extended during periods of rapid economic expansion are generally treated as "low risk". This is largely due to the fact that, in such periods, recorded loan losses are low and this recent good performance tends to be simply extrapolated into the future. In reality, given that the business cycle has not (and will never) disappear, this is precisely the time when bad credits are actually building up to materialise during the subsequent downturn. Since both the internal governance process and market discipline might be subject to assessments of exposure which are too low in upturns, and potentially too high in downturns, the role of public sector oversight becomes all the more important.

This raises more directly an issue only alluded to above. What should be the objective of public sector oversight? Traditionally, the focus has been on the financial viability of individual institutions. This is the normal preoccupation of financial supervisors. The reporting requirements to satisfy the needs of such *microprudential* oversight are essentially those I have just referred to above. What is being increasingly recognised, however, is that oversight should also be conducted with a view to ensuring that the system as a whole is stable; what the BIS has for years referred to as *macroprudential* oversight. The reason for this is rather obvious in the light of numerous recent financial crises which, ex post, have generally had costs amounting to many percentage points of GDP.

Measuring the expected costs of financial crises, ex ante, requires evidence pertaining to the changing probability of a crisis occurring. A number of suggestions can be made as to the kinds of data that might prove illuminating in this regard. Nevertheless, we are far from having reliable guides in this respect. A great deal of work has been done on macroprudential indicators, with some by my colleagues Claudio Borio and Philip Lowe showing particular promise. They find that a combination of indices pertaining to credit, asset prices and investment (generally focused on sustained deviations from trends) can generally predict crises while avoiding too many "false positives". This type of work has been held back, however, by a serious data deficiency; namely, in many countries there are no long-term time series for property prices. This is astonishing when one considers how frequently banking crises have been triggered by booms in commercial property. This is an area where statisticians clearly have much useful work to do.

Another area where there are serious data shortcomings in many countries is that of sectoral balance sheets, in particular the level of corporate debts denominated in foreign currency. It is clear from the Mexican (1994), East Asian (1998), Turkish (2000) and Argentine (2001) crises that currency mismatches grievously aggravated the economic downturn once the domestic currency had depreciated in value. The current difficulties facing Brazil, where many debts have been indexed either to inflation or to the exchange rate, have a similar character. While off-balance sheet transactions can seriously complicate the task of assessing exposures of this sort, the domestic banks should be the principal agents pressing for full disclosure. They should recognise that it is their own survival that is on the line should a large enough number of their clients be thrown into default because of an exchange rate change.

In recent years, the international banking statistics collected by the BIS have been improved in many ways. In particular, the consolidated banking statistics now give a fairly clear picture of the exposure of individual countries to international bank debt, as well as the exposure of the national banking systems that have given such credits. Yet some shortcomings still remain. We have relatively little information about the joint exposures of financial conglomerates that include banks, investment banking and insurance. Moreover, there are a whole host of new instruments and financial structures that could conceivably contribute to financial instability. Asset-backed securities, special purpose vehicles, credit derivatives, the reinsurance industry and hedge funds all seem to have been growing very rapidly in recent years. Yet we do not have a great deal of information about these developments and their possible implications.

If there is enhanced demand for data that could indicate growing financial vulnerability, it is fortunate that there is also an element of enhanced supply. It is now recognised, that there is significant information about exposures in the financial market variables themselves. For example, measures of implied volatility derived from option prices tell us something about the market's own assessments of market risk going forward. Various measures (like bid-ask spreads, turnover, and spreads between new and seasoned issues) can indicate emerging problems with respect to liquidity. And there are a whole host of indicators (spreads, Merton type estimates of the probability of default, and credit default swaps) about how credit risk is evolving. While these indicators do not always point in the same direction, the growing efficiency of arbitrage indicates that this should become less of a problem in the future. Supervisory data, commercial databases, and data based on

the workings of payment systems and custody arrangements may also provide insights into whether, and in what ways, the financial system is showing increasing signs of vulnerability.

4. The nexus between price stability and financial stability

There are certainly great statistical challenges in assessing whether *price* stability is being threatened. There are perhaps even greater challenges in assessing whether *financial* stability is being threatened. Unfortunately, the possibilities for interaction between price stability and financial stability make the resulting challenge even greater than the sum of the parts. "Chaotic" outcomes, multiple equilibria and the sudden transformation of "good" states of affairs to "bad" ones become all the more likely. This is not a world in which formal modelling based on high-frequency data is likely to provide much insight about the future. Rather, the best guide might be the study of history and the pathology of low-frequency events.

It is a fact that movements in the aggregate price level (for goods and services) can have implications for financial stability. When aggregate prices are rising, as we saw in the 1970s and 1980s, speculation and imprudent lending for the purchase of assets which keep their real value (in particular real estate) lead to an overextension of credit which then feeds back on the health of the financial system. When prices are falling, as we have seen recently in Japan, the burden of debt becomes increasingly onerous. Real interest rates can start to rise, and monetary policy becomes increasingly impotent as nominal rates fall to zero. Unserviced debts eventually threaten the health of the lenders. As noted above, Irving Fisher probably said as much about this phenomenon as needs to be said. But it is also the case that the health of the financial system can have important implications for price stability. A financial system burdened with bad debts, and unsure about both its own solvency and that of its customers, is unlikely to make credit easily available. In a downturn, such lending behaviour would almost certainly make the downturn worse. In turn, this would exacerbate any existing trends for inflation to fall and eventually lead to deflation.

Reflections of this sort indicate why central banks, even those without microprudential supervisory responsibilities, must retain a concern for macroprudential oversight. The interactions between the behaviour of the financial system and overall macroeconomic performance are crucial and of natural interest to central bankers. This said, if both independent supervisory authorities and central banks have an interest in financial stability, there needs to be some agreement as to how they should interact. These agreements need to cover both normal circumstances and times of crisis. The objective must be to exploit the comparative advantage of those who approach problems from the "bottom up", and those whose approach is more "top-down". It should be self-evident that both approaches are valid.

5. Central bank cooperation on statistical issues and the role of the BIS

Since I now have a captive audience, let me spell out quite briefly the contribution being made by the BIS to international financial cooperation with respect to statistical issues. We have done a great deal on this front in recent years, but the list of remaining challenges and open statistical questions remains a daunting one.

First, there is the issue of traditional macroeconomic monitoring. In this area, many of you will be familiar with the work of the BIS Data Bank. The original purpose of the Data Bank was to collect the principal macroeconomic time series data used by the central banks of the G10 in the conduct of their own monetary policy. Each central bank was (and is) charged with ensuring the quality of its own data contributions, with a view to getting access in exchange to similarly high-quality data from others. The BIS provides the technical platforms for the exchange of such data, and our staff also provide an additional layer of quality control. In recent years, two major trends have become noticeable. The first is that the number of countries participating in the Data Bank has increased significantly, and this expansion seems set to continue. One possible vehicle for this may be regional central banking groups (like CEMLA and SEACEN), which might piggyback off our efforts in Basel. The hope would be to encourage much enhanced statistical reporting from all of their regional participants. The second trend has seen BIS staff move beyond quality control towards providing a consulting role to those raising questions about the nature of the data provided by other countries. In this regard, clarifications about the comparability of definitions across countries come quite high on the list of services requested.

Second, there is the issue of providing data which is useful for macroprudential monitoring. The BIS now collects and compiles a very large number of financial market indicators. While these are currently largely drawn from the financial sectors in the more advanced industrial countries,

data from the larger emerging market and transition economies are being added on a regular basis. In addition to the principal statistics indicating the state of the macroeconomic background, indicators of market risk, credit risk and liquidity risk figure importantly. Capital flows and movements in credit aggregates are also presented. So too are many statistics pertaining to the process of financial intermediation and to the health of both corporate and household balance sheets. As noted above, however, there continue to be many areas, for many countries, where important statistical series are simply not available.

Third, and closely related to the second, the BIS collects and compiles a wide variety of international financial statistics. The international banking statistics are well known and have been extended and improved in many ways in recent years. Moreover, a whole set of further improvements are in the works and should be finally implemented within the next year or two. These data were originally intended to provide evidence about the exposure of creditor banks to international loans, but they have also proved useful as the basis for calculations of debt exposures by borrowers. The joint BIS-IMF-OECD debt statistics incorporate inputs from all three institutions in a coherent way. Moreover, the BIS has recently conducted research to identify why such "creditor-side" statistics on short-term debt exposure sometimes differ from the "debtor-side" statistics collected by the countries themselves.

The International Financial Statistics group at the BIS also collects a wide range of other statistics. This reflects the fact that international finance is no longer only (or even primarily) provided by banks, and that there is much more to international finance than traditional loans. Accordingly, the BIS provides statistics (largely based on commercial sources) on the international issuance of securities.[1] Moreover, in addition to the quarterly collection of data about exchange-traded derivatives, the BIS also performs a triennial survey of activity in over-the-counter derivatives markets. This latter survey complements the triennial survey of the world's significant foreign exchange markets (over 40 at last count), which has now been repeated five times.

While not primarily statistical, it is important to underline two related and important contributions by the BIS with respect to these numbers. First, they are either made publicly available (see *www.bis.org)* or are available to participating central banks through our new extranet facility called eBIS. If you are not aware of eBIS, and the wealth of facilities and information it provides to central banks, then you should be. Second, these numbers are regularly evaluated by the various groups of national experts which meet here at the BIS, whether they are primarily concerned with price stability, financial stability or both. These groups include the regular meetings of Governors, the Basel Committee, the Committee on the Global Financial System, the Markets Committee and the Financial Stability Forum, among many others.

The final issue I would like to deal with are future statistical challenges. The first of these must be to respond to past challenges, described above, which have not yet been adequately addressed. But in addition, a number of trade-offs can be identified where we need a clearer understanding of what precisely it is that we want. One such trade-off is that between timeliness and accuracy. More of the former means less of the latter. Another tradeoff is between the desire for international harmonisation and the need to reflect accurately national idiosyncrasies of various sorts. A third is the choice between stability and change in the adoption of new technologies and reporting formats. In this context, the most pressing issue must surely be the urgency with which we all strive to adopt newly emerging web-based information exchange standards. The new initiative, strongly supported by the BIS, on Statistical Data and Metadata Exchange (SDMX) should in time provide us with increasing insights as to the costs and benefits of alternative paths to follow.

To conclude, a lot has been done to foster international cooperation between central banks on statistical issues, but a lot remains to be done. This is the first meeting of the Irving Fisher Committee in which the BIS has played an important supportive role. We have enjoyed doing so. I would also add my hope that this first meeting with active BIS support for your important work will not be the last.

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1 *These numbers would be usefully complemented by information about the issuance of securities in domestic markets, and by data on the purchase by foreigners of domestically issued securities as well as the purchase by domestic entities of securities issued in international financial markets. Such data is not yet commonly available.*

SESSION 1

Central bank statistics and monetary stability

Chair: Jack Selody, *Head of the Monetary and Financial Analysis Department, Bank of Canada*

Secretary: Gert Schnabel, *BIS*

Papers: First Part

"Banco de Mexico's experience in measuring the risk position in Mexican pesos of foreign investors and its relevance for Monetary Policy"
Samuel Alfaro, *Bank of Mexico*

"Transaction technology innovation and overnight deposits demand in Italy"
Francesco Columba, *Bank of Italy*

"Statistical implications of the chosen monetary policy strategy: the Czech case"
Petr Vojtisek, *Czech National Bank*

"Gathering predictive information for implementing inflation targeting: the case of Peru"
Adrián Armas, *Central Reserve Bank of Peru*

"New challenges for a central bank under dollarization: the experience of Ecuador"
Amelio Pinto, *Central Pank of Ecuador*

Second Part

"The value of discrepancies"
Grazia Marchese, *Bank of Italy*

"Quarterly Monetary Union Financial Accounts for ECB Monetary Policy Analysis"
Reimund Mink, *ECB*

"The International Investment Position: Measurement aspects and usefulness for Monetary Policy and Financial Stability issues"
Frédéric Lambert and Laurent Paul, *Bank of France*

"Euroconversion in international databanks"
Henk Lub, *Netherlands Bank*

Discussants: Leon Taub, *Federal Reserve Bank of New York*
Rudi Acx, *National Bank of Belgium*

Session 1:
Central bank statistics
and monetary stability

Issues Paper

Jack Selody (Bank of Canada)

The role of data for monetary stability

In order for central bank statisticians to collect, compile and construct useful statistics it is critically important that they know how central bank economists intend to use their data.

In general, central bank economists use data for three basic purposes:
- to validate their models, because monetary policy decisions are better when based on valid models;
- to forecast future inflation and other variables from past data, because monetary policy works with a lag and so policy makers base their decisions on expected future outcomes; and
- to explain policy decisions to the public, because monetary policy works in part through expectations and therefore works better when the reasons for the decisions are understood by the public at large.

I would suggest that the guiding principle behind the creation of central bank statistics for monetary stability is that imperfect measures of useful economic concepts are preferable to perfect measures of useless economic concepts.

Of course, the debate about what constitutes a useful economic concept is as timeless as the debate about what constitutes a good statistic. I propose that in this session the discussion focus on four issues germane to matching central bank statistics to economic concepts.

Which economic concepts are most useful to monetary policy decision making? Do central banks have good statistical measures of these concepts? Does a lack of data availability limit monetary policy decision making?

How does a statistician know when a statistic is a good measures of an economic concept? What can be done to reduce measurement error? What can be done to make statistical constructs correspond more closely to economic concepts?

To what extent should monetary policy decisions be based on aggregate data? Is the information that is lost when data are aggregated useful for monetary policy analysis? What can be done to improve the way we aggregate data?

How important is it for economists in different central banks to use the same economic concepts (for example, not all central banks define core inflation the same way)? How important is it for statisticians in different central banks to harmonize their methodologies? Does greater harmonization come at the expense of a greater mismatch between central bank statistics and the corresponding economic concepts?

How does data availability (quality) influence the monetary policy decision making process?

Not all central banks use the same approach to monetary policy decision making. Moreover, some approaches are more demanding of the data than others. The following list presents one possible ranking of stylized approaches to monetary policy decision making according to the demands they make on the data (from least to most demanding of the data):

1. money targeting,
2. inflation targeting using a traditional macro economic model based on national accounts data,
3. inflation targeting using multiple paradigms based on an array of simple real and financial models,
4. inflation targeting using an advanced model that integrates real and financial behaviours.

Is this list complete, or do central banks use other approaches to monetary policy decision making? Is the ranking sensible?

Do central banks have access to all the data they need for monetary stability? If not, why not?

Do better statistics lead to better economic concepts, or do improved statistics follow from new or more precisely defined monetary policy concepts?

> *Alfaro* says that monetary policy decision makers in Mexico would like to know the risk position of foreigners in Mexican pesos. But these data are not easily obtained (nor do they correspond to any concept found in standard macro economic models). *How much attention should monetary policy makers be paying to this type of data? Is it feasible to acquire accurate information on financial exposures given continuing financial engineering and the lack of incentives for financial market participants to report information to the central bank?*

> *Columba* shows that innovations in transactions technology can have important effects on money data. This is just one aspect of the broader issue whereby money data has been distorted by financial innovation in general. *How good is the quality of money data? Can changes to statistical methodology keep pace with financial innovation? Does distorted money data mean that central banks should put less emphasis on money targeting in favour of inflation targeting?*

> *Vojtisek* explains why the Czech Republic switched from money targeting to inflation targeting in 1998. He also describes the extra demands for data that go along with inflation targeting. *Is it as easy to meet the data requirements of inflation targeting as the Vojtisek paper seems to imply? What are the benefits and costs of moving to inflation targeting?*

> *Armas* points out that Peru adopted an inflation targeting regime in January 2002. The move to inflation targeting has already led to improved economic statistics and analysis. *Do the inflation forecasting models used by emerging economies adequately capture their special circumstances? If not, does this matter?*

> *Pinto* argues that even when a central bank gives up responsibility for monetary policy (e.g., because of dollarization), the need to compile high quality statistics remains. *Is the need for statistics less when central banks do not have responsibility for monetary policy?*

How do we validate economic data

Economic data are used to validate economic models, but what validates the data? This is especially troublesome when economic models are part of the statistical methodology used to construct the data (e.g., economic models are often used to calculate output gaps or expectations variables). In these extreme cases the data can no longer be used to validate economic models. More generally, it would seem that the construction of most central bank statistics are influenced in part by assumptions about how the economy works.

How do central banks validate their data?

Is data quality better when the collection of data is centralized in one statistical agency or decentralized across statistical agencies?

It is sometimes stated that monetary policy is a macro economic policy and therefore should be based on aggregate not disaggregate data. On the other hand, almost all practising policy makers that I have met appear to have an enormous appetite for detailed disaggregate information from a wide variety of sources.

What is the mix of use of disaggregate versus aggregate data in central banks? Is the mix optimal?

Marchese argues that data can be improved by carefully examining the discrepancies between data that can be obtained from multiple sources. This line of reasoning suggests that one way to validate data is to measure it in more than one way, using different methodologies. The resulting discrepancies then give a natural metric for "data uncertainty." *Is it feasible to measure most economic data in more than one way, given the significance of reporting burdens and the lack of incentives to report data? Are statistical discrepancies strictly measures of data accuracy, or do they also contain independent information about economic behaviour? Would the widespread application of this methodology help give better measures of economic concepts?*

Mink describes how the ECB is collecting financial data to aid the decision making process. *Would this data be necessary if pillar one did not exist? Are balance sheet data and financial transactions data the best way of analysing financial decisions (for example, can we determine the degree of credit rationing in an economy from this data)?*

Lambert and Paul argue that some data (such as the International Investment Position) would be more useful if it were collected in a more timely and comparable manner. Such an improvement requires cooperation among countries, suggesting that data collection for monetary stability purposes should be international in scope. *Does monetary stability require harmonized international data? Is it feasible to expect harmonized data to accurately measure economic concepts?*

Lub discusses one methodological aspect of calculating real and nominal values when exchange rates fluctuate. *How should policy makers treat a group of countries — as a single entity or as a group of separate entities?*

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Banco de Mexico's experience in measuring the risk position in Mexican pesos of foreign investors and its relevance for Monetary Policy

Samuel Alfaro[1] (Banco de Mexico)

I. Introduction

Ever since Mexico liberalized its financial sector, in 1990, the activity of foreign investors has played a significant role in the foreign exchange market. This is because of the relatively large amount of the external capital flows that during some periods have come into the Mexican financial system, or in some other events have gone away. Depending on the prevailing exchange rate regime, these flows have caused sizeable fluctuations either in the international reserves, or in the exchange and interest rates. Given the importance of the actual and prospective exchange rate behavior in attaining Banco de Mexico's objectives, the monetary authorities have been interested in maintaining under surveillance the risk positions in Mexican pesos taken by foreign residents.

Up until the 1995 crisis, the surveillance process was facilitated by the regulatory framework that restricted some investment opportunities to market participants. Under such constraints, those foreign investors that were attracted by the large expected rates of return coming from acquiring Mexican peso denominated assets, relied mainly in outright positions in government securities. Given the size of these positions, Banco de Mexico assembled statistics measuring the stock of government securities held by foreigners in order to have an indicator of their risk position.

After the 1995 crisis it has been more difficult to obtain reliable data on foreign investors' risk positions in Mexican pesos. This difficulty has arisen since the regulatory constraints for market participants to conduct operations in specific instruments were eliminated, so that it has been complicated to follow the strategies taken by foreign investors. In particular, foreigners have been operating with new instruments, mainly derivatives, that not necessarily are booked in Mexico. Under such circumstances, the relevance of the government securities held by foreign residents as an indicator of their risk positions in Mexican pesos has almost vanished. To cope with this problem Banco de Mexico has had to develop new methodologies to assemble data that capture, if not the precise level, at least an accurate trend of the risk position in Mexican pesos taken by foreign investors.

The objective of this paper is to present the characteristics and results from the methodologies that Banco de Mexico has assembled during the last ten years. Special attention is focused on the limitations of these statistics as indicators of the factors that determine the financial markets' trends. These methodologies are applied to analyze the behavior of foreign investors under different events such as:
- The 1994 speculative attack against the Mexican peso predetermined exchange rate regime which is discussed in section II.
- The 1997-1998 staggered crisis in Southeast Asia and Russia which is presented in section III.
- The impact of the recent improvement of Mexico's risk evaluation by the credit rating agencies which is explored in section IV.

II. Analysis of the foreign investors' risk position during 1994.

During 1994 the Mexican economy went through a period of increasing instability that concluded in the devaluation of the currency. Even though the 1994 crisis was triggered by political events, the fragility of the prevailing macroeconomic foundations induced the government to implement a strategy aimed at avoiding a reversal of the foreign capital inflows that were attracted during the previous three years[1]. The most important part of this strategy was focused in the stock of government securities held by foreign residents, since it represented the main financial instrument to engage in Mexican peso risk. In what follows we analyze the main characteristics of the foreign holdings of government securities and its behavior during 1994. First, we present a brief background description in which we explain the methodology that has been applied to classify by the holders' residency, the stock of government securities. Afterwards, we identify the main trends followed during 1994 by the outstanding amount of government securities and its composition by instruments and holders. Finally, we examine in detail the available information for the periods in which the exchange rate faced speculative attacks, so that we can follow how the indicator of the foreign holdings of government securities was then interpreted.

From 1988 to 1994 the central bank operated in the financial markets with the objective of keeping the exchange rate within a predetermined band. In turn, this band was implemented to achieve an inflation objective set within a social accord led by the government. The disinflation policy was efficient since it brought down the annual inflation rate from levels of 159.2% in December 1987 to 7.1% in December 1994. However, the sustainability of the stabilization effort was shadowed by the inflexibility of the exchange and interest rates to respond to massive capital inflows which initially induced a rising current account deficit, an accumulation of international reserves and the expansion of banking credit. The interruption of those inflows, during 1994 and 1995, caused the most severe economic crisis in Mexico's modern history.

Up to 1994 government securities represented the main financial instruments used by foreign investors to engage in Mexican peso risk. The securities placed in the domestic money market by the Mexican government have represented the main instrument to document its internal debt. A factor that contributed to enhance their importance both as a useful investment instrument and as a source of valuable information, was the authorization in December, 1990 for foreign residents to maintain government securities in position. In particular, this deregulation allowed the financial authorities and the overall public to have access to information on the holdings of such instruments by foreigners. By following this information it is possible to appreciate the importance of the foreign investment in government securities, since by the end of 1993 it represented 90% of the international reserves and 12% of the broadest monetary aggregate.

The relevance of maintaining under surveillance the government securities stock held by foreigners during the period 1991-1994 is also evident by observing the proportion of Mexico's current account deficit that was financed by foreign portfolio investment flows in debt instruments (see Table 1)[2]. Consequently, the behavior of these holdings represented an accurate indicator of the disposition by foreign investors to finance the current account deficit, which in turn was the driving force behind the evolution of the foreign exchange market and the international reserve stock.

Table 1 – Foreign financing of the current account deficit

	Current account deficit		Foreign investment in government securities	
	Annual flow in millions	As a percentage of GDP	Annual flow in millions	As a percentage of the current account
1991	14,647	3.7	3,406	23.3
1992	24,438	6.1	8,47	33.3
1993	23,399	5.8	7,406	31.6
1994	29,662	7.6	-2,225	-7.5

1 *The fragility of Mexico's macroeconomic fundamentals during the early part of the 90's were mainly related to the incapacity to generate a high and sustained growth rate as pointed by Dornbusch and Werner (1994) and to the inflexibility of both interest and exchange rates as indicated by Gil-Díaz and Carstens (1996).*

2 *Dabós and Juan-Ramón (2000) investigates the impact of capital flows to Mexico on the real exchange rate distinguishing between the period prior and after the 1994-195 crisis.*

Information regarding the amount of government securities held by foreigners is obtained from the stock of such securities that banks maintain in custody as positions of their clients. Banco de Mexico has imposed as a regulation to banks the requirement to provide a daily report on the distribution by sectors of the securities kept in custody. In order to comply with the principle of banking secrecy, all the information is brought in aggregate levels. In particular, banks have to classify the instruments that have been deposited in custody between domestic and foreign clients.

To interpret correctly the information on the distribution by sectors of government securities it is necessary to keep in mind that it is subject to two important limitations:
- Holdings are classified by the residency of the agent that deposits the securities in custody. However this does not imply that such agent is the final holder. For example, the following transaction would be reported as a foreigner's position: a foreign investment bank that leaves in custody government securities acquired by instructions of a Mexican client.
- Holdings include the position coming from outright purchases of government securities plus the position derived from repurchase agreements (repos) involving such securities. The inclusion of repos is explained by the legal and operative treatment of this operation in Mexico. In particular, the securities that serve as collateral of the repurchase obligation are transferred to the creditor's own position. Consequently, it is possible that government securities that are classified as holdings of a specific sector include the instruments involved in interbank financing operations through repos.

The Mexican government has issued five types of government securities:
- Cetes, zero-coupon bills with maturity terms from 4 weeks to one year.
- Bonos, fixed-coupon notes with maturity terms from 3 to 10 years. The placement of this instrument began in March, 2000.
- Bondes, variable-coupon notes with maturity terms from 2 to 5 years.
- Ajustabonos and Udibonos, inflation-indexed notes with maturity terms from 2 to 10 years. Ajustabonos were discontinued in January, 1995 and Udibonos were introduced in May, 1996.
- Tesobonos, exchange rate-indexed zero-coupon bills with maturity terms from 4 weeks to one year. The last placement of this instrument occurred in January, 1995.

Figure 1 – Government securities held by the public
(Stocks in millions of December, 1994 Pesos)
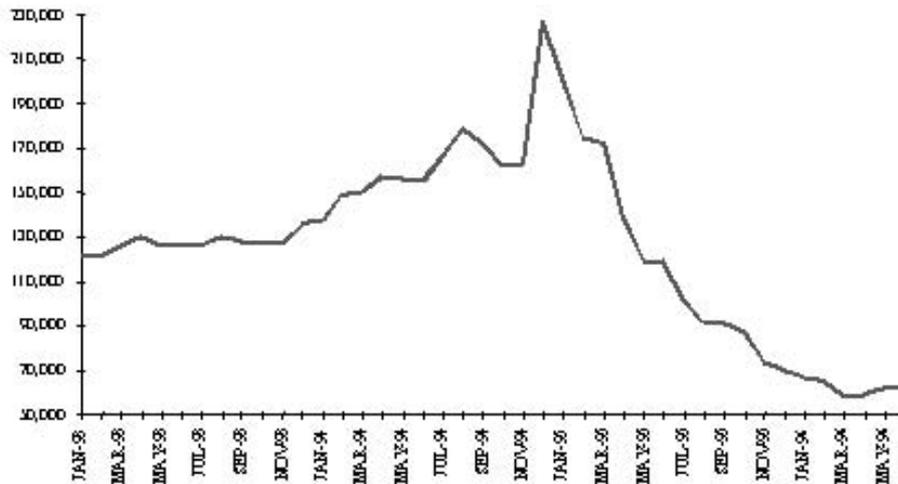
Figure 1 depicts the stock of government securities held by the public measured in real terms. It is important to note that the significant hike observed in December 1994 is explained mainly by the devaluation of the Mexican peso that implied an increase in the amount of Tesobonos measured in domestic currency. Eliminating the devaluation effect, the stock of government securities increased by 15% in real terms between January, 1993 and December, 1994. During 1995 and 1996 the outstanding amount of government securities decreased in real terms following the amortization of Tesobonos. This amortization was funded with the resources obtained by the Mexican government from the emergency financial package arranged with the US government, the international financial organizations and some central banks.

As previously mentioned, the evolution of the government securities stock during the period of analysis was determined by the behavior of Tesobonos. Figure 2 shows that up to the first months of 1994 the outstanding amount of this instrument represented less than 5% of the total stock of government securities, but starting March, 1994 the relative importance of Tesobonos followed an increasing trend during the remaining part of that year. This upward trend is explained by a deliberate strategy of the Mexican government to swap domestic debt from peso denominated to dollar indexed instruments. Such strategy was aimed to enhance the financial authorities' commitment to uphold the prevailing predetermined exchange rate regime, through providing to market participants an instrument that could be used to hedge the devaluation risk for a period of up to one year. The argument behind this strategy was that since the factor inducing an increase in the devaluation risk was not economical but political in nature (the assassination of the official party presidential candidate) the elections could be conducted in such a way as to provide an unquestionable winner, so that the new president might restore political stability.

Figure 2 – Distribution of Government securities: by currency
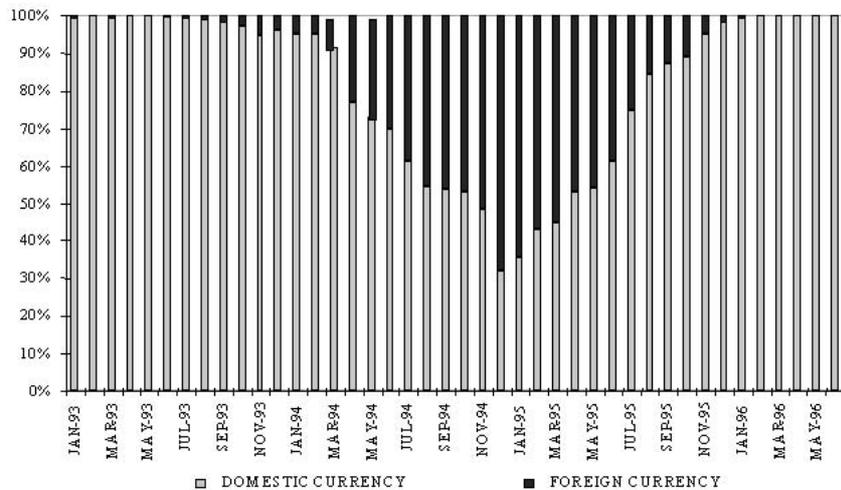
During the last three quarters of 1994 the political situation in Mexico, instead of observing an improvement after the clear victory of the official party's presidential candidate Mr. Zedillo, continued the path towards a continuous deterioration. To cope with this problem the Mexican government stayed with its initial strategy, placing an increasing amount of Tesobonos that reached a maximum outstanding stock equivalent to 29.2 billion US dollars, that represented almost five times the international reserves level. Under these circumstances the financial authorities were forced to leave the predetermined exchange rate regime and let the peso freely float. Furthermore, as the normal financial sources were closed after the December, 1994 devaluation, it was unfeasible to renew the amount of Tesobonos held by the public, so that they were amortized as scheduled.

The perception of the financial authorities regarding the sustainability of the prevailing exchange rate regime was supported in part by the relative stability of the position of government securities held by foreigners, which implied their acceptance of the government securities swap. In this regard, Figure 3 shows the distribution of the government securities outstanding stock according to the residence of the holder. Up to March, 1994 there was an upward trend in the proportion of domestic debt securities held by foreigners, reaching at that date the maximum level of 54%, signalling the positive outlook of the economy after the introduction of NAFTA. This proportion felt slightly in the coming months as some foreign investors decided to close their exposure to Mexican peso risk, so that it reached an average level of 49% during the period between March and December 1994 but its volatility remained almost unchanged. After the devaluation of the peso the relative importance of foreign investors in the government securities market decreased steadily as Tesobonos were amortized.

Regarding the foreign investors' acceptance of the government securities' swap strategy, Figure 4 shows that foreigners held a significant proportion of Tesobonos. In fact the average proportion was 77% between November, 1993 and March, 1994 and 68% for the rest of the sample period. As for the foreign resident participation in the stock of peso denominated government securities, data shows that up to March, 1994 foreigners kept under their position almost half of the outstanding stock (see Figure 5). After the killing of the PRI's presidential candidate foreign residents reacted by reducing their position, which at the end of 1994 represented only 26% of the amount of peso denominated government securities.

Figure 3 – Distribution of Government securities by residency of holder
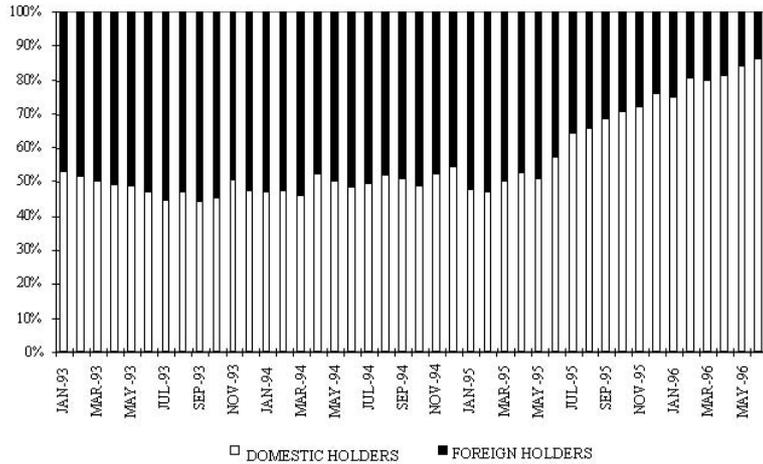
Figure 4 – Distribution of Tesobonds by residency of holder
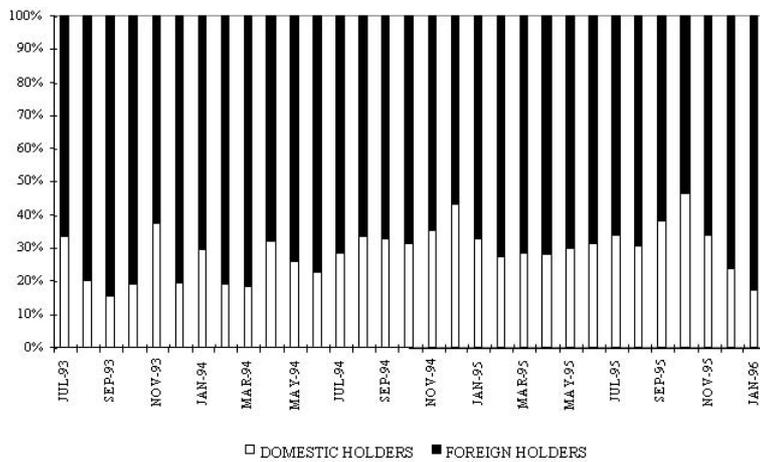
Figure 5 – Distribution of peso-denominated Government securities by residency of holder
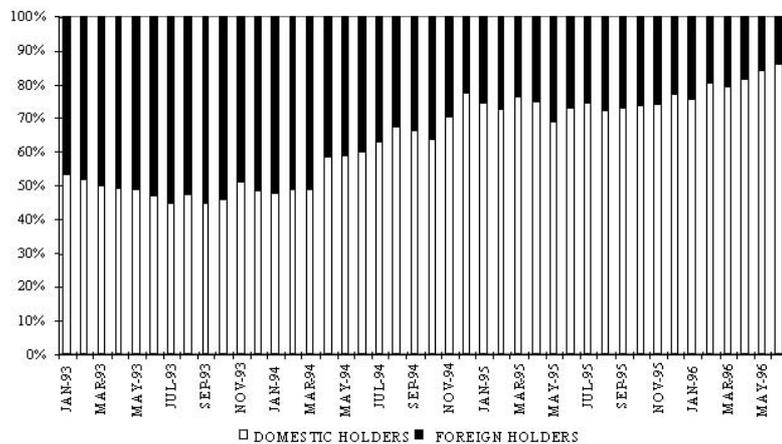
In order to understand how the financial authorities interpreted the information regarding the behavior of the government securities held by foreigners during 1994, in what follows we present in detail this information during three different periods in which Banco de Mexico sold US dollars in the foreign exchange market. In this regard, it is important to note that from March 25 to December 21, 1994 the central bank intervened at the upper level of the predetermined exchange rate band, selling an accumulated amount of 23.5 billion US dollars. Another issue that is relevant to point out

from the monetary policy operative framework of that period, is that in order to maintain stable the liquidity of the money market, foreign exchange interventions were accompanied by repo operations with government securities in which Banco de Mexico provided credit to commercial banks.

Figure 6 – Intervention in the foreign exchange market
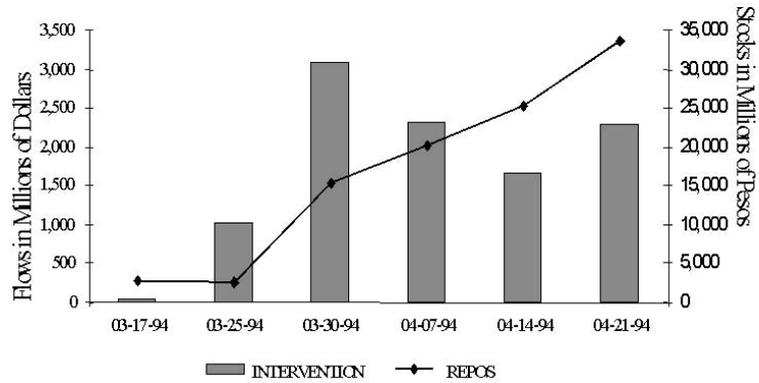
During the first period, from March 25 to April 21, the central bank sold 10.4 billion US dollars to support the exchange rate band (see Figure 6). At the same, foreign investors rebalanced the currency composition of their government securities holdings, reducing those denominated in Mexican pesos for the equivalent of 4.0 billion dollars and increasing their position in Tesobonos in 2.5 billion US dollars (see the graph set Figure 7). Consequently, a relatively small part (less than 15%) of the international reserve drop was explained by foreign residents closing their positions in government securities. In terms of the debt instruments maintained by domestic residents there was an increase of 1.6 billion US dollars, mainly allocated in Tesobonos.

Figure 7a – Government securities held by the public
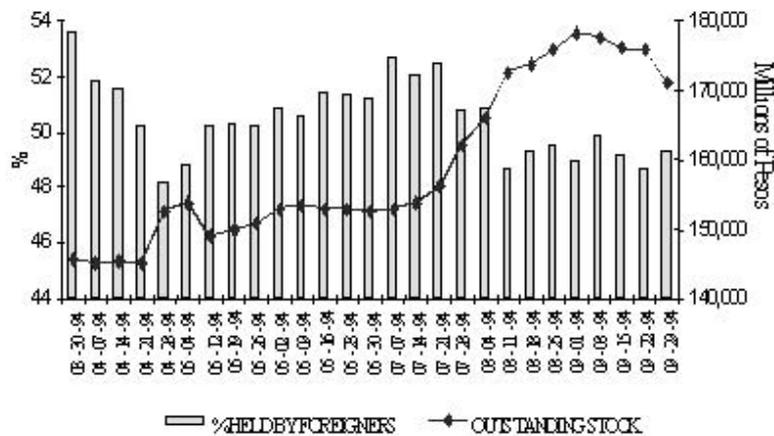
Figure 7b – Denominated in domestic currency
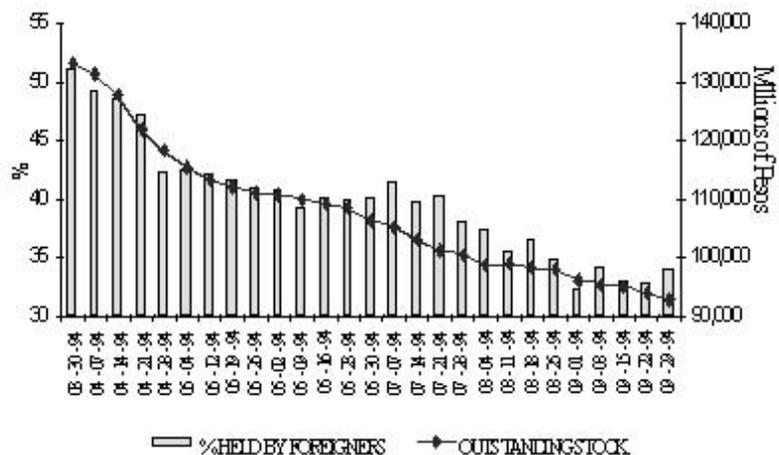
Figure 7c – Tesobonos
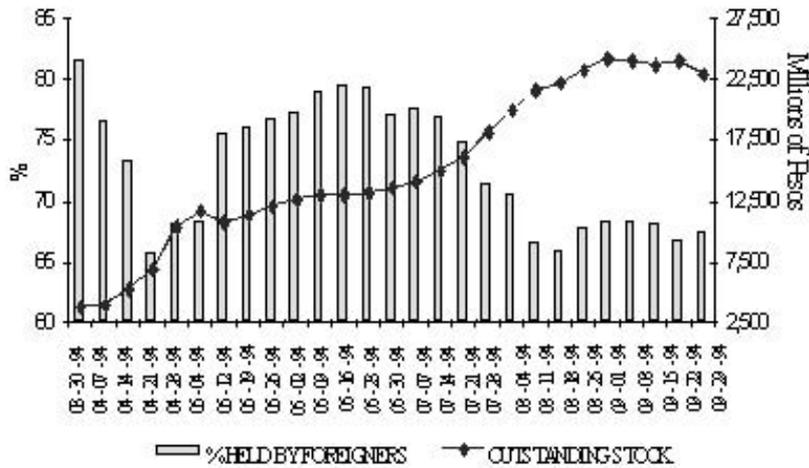
Banco de Mexico faced another period of demand for dollars that required its intervention in the foreign exchange market from June 23 to July 21, 1994 (see Figure 8). In that occasion the central bank sold 2.9 billion dollars. By looking at the level and distribution by holders of the government securities stock that is depicted in the graph set of Figure 7 it was perceived there was no relation with the foreign currency demand. This because both domestic and foreign residents were adjusting their positions to the government securities swap so that Tesobonos increased. In particular, the entire increment of the outstanding amount of government securities (0.9 billion dollars) was explained by foreign residents.

Figure 8 – Intervention in the foreign exchange market
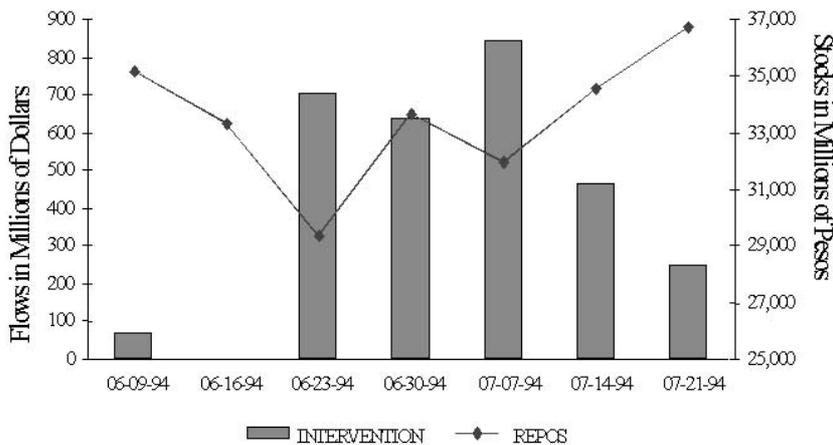
The final period of interventions in the foreign exchange market took place from November 10 to December 22, 1994 (see Figure 9). In such case, Banco de Mexico sold 10.2 billion dollars. From this amount, close to 20% could be attributed to foreign investors closing their risk positions involving Mexican pesos. In effect, as shown in the graph set of Figure 10 during that period foreign residents sold the equivalent to 3.0 billion US dollars of government securities denominated in Mexican pesos while they acquired 1.1 billion US dollars of Tesobonos. With respect to the stock of government securities maintained by domestic residents, this was increased in 4.2 billion dollars mainly because of an enlarged position in Tesobonos, so that it was not perceived that this variable represented a source of the speculative attack against the exchange rate regime.

Figure 9 – Intervention in the foreign exchange market
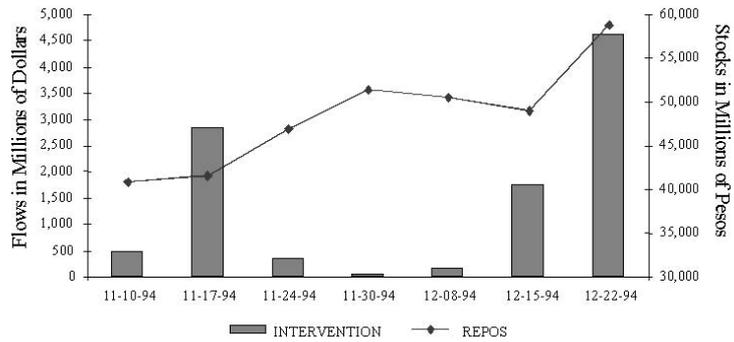
The assessment of the behavior of the government securities holdings during the 1994 crisis has generated important controversy. For instance, Meltzer (1996) established that the interest rate rise that took place after the killing of the official party's presidential candidate in March 23, 1994 was a response to a massive sellout of government securities by domestic residents, while foreign investors' sold only a relatively smaller amount of their holdings. When reviewing the International Capital Markets, the IMF (1995) also found evidence supporting the argument that domestic residents reacted earlier and with greater intensity during the 1994 crisis. On the other hand, Sachs, Tornell and Velasco (1995) reached the opposite conclusion since they considered that foreigners caused the crisis by withdrawing their investments from Mexico. Much of the arguments of these papers were based on incomplete information, so that in order to correct this problem Alfaro and Lopez-Giral (1996) presented a comprehensive data base which has also been used for this document. By using the corrected time series it has been evident that only a small fraction (around 15%) of Banco de Mexico's intervention can be attributed to a liquidation of government securities, which was conducted by foreigners.

Figure 10a – Government securities held by the public
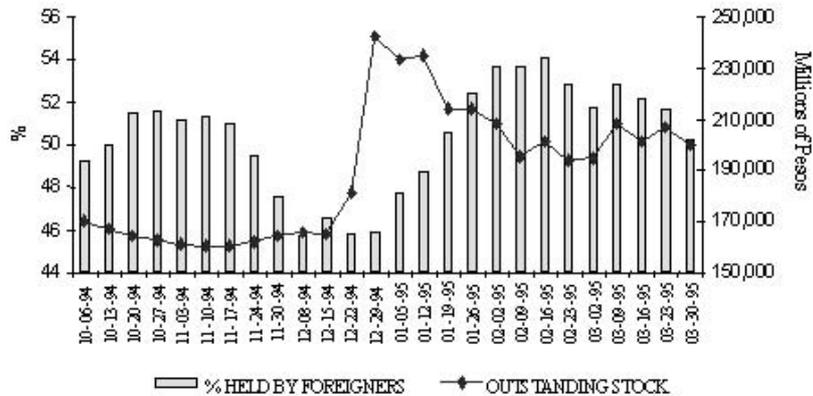
Figure 10b – Denominated in domestic currency
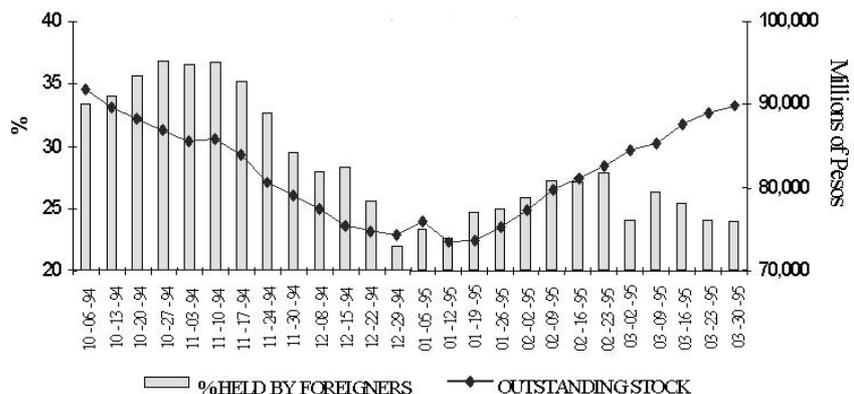
Figure 10c – Tesobonos
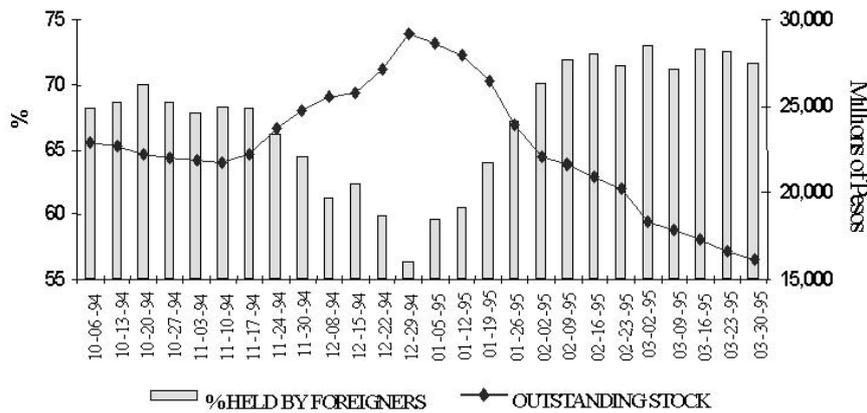

The above mentioned conclusion was also reached by the financial authorities, so that there was the perception that foreigners' disposition to engage in Mexican peso risk was not altered significantly during the 1994 crisis and that domestic resident increased their holding of government securities, so that the source of the speculative attacks came from other source. However, it is also important to consider that Banco de Mexico sterilized its interventions in the foreign exchange market, mainly through repo operations with government securities. In particular, as shown in Figures 6, 8 and 9 the amount of repos increased significantly from the equivalent of less than 1 billion US dollars prior to the first speculative attack to more than 17 billion when the exchange rate finally was devalued and allowed to be freely market determined in December, 1994. As remarked by Gil-Díaz and Carstens (1996) a central bank has to provide liquidity to the money market in order to compensate foreign exchange interventions or otherwise it will incur in a significant systemic risk in the payment systems.

Figure 11 – Interest rate and exchange rates
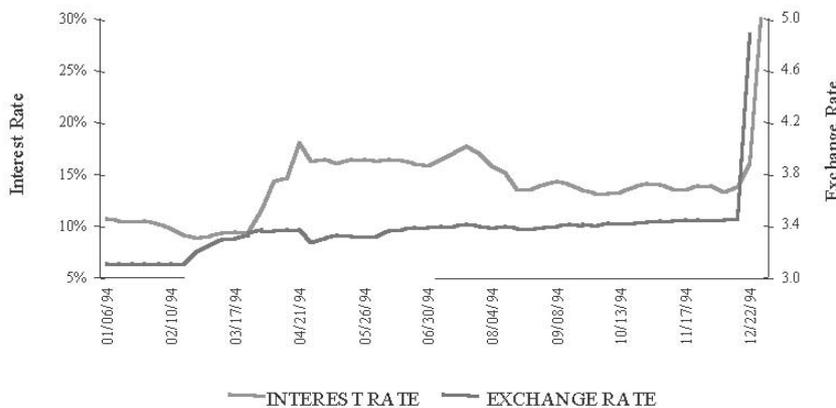
To evaluate the sterilization policy implemented by Banco de Mexico, the question is not related with the amount of credit supplied but rather with the conditions at which such domestic credit is offered. In particular, to discourage additional speculative attacks interest rates have be set at a high enough level. Figure 11 shows that interest rates in Mexico remained relatively constant during the periods of speculative attacks, so that the central bank was trapped trying to sustain a predetermined exchange rate regime while keeping the interest rates also under control. In this regard, it can be asserted that the speculative attacks were not induced by a sellout of government securities, but by the relatively inexpensive credit that was received using such securities as collateral.

III. Analysis of the foreign investors' risk position during 1997-1998

During the last quarter of 1997 and all the year of 1998 Mexico suffered from a contagion effect coming from the Southeast Asian and Russian crises. Even though the stock of government securities held by foreign residents was not longer as important as prior to the 1994 devaluation, financial markets continued being highly influenced by external capital flows. The main task was then to figure out the proper statistic to estimate such capital flows. In this section we apply the results of a methodology that measures the foreigners' risk position in Mexican pesos to analyze the impact of the above mentioned contagion effect. In this regard we begin by providing a basic background on the monetary and exchange rate policies in place at that time. We continue with a definition and description of the components of the indicator built to measure the foreigners' risk position in Mexican pesos. Finally, we explain the evolution of such indicator during the period of analysis and compare it with other financial variables.

The activity of foreign investors in the Mexican financial markets changed significantly after the 1994-1995 crisis. In particular, they were more concerned with the proper combination between expected return and perceived risk of their positions. Part of this change of attitude was induced by the prevailing exchange rate and monetary policies. Following the December, 1994 devaluation of the Mexican peso the financial authorities implemented a flexible exchange rate regime, prompting the central bank to alter the monetary policy orientation. The decision to abandon the predetermined exchange rate regime was justified considering the fact that, at that date, the international assets stock comprised only 13.6% of all foreign currency denominated liabilities maturing in less than one year, so that the exchange rate was not longer useful to act as the nominal anchor of the economy. Therefore, the central bank had to void the exchange rate as an intermediate target and announced a monetary program containing both an annual inflation objective along with some quantitative goals. This framework reflected a new attitude of the monetary authorities since they have abandoned rigid rules and intermediate targets, adopting a more flexible policy that could react rapidly to the changing economic environment.

It is important to remark that since 1995 Banco de Mexico has implemented its monetary policy operative framework based on the principle that the level of both interest and exchange rates are market determined. Hence, when there has been a change of the monetary conditions, market forces have determined the distribution of the adjustment among these prices. By following this strategy, the central bank has avoided the problem of selecting the "adequate" combination of interest and exchange rates movements required to reach the equilibrium in the financial markets, particularly when markets have been subject to high volatility. In those cases in which the monetary authorities have decided to change the monetary policy stance, policy signals have been oriented towards indicating the direction of the interest rate movement, but without determining any specific desired level of either interest or exchange rates. In fact, financial market prices (interest and exchange rates) have represented the main indicators for monetary policy, because of their information content regarding participants' perceptions about liquidity and risk[1].

Figure 12 – Government securities held by the public
(Stocks in millions of December, 1998 Pesos)

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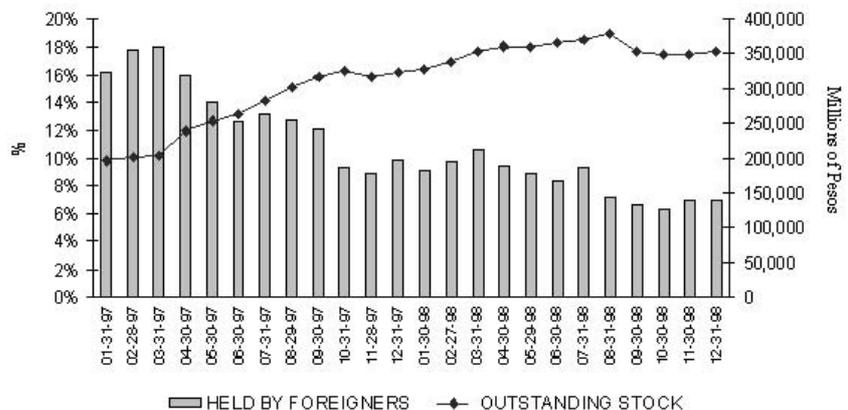
1 *Gil Díaz (1998), Marcos(1999) and Carstens and Werner (2000) provide detailed descriptions of the monetary policy and its transmission mechanism.*

Even though the Mexican economy was able to overcome the 1995 crisis, foreign investors maintained a cautious approach towards an additional exposure to Mexican-peso risk through the holdings of government securities (see Figure 12). As previously mentioned, this attitude was partially explained because market risk increased significantly as both exchange and interest rates were freely determined. On the other hand, foreign investors were discouraged by the lack of liquidity of the government securities secondary market. In particular, they experienced a liquidity squeeze during the most difficult days of the 1995 crisis, when they were unable to sell their positions either in Tesobonos or in Mexican pesos denominated securities.

Another factor that also influenced on the demand for government securities by foreign investors was the deregulation process of the foreign exchange market. In this regard it is important to mention that prior to 1995 investors were not allowed to engage in foreign exchange transaction involving domestic currency with settlement outside Mexico. This restriction caused the closing of the Mexican peso future market that operated in the Chicago Mercantile Exchange up to 1985. From 1990 and up to the first months of 1995, the only available instrument to hedge a risk position in Mexican pesos was a mechanism (*"coberturas cambiarias"*) regulated by the financial authorities that had severe limitations, mainly because the settlement was conducted only by differences to be paid in domestic currency. During 1995 these restrictions were relaxed in such a way that a peso futures market started again to operate at the Chicago Mercantile Exchange and forwards began to trade not only in Mexico but in other international financial centers.

Once forwards and futures began to operate, the degrees of freedom for foreign investors increased significantly, as they had had the possibility to hedge their government securities position involving Mexican peso risk. In this regard, market participants could create a synthetic Tesobono by combining a position in government securities with the forward purchase of US dollars with similar dates to maturity. At the same time, by conducting forward buying and selling of US dollars with different maturity dates, investors were able to take positions with respect to movements of the yield curve without incurring in an exchange rate risk or a liquidity risk associated with an open position in government securities.

Another example of the facilities of the forward market is the possibility to assemble a single transaction of selling forward dollars the combined outcome of a spot operation and an acquisition of government securities. All these benefits associated with the forward market have had an impact in reducing the attractiveness of holding government securities.

Although the stock of government securities held by foreigners has not been as relevant as before the 1995 crisis, the behavior of foreign capital inflows continued playing an important role to explain the behavior of the exchange rate market. In order to have information on the Mexican peso risk positions that might influence the domestic financial markets, Banco de Mexico constructed an indicator that combined the stock of government securities held by foreigners with the net forward position in Mexican pesos against US dollars. This indicator has been denoted as the "Foreigners' Uncovered Net Position in Government Securities" and starting 1996 it began to be followed by Banco de Mexico as an estimate of the foreign investors' perception of the Mexican peso risk. In this regard, the Uncovered Net Position's trend has been interpreted as a signal of such perception, while its amount constitutes an indicator of the potential demand for dollars coming from foreigners in case the economy faced a volatile scenario.

The Uncovered Net Position is computed as the difference between:
• The amount of government securities held by foreign investors and,
• The net position of US dollars to be received by foreigners from forward, future and spot transactions against the Mexican Banking System. The latter can be seen as a very short term future or forward contract.

The net position US dollars to be received by foreigners from forward, future and spot transactions is separated from the position held by domestic residents because it has been observed that the former variable has a relation of statistical causality with the exchange rate. In particular, Alfaro and Schwartz (2000) found that the foreigners' position causes (in a Granger's sense) movements of the exchange rate MXP/USD.

The net position of foreign currency operated in forward and future contracts is obtained from the information provided by Mexican banks to Banco de Mexico in a report that they have to fill as part of the regulation to monitor the market and credit risk involved in derivative products. In particular, banks have to send detailed data on a daily basis on the operations conducted in the over-the-counter market including the name of the client and its country of residency. By aggregating the amount of every outstanding forward and future transactions conducted by banks with foreign residents we compute the net amount of US dollars to be delivered or received in such contracts that is a component of the Uncovered Net Position as it is shown in the following examples.

The basic idea behind the Uncovered Net Position was to obtain information of the foreigners' operations involving Mexican peso risk under the assumption that they not only rely in government securities but also in futures and forwards. Another important element of the procedure was the emphasis on obtaining a timely indicator of the date in which foreign exchange transactions may influence on the exchange rate level. In particular, this explains why spot operations that are engaged prior to the settlement date are included in the statistics.

A simple example illustrates how this indicator works:

Table 2

	t	t+1	t+2	t+3
Uncovered net position in Government securities (I-II)	10	10	10	10
I. Government securities holdings	0	0	10	10
II. US Dollars to be received or delivered in (a + b)	10	10	0	0
a. Forward and future contracts	0	0	0	0
b. Spot transactions	-10	-10	0	0

In this example, it is considered the case of a foreigner that carries a long position in Mexican pesos by holding government securities. When measuring the Uncovered Net Position, this strategy appears at the date in which the investor sells 10 million US dollars to the Mexican Banking System, which is at time t, regardless of the fact that this operation is settled at the delivery date, which is at time $t+2$. At this later date the foreign investor receives the equivalent in Mexican pesos of the 10 million US dollars engaged in the spot foreign exchange transaction and with such funds he/she buys Government Securities (row I in Table 2). In this example, holding everything else constant, there is a long 10 million US dollars Uncovered Net Position starting at date t, which corresponds to the time when this operation affects the foreign exchange market, possibly inducing an appreciation of the Mexican peso.

If we consider an extension of the above mentioned example, in which the foreign investor hedges his/her long position in Mexican pesos with a forward acquisition of US dollars, then the Uncovered Net Position will be balanced. Consequently, the foreigner is neutralizing the risk associated with future fluctuations of the exchange rate that could reduce the dollar value of his/her holdings of government securities (see Table 3). Anyway, it is important to remark that this hedging strategy does not preclude the foreign investor to be subject to interest rate risk if the maturity term of the forward transaction is different from that of the government securities holdings. This flexibility of the forward foreign exchange operations represents its main attractiveness in relation with outright positions with government securities.

Table 3

	t	t+1	t+2	t+3
Uncovered net position in Government securities (I-II)	0	0	0	0
I. Government securities holdings	0	0	10	10
II. US Dollars to be received or delivered in (a + b)	0	0	10	10
a. Forward and future contracts	10	10	10	10
b. Spot transactions	-10	-10	0	0

The Uncovered Net Position was the main indicator of the perception to engage in Mexican pesos risk by foreign investors during the period from June, 1997 to September, 1998. In this period the global economy faced significant turbulence induced by the capital account crises experienced by different Southeast Asian countries and Russia. Such crises occurred following a staggered pattern and induced a sharp reduction of the investors' risk aversion that had important consequences for the emerging economies like Mexico.

In order to provide a more detailed picture of the Uncovered Net Position's behavior during the period of analysis we present a description of its components, namely the foreign holdings of government securities and the amount of US dollars bought by foreigners through forward, future and spot transactions not settled.

Figure 13 depicts the stock of government securities maintained by foreign residents measured in US dollars. It is evident that such position followed an increasing trend up to October, 1997, which suggests that the first episodes of the crisis by Thailand and the Philippines did not affect the foreigners investors' risk position in government securities. Foreign investment in government securities decreased starting October, 1997 mainly because the Southeast Asian crisis was spreading to larger countries like Korea and the international oil price initiated a sharp decreasing trend. It is important to note that the initial reduction of the foreign investors' position in government securities was temporary since by February, 1998 the amount of such position returned to the level prevailing at the end of the last quarter of 1997, a movement that indicates that they considered those securities as part of their long-term strategy. The upward trend followed by the foreign holdings of government securities at the beginning of 1997 was reversed in May as the emerging market risk increased because of the perception that Russia's financial situation was no longer sustainable. From May to September, 1998 the stock of government securities held by foreigners was decreased by 61.9% reaching a level of 2,088 million dollars at the end of that period. This reaction was mainly caused by the impact of the Russian crisis.

Figure 13 – Government securities held by foreigners
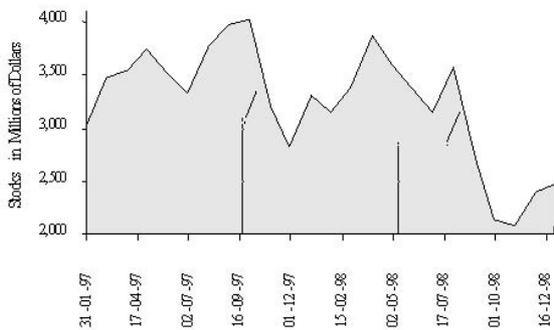
The net position of US dollars to be delivered by foreigners from forward, future and spot transactions, depicted in Figure 14, in general followed similar movement as the stock of government securities held by this sector. It is important to note that this position had a negative sign during the period of analysis, because of the way some credit operations were documented as explained in the following section. During the period of analysis foreigners reduced their exposure to Mexican pesos risk using mainly forwards and futures for an estimated amount of 2,379 million dollars. In comparison with the stock of government securities held by foreigners, we can identify the following distinctive trends of the net amount of US dollars to be delivered by this sector in forward, future and spot transactions:

• This position did not follow a positive trend prior to October, 1997 but it was rather stable, which indicates that government securities still constituted the main investment instrument at that time.

• This position maintained a downward trend from October, 1997 until May, 1998 which suggests the use of forwards and futures as hedging instruments.

• The decline of this position prior to the outbreak of the Russian crisis occurred earlier responding to hedging requirements by foreign investors.

Figure 14 – Dollars to be received by foreigners in forwards, futures and spot transactions
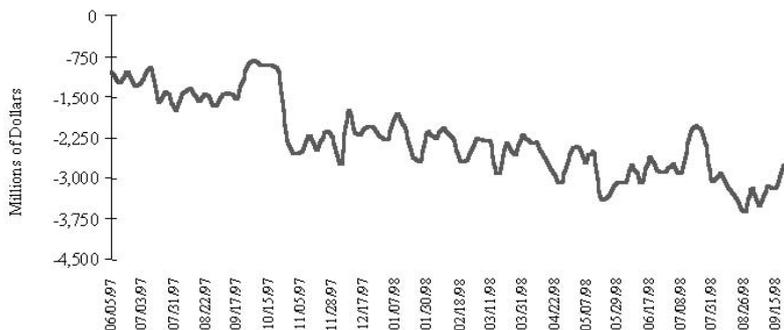
By combining the stock of government securities held by foreigners with their net position of US dollars to be delivered by forward, future and spot transactions we obtain the Foreigners' Uncovered Net Position in Government Securities which is shown in Figure 15.

Figure 15 – Foreigners' uncovered net position in Government securities
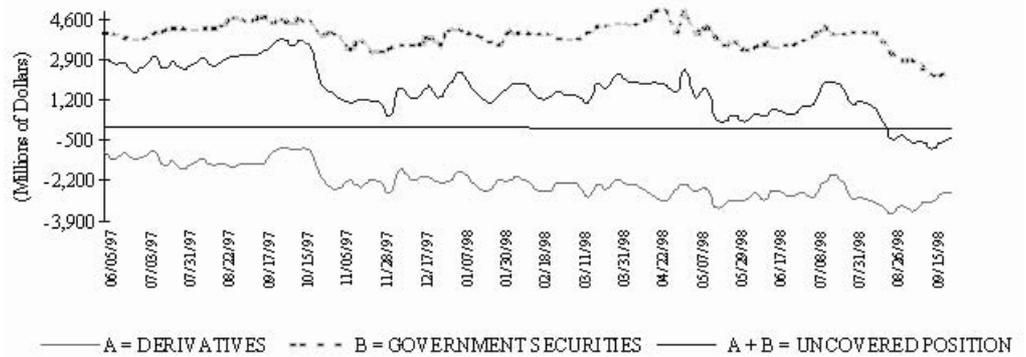
In comparison with its components it is evident that the Uncovered Net Position was influenced by the events that occurred during the period of analysis with more intensity. In particular, we can identify four different periods in which the Uncovered Net Position was drastically reversed:

1   October-November, 1997 after the crises in some Southeast Asian countries was spreading to Korea and the oil price felt significantly. This downward trend ended after the crisis in Korea unfolded with the abandonment of its prevailing predetermined exchange rate regime.
2   January, 1998 a short period in which foreigners reduce their exposure to Mexican peso risk. This reaction concluded after the financial authorities implemented actions oriented towards restricting the monetary policy and reducing the public sector budget in an effort to offset the impact of the oil price reduction both on the foreign exchange and the public finance (see Figure 16)[1].

Figure 16 – Foreigners' uncovered net position in Government securities

3   May, 1998 lasting also a brief period that was caused by the continuing fall of the oil price. This episode ended when the government announced another adjustment to the public sector budget.
4   July-September, 1998 a period dominated by the turmoil caused by the Russian crisis. The main reaction of the selling of the Mexican peso was a sharp depreciation of the exchange rate. In order to reduce the pass through of such depreciation to inflation, Banco de Mexico implemented consecutive signals of monetary policy restriction that proved ineffective to reverse the trend to sell Mexican peso, as indicated by the Uncovered Net Position' behavior. As the situa-

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1   *The relation between the oil price and the public sector deficit arises because more than one third of the budget is normally financed with oil revenues coming mainly from exports. This relation was included as a vulnerability factor of the Mexican Economy in the Macrofinancial Risk and Exposure section in IMF(2001).*

tion continued under a deteriorating path, in September 21, 1998 Banco de Mexico intervened in the foreign exchange market buying Mexican pesos and at the same restricting again the monetary policy. It is difficult to assess the success of this policy because two days later the Federal Reserve Bank announced a reduction of its objective level for the Federal Funds inter-bank rate, so that the situation of the global financial markets improved significantly. In any case, at the time of Banco de Mexico's intervention the Uncovered Net Position began to stabi-lize.

As previously mentioned, during the period of analysis there was a strong correlation between the behavior of the Uncovered Net Position and that of the foreign exchange rate (see Figure 17). Be-cause of this correlation, the monetary authorities began to follow the data of the Uncovered Net Position on a timely basis. Such position was interpreted as the amount of US dollars that could be demanded in the exchange market in case foreign investors determined to balance their initial short position. By the end of November, 1997 as the amount of this position was reduced considerably reaching levels of around 1,866 US dollars, it seemed that foreigners had balanced their risk expo-sure without causing a significant depreciation of the Mexican peso. This in turn allowed the mon-etary authorities to comply with the inflation target of 18% that was set for 1997 and prompted them to announce an aggressive objective of 12.5% for 1998.

Figure 17 – Foreigners' uncovered net position in Government securities
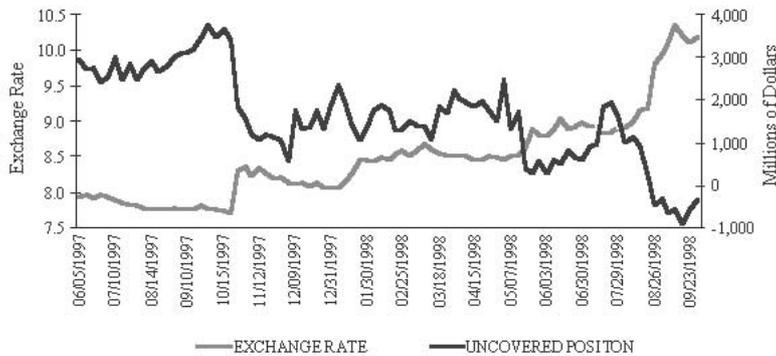
From the end of January and until April, 1998 the Uncovered Net Position level increased again, so that foreign investors accumulated a long position of Mexican pesos amounting the equivalent of 2461 million US dollars. Given the prevailing instability of the emerging financial markets it was perceived that such position implied a significant risk for attaining the inflation objective, as it could be easily reversed. This scenario was materialized in July, 1998 as foreigners cleared their risk exposure in Mexican pesos, inducing a sharp depreciation of the exchange rate. Such weak-ness of the Mexican peso was evaluated by the monetary authorities as not consistent with macro-economic fundamentals, since it could induce significant inflationary pressures. Consequently, Banco de Mexico tightened the monetary policy in three different occasions from July to Septem-ber, 1998. The result of the restrictive stance was reflected in the short-term Cetes interest rate level, which increased by 21.5 percentage points during that period (see Figure 18). By the end of 1998 Banco de Mexico did not attain its annual inflation target mainly because of the exchange rate depreciation.

Figure 18 – Interest and exchange rates
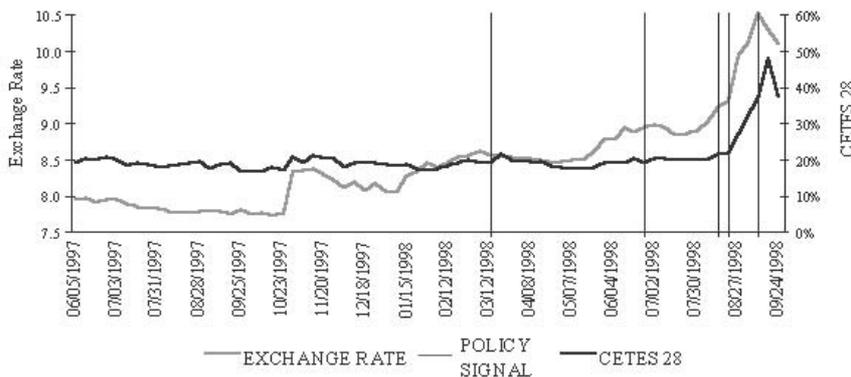
Even though this failure to attain the inflation target, it was evident from the events of 1997 and 1998 that the facility of the exchange and interest rates to freely react to market conditions contributed greatly to overcome exogenous shocks without causing proportional damage to the economy. On the other had, we also found that under a scenario of external capital movements responding to such events as a global crisis, the flexibility of the actual monetary and exchange rate framework enlarged the resultant volatility of the financial variables and complicated the monetary policy evaluation.

IV. Analysis of the foreign investors' risk position during 2001-2002

In reaction to the terrorist attacks of September 11, 2001 most of the central banks altered their policy stance towards an easing mode, implying a sharp reduction of interest rates. Under those circumstances investors attempted to seek for alternatives in which they could obtain a relatively high return while still maintaining a low risk profile. Mexico represented such alternative mainly because of its strong macroeconomic fundamentals and also due to the perspective of attaining an investment grade by the credit rating agencies. Consequently a sizeable amount of external funds entered into Mexico and forced the monetary authorities to improve the methodology of the Uncovered Net Position in order to measure adequately the foreigners' risk position in Mexican pesos. In what follows, in a first place, we explain the major shortcomings of the procedure to compute the Uncovered Net Position and we specify a new methodology that solves such problems. After that we compare the improved indicator to evaluate the size and impact of the external capital inflow experience from the last quarter of 2001 until the first quarter of the 2002.

   The methodology that has been applied to compute the Foreigners' Uncovered Net Position in Government Securities has presented serious deficiencies which became more relevant during 2001. First of all, as was already evident during 1997 and 1998, forwards and futures represented the main investment alternative for foreigners to engage in Mexican peso risk. In fact, after reaching a relative stable long US dollars level, the outstanding amount of such derivatives increased its volatility significantly starting the second half of 2001 (see Figure 19). On the other hand, as mentioned before after the 1995 crisis the flows of government securities held by foreigners has been non-relevant to explain the behavior of the Mexican financial markets. Under those circumstances it has been obvious that forwards and futures have not been related to the hedging process of a risk position in Mexican pesos maintained in government securities as assumed in the Uncovered Net Position.

Figure 19 – Foreigners' forward and future contract holdings
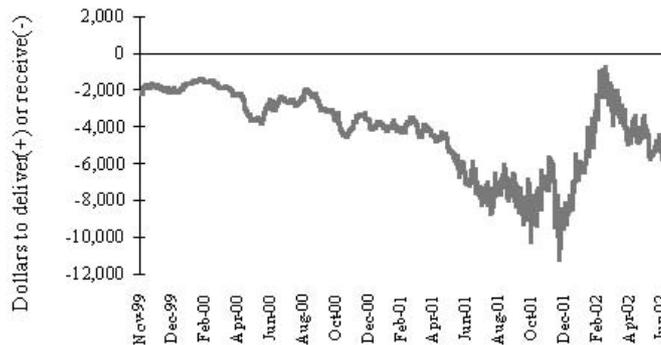
Another important problem in computing the Uncovered Net Position is the use of forwards by some Mexican commercial banks as an alternative way to document credit operations with foreign financial institutions. The operational mechanics of this operation is the following:
• A Mexican bank records its payment obligation involved in a credit from a foreign financial institution as a forward sale of US Dollars against Mexican Pesos. In particular, the foreign creditor is also the counter-party of the forward operation.
• The principal amount and the term to maturity of the credit are the same as those of the forward operation (generally short-term operations).

- In order to balance its foreign exchange position (short US Dollars forward), the domestic bank conducts an opposite spot operation (buying the US Dollars obtained from the credit). This operation also squares the position of its counter-party.

It is important to mention that by following the Uncovered Net Position methodology the above mentioned operation, of documenting a credit using forward contracts, generates a bias towards showing a short US dollars level, since only one of the transactions is considered. The following example of Table 4 illustrates this problem.

Table 4

	t	t+1	t+2	t+3
Uncovered net position in Government securities (I-II)	0	0	-10	-10
I. Government securities holdings	0	0	0	0
II. US Dollars to be received or delivered in (a + b)	0	0	10	10
a. Forward and future contracts	10	10	10	10
b. Spot transactions	-10	-10	0	0

In this case it is assumed that a Mexican bank receives financing by a foreign counterpart and that the transaction is registered as a forward contract. When computing the Uncovered Net Position it is specified that the foreigner is going to receive 10 million US dollars from a forward contract that records the payment obligation of the Mexican bank to its creditor. This transaction is reported in item b. of Table 4 lasting from time *t* to *t+3* and onward until maturity. On the other hand, in order to maintain in balance its position involving peso/dollar transactions, the foreign creditor delivers in the spot 10 million US dollars involved in the loan to the Mexican bank. This latter transaction is recorded in item c. of Table 4 but only at dates *t* and *t+1*, which corresponds to 48 or 24 hours before the US dollars are delivered by the foreigner. After the spot transaction is settled, at time *t+2*, the Uncovered Net Position does not record the US dollars delivered by the foreigner and it appears that the only open transaction is the forward reception of US dollars by the foreign investor, therefore the Uncovered Net Position presents a negative sign starting *t+2*. In this regard the Uncovered Net Position has a bias towards presenting a short position in Mexican pesos.

　　It is important to note that this bias of the Uncovered Net Position does not only arises from the way Mexican banks document their credit operations, but also from the investment alternatives available to foreigners to engage in Mexican peso risk, other than outright holdings of government securities. In particular, a similar distortion is observed when a foreigner sells US dollars in the spot market to a Mexican bank and hedge its foreign exchange risk by buying forward US dollars, but instead of investing in government securities he/she allocates the Mexican pesos received from the spot transaction to acquire other kind of asset, such as equity. Consequently, the assumption of the Uncovered Net Position, that foreigner investors assign the product of any selling of US dollars in the spot market to acquire government securities has not been relevant as to measure his/her disposition to engage in Mexican peso risk.

　　In order to resolve the deficiencies of the Uncovered Net Position and to gather all the available information regarding the exposure of foreign residents to Mexican peso risk a new indicator was developed during 2001. Such indicator named "Net Position in Mexican Pesos of the Foreign Sector with the Banking System" aims at assembling all the foreign exchange operations conducted by foreigners with the Mexican commercial banks. This position is calculated as the sum of:

1　Cash Holdings:
　　　　(a) Spot Transactions: This accounts for the net amount of pesos that foreigners receive from operations with same day value, plus those that settle today from previously engaged spot operations plus any remaining open spot transaction.
　　　　(b) Expiration of Future and Forward Contracts: It accounts for the net amount of Mexican pesos that the foreigners receive due to the payment of a derivative contract kept until its maturity.

2　Derivative Holdings:
　　　　The net position of Mexican pesos to receive by foreigners due to open forward and future contracts.

In order to observe the way the Net Position in Mexican Pesos deals with those situations that created a distortion for the Uncovered Net Position, we came back to the example shown in Table 4. In this case, the forward operation which documented the credit received by the Mexican commercial

bank from is foreign counterpart is reported in line b. of Table 5. In particular, the negative sign of this item indicates that the foreign resident has the obligation to deliver Mexican pesos for the equivalent of 10 million US dollars. On the other hand, the spot operation by which the risk position in forward is balanced is reported in line a. Given that the foreign creditor does not incur in foreign exchange risk in this operation the Net Position in Mexican Pesos amounts to cero in each period.

Table 5

	t	t+1	t+2	t+3
Net position in Mexican Pesos of the foreign sector (m.d.)	0	0	0	0
a. Cash holdings	10	10	10	10
b. Derivative holdings	-10	-10	-10	-10

It is important to remark that in the above example the amount of pesos received by the foreign creditor in the spot transaction is included either when it is open or when it is settled. This is because the methodology to obtain the Net Position in Mexican Pesos is based on the idea that the cash position denominated in US dollars of the Mexican banks can be segregated according to the sector that delivered such funds. In order to conduct such segregation, the item of cash holdings includes the amounts settled of previously engaged spot operations and the expiration of future and forward contracts.

Given that Mexican commercial banks document much of their interbank financing denominated in US dollars through forward operations, the components of the Net Position in Mexican Pesos depicted in Figure 20 have the same signs as the example shown in Table 5, implying a short Mexican pesos position in derivatives which is compensated with a long Mexican pesos position in cash balances. In this regard it is evident that the amount of cash holdings obtained by Mexican banks from foreigners have been relatively more stable than their net position in derivative products. This suggests that most of the investment and speculative positions conducted by foreigners involving Mexican peso risk are executed using future and forward contracts.

Figure 20 – Components of the net position of the foreign sector in Mexican pesos
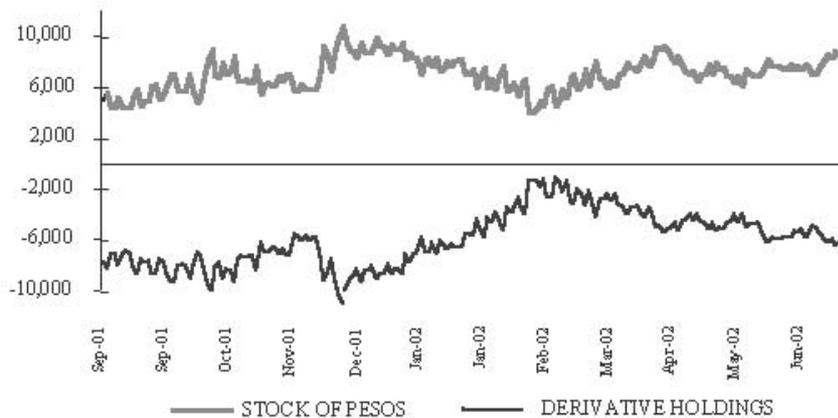
(Stocks in millions of dollars)

When assembling the components of the Net Position in Mexican Pesos for the last quarter of 2001 and the first quarter of 2002 we can obtain an estimate of the inflows that came into Mexico to take advantage of the relatively high expected return over risk ratio. In particular, such inflows as calculated by the Net Position in Mexican Pesos amounted to 6,680 million US dollars, causing an important appreciation of the exchange rate (see Figure 21). It is important to mention that such inflows to the Mexican financial markets occurred at the same time as the domestic economy entered the deepest part of a recession that was mainly induced by the contraction of the industrial sector in

the United States. Another element that could prevent the foreign investors to bring their funds to Mexico in the last quarter of 2001 were the financial problems faced by Argentine which had affected also the Brazilian markets. However, the Mexico risk perception disassociated from the problematic of the Latin American region mainly because of the strong linkages of the Mexican economy with the United States that have been developed after seven years of the free trade agreement (NAFTA).

Figure 21 – Net position in Mexican pesos of the foreign sector
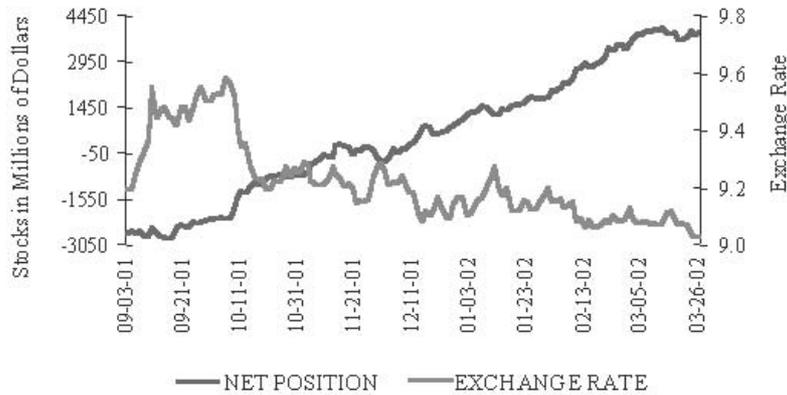
In fact, the linkages of Mexico with the US economy have been established not only in the real sector but also in the financial sector, as was evident by the acquisition of Banamex (the largest Mexican commercial bank) by Citigroup in September 2001. Taking into consideration the strength of the Mexican economy due to its relation with the United States, and the persistent implementation of sound monetary and fiscal policy actions that also distinguished Mexico from the rest of the Latin American region, starting the last quarter of 2001 there was the expectation that Standard & Poor's could improve Mexico's credit rating to investment grade. In an effort to anticipate the capital inflows that could induce a credit rating improvement, foreign investors began to sell US dollars through forward transactions that resulted in an upward trend of the Net Position in Mexican Pesos. It is important to note that the investment strategy aimed at anticipating the upgrade was also manifest in the market for sovereign bonds denominated in foreign currency, as the interest rate spread as measured by the EMBI+ index also declined significantly during the period of analysis (see Figure 22). Standard & Poor's gave the investment grade to Mexico on February 7, 2002 and that announcement had a limited impact on the Mexican financial markets as this movement was anticipated by the participants at least three months in advance.

Figure 22 – Net position in Mexican pesos of the foreign sector
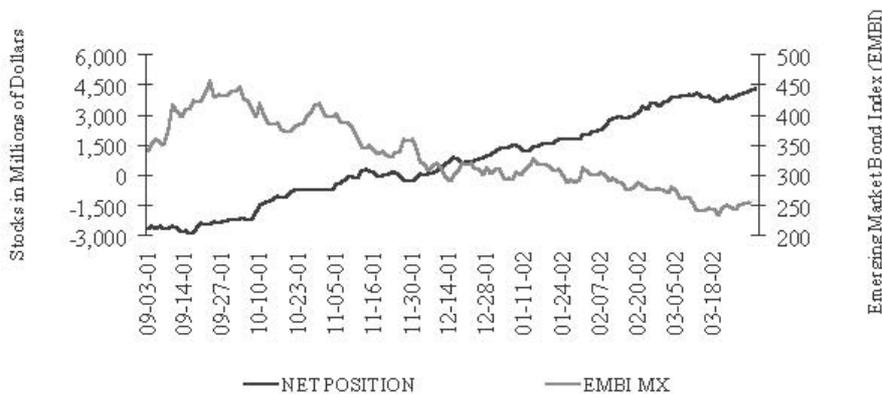
In regards with the interpretation by the monetary authorities of the information conveyed by the Net Position in Mexican Pesos, it was based on the consideration that, given the past experience with the short-term capital inflows in first years of the 1990's, there was not much space for a policy seeking to inhibit exchange rate appreciation. On the other hand, because of the domestic de-

mand weakness, so that inflationary pressures were low and the annual target was almost attained, it was evaluated that the best alternative was not only to allow interest rates to fall as needed but to prompt such reaction by sending a signal of a loose monetary policy. In consequence interest rates felt significantly until reaching a minimum level of 5.28% in April 25, 2002 (see Figure 23).

Figure 23 – Interest and exchange rates
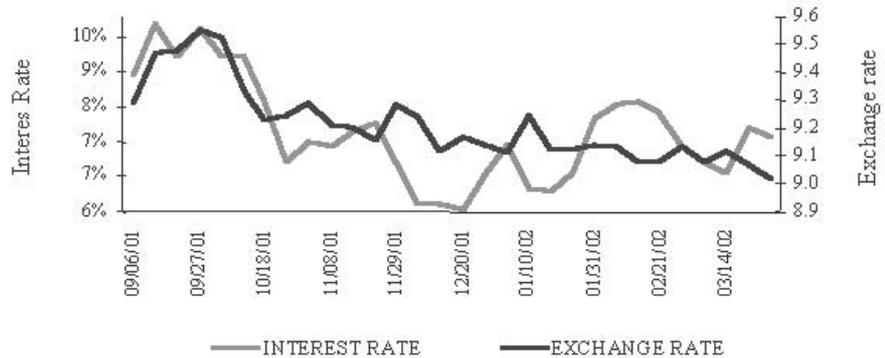
V. Final Remarks

In the case of Mexico foreign capital flows have played a significant role in the financial markets during the last twelve years. As has been displayed in the document the incidence of such flows have depended mainly on the institutional framework in place. In this regard, we have shown evidence that there is no alternative to conceal the impact of such flows. For instance, during the 1994 crisis the financial authorities implemented a set of actions (government securities swap from Mexican peso denominated to US dollar indexed, foreign exchange interventions at the upper limit of the band, interest rates controls) focused on spreading out the implications of a sudden interruption of the capital inflows on which the economy was so dependant. The result was unpleasant, as the explosion of contained adjustments caused the worst crisis in Mexico's modern history.

The actual monetary and exchange rate policies implemented in Mexico, that allows the financial system prices to freely adjust to the changing circumstances, gives rise for a relatively less expensive adjustment. Obviously, as foreign capital flows induce severe responses of financial variables, there are agents whose objective functions can be disturbed, including the central banks as in the case of the Russian crisis of 1998. However, if the macroeconomic fundamentals are kept under control the secondary effect of foreign capital flows are limited, so that it is feasible to take full advantage of the positive impact of such flows. This was the case in 2001, when Banco de Mexico was able to attain easily its inflation objective because of the appreciation of the peso and the economy enjoyed an interest rate reduction provoked by the accommodation of the foreign capital inflows.

Given the importance that in some periods the monetary authorities have assigned to collecting reliable information on the foreigners' disposition to engage in Mexican peso risk, in this paper we have presented three different indicators. In particular, we have also pointed that, even though there has been an improvement process in the elaboration of such statistics, they only represent estimations of a complex economic phenomenon like the external capital flows. Nevertheless, as was evident in the 1994 crisis it does not matter so much the accuracy of the data, but the interpretation of the users. In that event the authorities tried to mould the data to their own objectives, instead of getting the broadest picture. On the other hand, for the experiences of 1997-1998 and 2001-2002 the interpretation of the indicator on the foreigners' disposition to engage in Mexican peso risk was a complement of information obtained from the market, so that there has not been much room for a bias in its reading.

As with other indicators collected and interpreted by central banks, it is important to question the use of estimating the trend and size of the funds allocated by foreigners in Mexican peso risk. In particular, this question is more relevant when it is acknowledged that the central bank's influence to alter such flows is non-significant. In this regard, and given the incidence of foreign financial in-

vestment on the domestic markets, by estimating its behavior the central bank could assemble a set of early warning signals on the risks engaged by the Mexican financial institutions under the assumption of a flows' reversal. The same kind of exercise can be conducted to assess the impact on inflation of a flows' reversal.

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Transaction technology innovation and overnight deposits demand in Italy

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1. Introduction[3]

> *Krueger: "Have you thought much about how debit cards and the kind of new financial products that are available, how that alters the situation?" (i.e. the money demand function).*
> *Baumol: "No, but you've just given me an idea. It's the next thing I'll think about"*[4].

The last two decades have witnessed a wave of innovations in transaction technology (Automated Teller Machines (ATMs), Points of Sale (POS), credit cards). Just between 1991 and 1999 in Italy the number of ATMs and of POS increased at an average annual rate of 18.4 and 98.4 percent, respectively; most of the euro area countries experienced a similar, rapid diffusion of these new technologies. Financial and transaction technology innovation has been considered relevant for the analysis of the stability properties of monetary aggregates; however, partly due to the fact that the phenomenon has gained relevance only in relatively recent years (especially for POS), there have been relatively few attempts to account for it, particularly within the traditional time series analysis framework. The omission of proxies for this kind of innovation from money demand equations may bias the estimated parameters, particularly the income elasticity and hence the velocity of money, and suggests a potential impact on euro area monetary aggregates, which deserves careful scrutiny.

To investigate this issue we analyse the effect of the diffusion of ATMs and POS on overnight deposits, by far the most prominent component of the monetary aggregate M3[5] We use a panel data set comprising 95 Italian provinces from 1991 to 1999, which gives the possibility to exploit the cross-section variability of the data and to overcome some of the problems linked to a potential aggregation bias of the estimates based on national data. To our knowledge, the effect of transaction technology innovation on Italian monetary aggregates has been explored partially and only with reference to ATMs.

ATM allows easier cash withdrawals from overnight deposit, altering the ratio between the cost of holding cash and the cost of holding overnight deposits. The POS technology allows the card holder to buy items by debiting immediately his bank account; POS purchases are an alternative to a check but also to cash, because of the irreversibility of the payment.

A theoretical model by Paroush and Ruthemberg (1986) suggests that the introduction of ATMs should increase the share of demand deposits at the expense of currency holdings, under the assumption that the cost of holding demand deposits is reduced with the introduction of ATMs[6]. I expect the effect of POS to be similar to that of ATM.

Such lower cost should derive, in a Baumol-Tobin model perspective, from the decrease of the time, and henceforth of the transaction cost, necessary to draw on demand deposit. Indeed, their empirical findings are in line with the a priori: more ATMs lead to a higher level of demand deposit

holdings and a lower one of currency holdings. According to Zilberfarb (1989), the assumption that the cost of holding demand deposits is reduced with the introduction of ATMs must be empirically tested, and hence the sign of the effect of ATM on demand deposit cannot be assumed to be a priori positive. However, his empirical results support the findings of Paroush and Ruthemberg.

Based on these a priori and these empirical findings, we expect the effects of the diffusion of ATM and POS on overnight deposit demand to be positive. Unlike Paroush and Ruthenberg, we are up to now unable to test for the presence of a substitution effect between overnight deposits and currency, as data on currency holdings at the sub-national level are currently unavailable. Likewise, we are unable to analyze the impact of credit cards, even if it is an interesting issue raised in the literature, because the relevant data disaggregation is not available. Nevertheless we believe that our results suggest that accounting for transaction technology innovation has the potential to significantly improve on standard time series which overlook this dimension.

In section 2 the existing literature is reviewed. Section 3 presents the methodology and the data, section 4 discusses the empirical analysis comparing the results with the ones of other authors. Section 5 reports the robustness checks performed and section 6 sets the conclusions of the paper. An appendix describes the data.

2. Existing literature

With regard to the relevance of financial innovation, the Italian evidence, according to Angelini, Hendry and Rinaldi (1994), displayed a structural break in money demand. Financial innovation led to a transition from money as a store of value to money as a transaction medium through a change in the scale variable from net financial wealth in the period 1975-79 to domestic demand in the period 1983-91. With reference to the relevance of using disaggregated data Mulligan and Sala-i-Martin (1992) argue that estimates of money demand using aggregate time series may encounter some difficulties, particularly when taking account of financial technology that, because of its unobservable nature, is commonly thrown into the error term. They underline that the potential distortion of the estimates of money demand parameters is avoided when money demand is estimated cross-sectionally, as they do, estimating money demand functions with cross sections of U.S. states from 1929 to 1990.

With respect to the role of transaction technology innovation Mulligan and Sala-i-Martin (1996, 2000) and Attanasio, Guiso and Jappelli (2002) underline that the parameters of money demand are affected by financial technology innovation and this may cause time series analysis to be inappropriate. To overcome the resulting instability in the parameters, the mentioned authors estimate money demand at the micro level using firm or households data, that allow to use geographic and time variability. Duca (2000) stresses the relevance of the analysis of financial technology for the analysis of monetary aggregates addressing the "case of missing money" that, since the paper by Goldfeld (1976), originated a considerable literature.

About the relevance of ATM Zilberfarb (1989), building on Paroush and Ruthenberg model, provides empirical evidence of a positive effect of ATMs on demand deposit using Israeli data. Hester, Calcagnini and De Bonis (2001) using data between 1991 and 1995 of a sample of large Italian banks which have 85 per cent of Italian banking assets, find some evidence supporting the idea that ATMs reduce transaction costs and the demand for currency. Attanasio, Guiso and Jappelli (2002) estimate the demand for cash using data of the Survey of Household Income and Wealth run by the Bank of Italy between 1989 and 1995 and find that ATM-users have a more pronounced elasticity of money demand to the interest rate compared to the one of non-ATM users.

Drehmann, Goodhart and Krueger (2002) investigated the effects of modern payment technologies, namely POS and ATMs, on the demand for cash finding no evidence of strong effects. They expected the modern cash management technologies to have a strong effect on small banknotes, that are used for everyday transactions and may be substituted by card payments. For the large banknotes they do not forecast a strong effect because these probably will continue to be the notes preferred in the black economy. Their conclusions are that POS have a significant negative effect on the demand for small banknotes, but the advance of ATMs seem to increase the demand for small banknotes. All in all they conclude that technology is not crowding out small banknotes, while the effect on large notes and hence on total notes in circulation is not clear-cut.

With regard to the relevance of using disaggregate data, the debate on the role of national components of monetary aggregates is tackled by Dedola, Gaiotti and Silipo (2001). The authors stress the role of the analysis of national components of euro area monetary aggregates and the relevance, in dynamic models, of the method used to estimate parameters of money demand. Considering cross-section or time-series evidence leads to substantial differences in the estimated elasticity of money demand, especially for income elasticity. Focarelli (2002) warns on the distortions in the

estimates of money demand parameters potentially arising from an aggregation bias and develops a method to correct the biases of the estimates.

3. Methodology and data

The idea is to estimate the demand for overnight deposit exploiting the remarkable cross-section variability of our data set (table 1). We estimate a traditional specification (comprising scale variable and opportunity cost) to which we add two new variables to account for the diffusion of ATM and POS[1] :

$$(OD/P)_{jt} = b_1 \log (GDP/P)_{jt} + b_2 (i_{3m} - i_{od})_{jt} + b_3 \log (ATM)_{jt} + b_4 (POS)_{jt} + \varepsilon_{jt} \qquad (1)$$

where OD stands for overnight deposits, GDP for nominal gross domestic product, P is the consumer price index of the region to which the province belongs, i_{3m} is the interest rate on 3-month Treasury-bills, i_{od} is the interest rate on overnight deposits, hence the difference between the two interest rates is the opportunity cost, ATM is the number of automated teller machines, POS is the number of points of sale, ε_{jt} is an error term. Data are annual, j indexes the Italian provinces and ranges between 1 and 95, t indexes the year, from 1991 to 1999. The time span considered is limited by the availability of data on ATM, which were not collected with provincial detail before 1991 and from data on nominal provincial GDP[2] that are available until 1999; the total number of observations is therefore 855.

In our preferred specification we use OD, GDP, ATM and POS per capita (divided by each province population) to eliminate common trends; we choose gross domestic product as scale variable, consistently with Mulligan and Sala-i-Martin (1992), and with Dedola, Gaiotti and Silipo (2001).

Time dummies a_t are introduced to control for aggregate time variation. Fixed effects a_j for each of the 95 provinces are assumed to account for the geographic heterogeneity in the preference for cash and henceforth for demand deposit which can not be eliminated totally without the risk of incurring in the omitted variables bias. The cross-section differences may be due to diversity in attitude of the province's population toward the use of cash and demand deposit, as Attanasio, Guiso and Jappelli (2002) note.

To estimate the effect of ATMs and POS on demand deposit fully exploiting the richness of our panel data set, we follow Pesaran and Smith (1995). In the static case, according to Pesaran and Smith, four procedures are widely used, pooling, aggregating, averaging group estimates and cross-section regression; the estimates of the coefficients, if these differ randomly, are consistent in any of the procedure adopted. Owing to the short time span available in our data, we deemed it inappropriate to estimate a dynamic model. In the dynamic case pooled and aggregate estimators are not consistent. Moreover due to the dimension of T the mean group estimator is not feasible; there is however, due to the size of N (95), the possibility to average the data over time and to estimate a cross-section regression on group means.

4. Results

We report the results of pooled (see table 2) and of cross section regressions (table 3), and of long run averages regression (table 2) . To document the effect of the introduction of ATM and POS we estimated the equation with four different specifications: firstly without terms accounting for transaction technology, secondly with ATMs, thirdly with POS and finally with both ATMs and POS.

In table 2 we report the results of the pooling procedure in three different formulations: no fixed effects, fixed time effects, fixed group effects (within estimator). Fixed group and time effects are appropriate, because of the mentioned peculiarities of the Italian provinces with respect to the cash management behaviour and of diffusion through time of the transaction technologies. We find that following a 1 per cent increase in the number of ATMs (when considered jointly with POS) overnight deposits increase between 0.09 per cent and 0.15 per cent, depending on the formulation considered. The effect of POS, as expected, is of the same sign: a 1 per cent increase in the number of POS increases overnight deposits between 0.05 per cent and 0.19 per cent. The elasticity to the opportunity cost is usually negative. The income elasticity through the three formulations decreases

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1   *The specification is similar to the ones used by Mulligan and Sala-i-Martin(1992) and Zilberfarb (1989).*
2   *Data on provincial GDP are elaborated by Istituto Guglielmo Tagliacarne.*

consistently when the terms accounting for transaction technologies are introduced; through the four specifications of the equation it decreases when fixed effects, particularly the group ones, are considered. Its values are well above 1, between 1.76 and 1.11, when geographical differences (fixed group effects) are not considered and under 1, between 0.91 and 0.50, when they are accounted for.

The results obtained with regression with long run averages, as suggested by Pesaran and Smith, ensure consistent estimates (table 2). The results confirm the sign and the magnitude of the estimates obtained with the pooling procedure. The effect of ATM on overnight deposits is 0.34 per cent; the effect of POS is 0.24 per cent and if ATM and POS are considered jointly the effects are 0.14 and 0.19 respectively; the elasticity of the opportunity cost is around -0.1 per cent. The income elasticity is 1.72 when no transaction technology is considered, but it decreases until 0.98 when transaction technology is introduced in the specification. The results of the cross section regression, one for each year (table 3), confirm these results. There are positive effects of ATM and POS on overnight deposits, increasing through time; the elasticity to the opportunity cost is negative. The income elasticity decreases as more proxies for the innovation in transaction technology are added to the regression terms and, additionally, through time.

Our results for the effect of ATM on overnight deposit are remarkably similar to the ones of Paroush and D. Ruthenberg (1986), who find that a 1 per cent increase of use of ATMs increases actual real demand deposit balances by about 0.2 per cent. Zilberfarb (1989) estimates suggests a larger effect: a 1 per cent increase in the number of ATMs (or ATMs debits) increases real demand deposits by 1 per cent. We do not know of papers performing similar exercise for POS, even if it may be sensible to use as comparison the ones cited for ATM.

For the income elasticity our results may be compared with the ones of Mulligan and Sala-i-Martin (1992), who find a high income elasticity, larger than one for demand deposit within a cross-section analysis. With regard to the euro area monetary aggregates Calza, Jung and Stracca (2000) find a long-run income elasticity of 0.73 for nominal overnight deposits, and Stracca (2001) finds the long-run income elasticity of M1 to be 0.76. Comparisons can be done also with authors who studied a broader monetary aggregate. Angelini, Hendry and Rinaldi (1994) for Italian M2 find a less than unitary elasticity to domestic demand in real terms, in equilibrium an elasticity of 0.6/0.7 per cent. Dedola, Gaiotti and Silipo (2001) for euro area M3 find (with pooling with fixed effects and with long-run coefficients constrained to be equal only across 5 countries) a real GDP elasticity of 1.2; with aggregate time series an elasticity of 1.26 and with group mean estimator an elasticity of 1.25. Focarelli (2002) for euro area M3 finds an income elasticity ranging between 1.4 and 1.6.

5. Robustness checks

We ran all the regressions mentioned also in absolute levels without detecting significant differences with the estimates presented. In the specification search we tried also to introduce, without satisfying results, other variables: the differential between the 10 year Government benchmark security and the interest rate on overnight deposits, a different measure of the opportunity cost, i.e. the differential with the one year Treasury bill rate, the inflation rate, quadratic terms for ATM and POS, dummies for the different Italian areas interacted with the opportunity cost.

We performed the regressions also deleting the observations in the first and the 99th percentiles and eliminating outliers provinces, without detecting significant changes in both cases in the estimates. To check the robustness of the estimates and to control for error autocorrelation and heteroscedasticity we estimated the model also with general least squares, assuming an AR(1) correlation structure within the provinces and heteroskedatisticity across the provinces; the results confirm the ones reported.

We also split the sample across time and across geographical areas to control for variation in the time and geographical patterns. The first split is between the years 1991-1996 and the years 1997-1999 in view of the observation from the cross-section results that the income elasticity coefficients displayed a downturn in 1996 and to control for the fast development of the new transaction technologies in the last three years of the panel. The estimates run on the two sub-samples confirm the finding of a positive effect of ATM and POS on overnight deposits (tables 4 and 5).

The second split we did was between Northern, Central and Southern Italy to see if the overnight deposit demand is robust to geographical sub-sampling; the results show that the positive effect of ATM and POS are confirmed in each of the three sub-samples. However differences in the magnitude of the coefficients exist, the effects of ATM and POS in Northern Italy are stronger; this may be consistent with differences in the use of currency that is thought to be higher in Southern Italy (see Attanasio, Guiso, Jappelli (2002)) (tables 6, 7 and 8).

6. Conclusions

The main results of this paper are the following:
- the estimated effect on overnight deposit of a 1 per cent increase of the number of ATM is positive (as expected), and ranging between 0.09 and 0.14 per cent, depending on the estimation method used;
- the effect on overnight deposit of an increase of 1 per cent of the number of POS is positive, as expected, and ranging between 0.04 and 0.19 per cent;
- based on these estimates, and considering that the annual growth of ATMs has been 18.4 per cent on average over the period 1991-99, the spread of ATMs technology might have been responsible of a 1.8 per cent extra growth in overnight deposits;
- the income elasticity decreases when ATM and POS are accounted for. It is also reduced when fixed (provincial) effects are considered and also through time;
- the values of income elasticity estimated with long run average regression range between 1.72 when no transaction technology is considered, to 0.98 when it is introduced in the specification;
- in the estimates with the pooling procedure the income elasticity yields values ranging between 1.76, when no fixed effects are considered, to 0.46 when fixed effects for time and geographic differences are introduced;
- the effect of the opportunity cost is of the expected sign (negative).

These results suggest that transaction technology innovation seems to have an important positive effect on overnight deposits; the resulting total effect on monetary aggregates (e.g. M3) could be smaller, due to possible effects of the opposite sign on currency in circulation. The overall effect on broader monetary aggregates deserves further research. The empirical evidence is consistent with the hypothesis that not accounting for transaction technology innovation may create a potentially serious omitted variables problem in traditional time series analysis.

Tables

Table 1 – Main features of the dataset

	1991	1992	1993	1994	1995	1996	1997	1998	1999
Population									
Total (mln)	56.8	57.0	57.2	57.3	57.4	57.4	57.6	57.6	57.7
Mean	0.60	0.60	0.60	0.60	0.60	0.60	0.61	0.61	0.61
Std.dev.	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.65	0.65
Real GDP									
Total (bln)	364	384	394	414	445	470	486	489	503
Mean	3.83	4.05	4.15	4.35	4.69	4.94	5.12	5.15	5.30
Std.dev.	5.19	5.45	5.56	5.87	6.31	6.65	6.91	6.97	7.18
OD									
Total (bln)	238	241	258	264	275	293	315	356	390
Mean	2.50	2.54	2.72	2.78	2.89	3.08	3.32	3.75	4.10
Std.dev.	5.38	5.45	5.82	5.76	5.70	6.04	6.50	7.78	9.27
ATM									
Total (No.)	11,599	14,179	16,792	19,574	21,838	24,345	25,533	28,029	30,855
Mean	122	149	177	206	230	256	269	295	325
Std.dev.	188	216	257	279	311	328	330	356	384
POS									
Total (No.)	45,577	64,564	78,265	112,828	154,868	214,672	275,406	344,592	449,566
Mean	480	680	824	1,188	1,630	2,260	2,899	3,627	4,732
Std.dev.	889	1,253	1,424	1,913	2,486	3,321	4,204	5,225	7,457
Prices									
Mean	82.95	87.58	91.45	95.03	100.00	103.68	105.44	107.23	108.97
Std. Dev.	1.06	0.86	0.73	0.61	0.00	0.69	0.96	1.26	1.59
iod									
Mean	7.38	7.82	6.43	5.09	5.66	5.78	4.13	2.80	1.37
Std. Dev.	0.46	0.58	0.55	0.47	0.43	1.57	1.12	0.81	0.41
i3m									
Mean	12.66	14.48	10.47	8.84	10.73	8.61	6.40	4.96	2.77
No. Obs.	95	95	95	95	95	95	95	95	95

Sources: Bank of Italy, ISTAT, Istituto Guglielmo Tagliacarne.

Table 2 – Dependent variable: real overnight deposits[8]

Explanatory variable	Pooled	Time effects	Group effects	Long run averages
Real GDP	1.76***	1.75***	0.91***	1.72***
Opportunity cost	-0.03***	-0.05***	-0.04***	-0.14***
No. Obs.	855	855	855	95
R2	0.79	0.79	0.78	0.82
Real GDP	1.41***	1.20***	0.78***	1.06***
Opportunity cost	-0.01	-0.05***	-0.02***	-0.13***
ATM	0.19***	0.29***	0.11***	0.34***
No. Obs.	855	855	855	95
R2	0.81	0.82	0.78	0.84
Real GDP	1.49***	1.27***	0.56***	1.12***
Opportunity cost	0.00	-0.04***	-0.01***	-0.10**
POS	0.11***	0.19***	0.06***	0.24***
No. Obs.	855	855	855	95
R2	0.81	0.83	0.79	0.85
Real GDP	1.41***	1.11***	0.59***	0.98***
Opportunity cost	0.01	-0.04***	-0.01***	-0.10***
ATM	0.09**	0.15***	0.03	0.14
POS	0.08***	0.15***	0.05***	0.19***
No. Obs.	855	855	855	95
R2	0.81	0.84	0.80	0.86

[8] *Overnight deposits, ATM, POS and real GDP are per capita amount and in log form; opportunity cost is the differential between i3m and iod. The significance levels are for three, two and one star, 1, 5 and 10 per cent respectively.*

Table 3 – Dependent variable: real overnight deposits[9]

	1991	1992	1993	1994	1995	1996	1997	1998	1999
Real GDP	1.98***	1.94***	1.89***	1.76***	1.73***	1.66***	1.64***	1.62***	1.53***
Opp. cost	-0.02	-0.08	-0.10*	-0.17**	-0.23***	-0.03***	-0.04**	-0.05**	-0.17***
No. Obs.	95	95	95	95	95	95	95	95	95
R2	0.78	0.78	0.79	0.78	0.84	0.82	0.82	0.81	0.79
Real GDP	1.37***	1.40***	1.57***	1.26***	1.16***	1.01***	0.98***	1.03***	0.98***
Opp. cost	0.00	-0.05	-0.09	-0.14*	-0.19***	-0.03***	-0.05**	-0.05*	-0.17**
ATM	0.22**	0.23**	0.14	0.24**	0.30***	0.39***	0.41***	0.41***	0.39***
No. Obs.	95	95	95	95	95	95	95	95	95
R2	0.80	0.80	0.79	0.80	0.87	0.85	0.86	0.85	0.82
Real GDP	1.67***	1.40***	1.37***	1.29***	1.27***	0.95***	1.03***	1.07***	0.99***
Opp. cost	-0.01	-0.04	-0.03	-0.12	-0.19	-0.02	-0.03	-0.03	-0.10
POS	0.08*	0.17***	0.18***	0.17**	0.17***	0.31***	0.30***	0.29***	0.34***
No. Obs.	95	95	95	95	95	95	95	95	95
R2	0.79	0.81	0.82	0.80	0.87	0.88	0.87	0.86	0.83
Real GDP	1.34***	1.30***	1.40***	1.15***	1.07***	0.77***	0.83***	0.83***	0.77***
Opp. cost	0.00	-0.04	-0.03	-0.11	0.18***	-0.03**	-0.04**	-0.04	-0.12
ATM	0.17	0.07	-0.02	-0.12	0.20**	0.16	0.22**	0.27**	0.23*
POS	0.05	0.16***	0.19***	0.13**	0.10*	0.27***	0.23***	0.22***	0.27***
No. Obs.	95	95	95	95	95	95	95	95	95
R2	0.80	0.81	0.82	0.81	0.87	0.88	0.88	0.87	0.84

[9] *Overnight deposits, ATM, POS and real GDP are per capita amount and in log form; opportunity cost is the differential between i3m and iod. The significance levels are for three, two and one star, 1, 5 and 10 per cent respectively.*

Table 4 – Dependent variable: real overnight deposits; sub-sample 1991-1996[10]

Explanatory variable	Pooled	Time effects	Group effects	Long run averages
Real GDP	1.83***	1.81***	0.87***	1.77***
Opportunity cost	-0.03***	-0.05***	-0.02***	-0.15***
No. Obs.	665	665	665	95
R2	0.79	0.79	0.79	0.82
Real GDP	1.49***	1.25***	0.79***	1.16***
Opportunity cost	0.00	-0.05***	-0.09***	-0.13***
ATM	0.17***	0.27***	0.07***	0.29***
No. Obs.	665	665	665	95
R2	0.80	0.82	0.80	0.84
Real GDP	1.56***	1.33***	0.63***	1.21***
Opportunity cost	0.00	-0.04***	-0.01**	-0.11**
POS	0.10***	0.18***	0.04***	0.21***
No. Obs.	665	665	665	95
R2	0.81	0.83	0.80	0.85
Real GDP	1.49***	1.16***	0.66***	1.09***
Opportunity cost	0.01	-0.04***	-0.01**	-0.11**
ATM	0.07	0.14***	0.02	0.10
POS	0.07***	0.14***	0.03***	0.17***
No. Obs.	665	665	665	95
R2	0.81	0.83	0.81	0.85

[10] *Overnight deposits, ATM, POS and real GDP are per capita amount and in log form; opportunity cost is the differential between i3m and iod. The significance levels are for three, two and one star, 1, 5 and 10 per cent respectively.*

Table 5 – Dependent variable: real overnight deposits; sub-sample 1997-1999[11]

Explanatory variable	Pooled	Time effects	Group effects	Long run averages
Real GDP	1.59***	1.60***	-0.62*	1.60***
Opportunity cost	-0.06***	-0.06***	-0.07***	-0.07**
No. Obs.	285	285	285	95
R2	0.80	0.80	0.65	0.81
Real GDP	1.01***	1.00***	-0.31	0.95***
Opportunity cost	-0.05***	-0.06**	-0.03***	-0.07*
ATM	0.40***	0.40***	0.25***	0.44***
No. Obs.	285	285	285	95
R2	0.84	0.84	0.24	0.85
Real GDP	1.10***	1.04***	-0.28***	0.99***
Opportunity cost	-0.02	-0.04**	-0.01	-0.04
POS	0.28***	0.31***	0.15***	0.34***
No. Obs.	285	285	285	95
R2	0.85	0.85	0.08	0.86
Real GDP	0.91***	0.82***	-0.24***	0.76***
Opportunity cost	-0.03*	-0.04**	-0.01*	-0.05*
ATM	0.22***	0.24***	0.08	0.25
POS	0.21***	0.44***	0.13***	0.26*
No. Obs.	285	285	285	95
R2	0.86	0.86	0.39	0.87

[11] *Overnight deposits, ATM, POS and real GDP are per capita amount and in log form; opportunity cost is the differential between i3m and iod. The significance levels are for three, two and one star, 1, 5 and 10 per cent respectively.*

Table 6 – Dependent variable: real overnight deposits; sub-sample Northern Italy[12]

Explanatory variable	Pooled	Time effects	Group effects	Long run averages
Real GDP	0.79***	0.78***	1.00***	0.75***
Opportunity cost	-0.03***	-0.03***	-0.02***	-0.12
No. Obs.	369	369	369	41
R2	0.33	0.35	0.33	0.38
Real GDP	0.78***	0.79***	0.58***	0.81***
Opportunity cost	-0.03***	-0.03**	0.00	0.12
ATM	0.01	0.00	0.15***	-0.11
No. Obs.	369	369	369	41
R2	0.33	0.35	0.30	0.39
Real GDP	0.74***	0.71***	0.24	0.71***
Opportunity cost	-0.01*	-0.04***	0.00	-0.12
POS	0.05**	0.09***	0.09***	0.05
No. Obs.	369	369	369	41
R2	0.35	0.37	0.27	0.39
Real GDP	0.77***	0.73***	0.24	0.77***
Opportunity cost	-0.02**	-0.04***	0.00	-0.12
ATM	-0.10**	-0.07***	0.00	-0.18
POS	0.08***	0.10***	0.09***	0.08
No. Obs.	369	369	369	41
R2	0.35	0.37	0.27	0.40

[12] *Overnight deposits, ATM, POS and real GDP are per capita amount and in log form; opportunity cost is the differential between i3m and iod. The significance levels are for three, two and one star, 1, 5 and 10 per cent respectively.*

Table 7 – Dependent variable: real overnight deposits; sub-sample Central Italy[13]

Explanatory variable	Pooled	Time effects	Group effects	Long run averages
Real GDP	1.97***	1.77***	1.21***	1.09*
Opportunity cost	-0.04***	-0.12**	-0.03***	-0.42*
No. Obs.	180	180	180	20
R2	0.62	0.64	0.62	0.74
Real GDP	1.89***	1.54***	1.23***	1.09
Opportunity cost	-0.03**	-0.11**	-0.02***	-0.42*
ATM	0.07	0.16**	0.04*	0.00
No. Obs.	180	180	180	20
R2	0.62	0.66	0.62	0.74
Real GDP	1.76***	1.17***	1.04***	0.67
Opportunity cost	0.02	-0.07**	-0.01	-0.26*
POS	0.14***	0.31***	0.05***	0.33***
No. Obs.	180	180	180	20
R2	0.66	0.75	0.65	0.82
Real GDP	1.82***	1.19***	0.94***	0.86***
Opportunity cost	0.01	-0.02*	-0.01*	-0.31
ATM	-0.10*	-0.02***	-0.05*	-0.29
POS	0.17***	0.31***	0.07***	0.40***
No. Obs.	180	180	180	20
R2	0.67	0.75	0.66	0.84

[13] *Overnight deposits, ATM, POS and real GDP are per capita amount and in log form; opportunity cost is the differential between i3m and iod. The significance levels are for three, two and one star, 1, 5 and 10 per cent respectively.*

Table 8 – Dependent variable: real overnight deposits; sub-sample Southern Italy[14]

Explanatory variable	Pooled	Time effects	Group effects	Long run averages
Real GDP	1.16***	1.16***	1.03***	1.16***
Opportunity cost	-0.06***	-0.03*	-0.06***	-0.06
No. Obs.	306	306	306	34
R2	0.93	0.93	0.93	0.94
Real GDP	1.07***	1.08***	0.88***	1.04***
Opportunity cost	-0.04***	-0.03*	-0.04***	-0.07
ATM	0.08**	0.07*	0.08***	0.11
No. Obs.	306	306	306	34
R2	0.93	0.93	0.93	0.94
Real GDP	1.09***	1.11***	0.78***	1.01***
Opportunity cost	-0.04	-0.03**	-0.04***	-0.04
POS	0.05**	0.04***	0.04***	0.10***
No. Obs.	306	306	306	34
R2	0.93	0.93	0.93	0.94
Real GDP	1.08***	1.07***	0.81***	1.00***
Opportunity cost	-0.04***	-0.03*	-0.04***	-0.04
ATM	0.03	0.05	0.05**	0.02
POS	0.04	0.03	0.02*	0.10
No. Obs.	306	306	306	34
R2	0.93	0.93	0.93	0.94

[14] *Overnight deposits, ATM, POS and real GDP are per capita amount and in log form; opportunity cost is the differential between i3m and iod. The significance levels are for three, two and one star, 1, 5 and 10 per cent respectively.*

Appendix I – The data set

The data set comprises variables for 95 [1] Italian provinces for the period 1991-1999, the number of observations is equal to 855; the frequency is annual.

Automated tellers machines: number of ATMs located in the provinces examined; the source is the banking statistics data set collected by Bank of Italy (Matrice dei conti).

Gross domestic product: gross nominal value added per province: source Istituto Guglielmo Tagliacarne.

Interest rate on overnight deposits: we calculated the interest rate on the basis of the data for overnight deposits higher than 20 millions lira, the only one for which the data are available with provincial detail; the source is a special data set collected by Bank of Italy (Centrale dei rischi).

Interest rate on 3-month Treasury bill (BOT): source monetary statistics collected by Bank of Italy.

Overnight deposits: deposits held in the branches situated in the provinces examined; the source is the banking statistics data set collected by Bank of Italy (Matrice dei conti).

Points of sale: number of POS located in the provinces examined; the source is the banking statistics data set collected by Bank of Italy (Matrice dei conti).

Prices: the index of prices used is the consumer price index and is calculated only for the administrative centre of each region and attributed also to the other provinces of the region because of lack of data; source, elaborations on Istat data.

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Abstract

The objective of this paper is to analyse the effect of transaction technology innovation on the demand for overnight deposits in Italy. The rapid diffusion of ATM and POS during the last decade may have contributed to change money demand patterns, so standard time series analysis not accounting for these developments may suffer from an omitted variable problem. Using data on 95 Italian provinces from 1991 to 1999, I find that transaction technology innovation has a positive effect on overnight deposits. Accounting for that in the regressions, estimated income elasticity is reduced.

JEL Classification: E41;
Key words: Demand for money; omitted variables; transaction technology.

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Statistical implications of the chosen monetary policy strategy: the Czech case

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Monetary policy strategy exercised in the Czech Republic

The Czech National Bank (CNB) had maintained a kind of monetary targeting strategy from the beginning of the transitional period. In spite of the fact that some direct instruments were used at the beginning of the nineties there was a fixed exchange rate regime and monetary aggregate targets in the strategy for several years. In the mid-nineties a wide range of liberalisation of capital flows both inwards and outwards were introduced. These three features of the monetary policy became incompatible. The exchange rate regime was eased to a fluctuation band and in May 1997 after a period of monetary turbulence the maintenance of any commitment concerning the level of exchange rate was completely abolished. The loss of the nominal anchor was one drawback of this decision. Therefore the CNB decided to change its monetary policy regime and at the start of 1998 it switched to inflation targeting. This strategy has continued to be used since that time. In order to meet its inflation target the central bank exercises its monetary policy through its major instrument – the Repo rate.

While the monetary targeting scheme focuses mainly on the development of monetary aggregates, inflation targeting observes various areas of indicators. I believe that the practical application of inflation targeting in the Czech Republic does not differ from that applied in other countries maintaining the same strategy. The main features of inflation targeting are its medium-term focus, the use of an inflation forecast and the explicit public announcement of an inflation target or sequence of targets. The inflation forecast in particular involves the use of a great deal of statistical data. Moreover, the formal model for macroeconomic forecasting is currently being used.

Statistical information used within the inflation targeting framework

In order to be able to work out the inflation and macroeconomic forecasts inflation itself and a number of factors are analysed. The factors of inflation determine the main areas of statistical data that should be covered.

Inflation
The development of inflation is one sphere of particular interest. More detailed information is required for analytical and forecasting purposes in the current policy scheme. The development of all individual items of the consumer basket is provided to analysts. The figures are transmitted from the Czech Statistical Office (CSO) and stored in the CNB database. Various groups of the basket are calculated: tradables, non-tradables and regulated items, food and so-called adjusted inflation and net inflation. In the first years of maintaining the inflation targeting concept the target was set in net inflation. Net inflation was defined as the Consumer Price Index (CPI) adjusted for regulated prices and for the effect of other administrative measures (e.g. indirect taxes). Adjusted inflation includes prices of the non-food items in the basket excluding regulated price items and administrative influences. In order to eliminate external shocks adjusted inflation excluding petrol prices is also calculated.

Monetary development
There have been almost no changes resulting from the change in strategy. Monetary development is one of the most important factors in analytical and forecasting work. Standard areas are covered by statistical data produced mainly by the CNB:
• monetary aggregates,

- credits provided to businesses and households,
- interest rates (short-term, long-term, clients), yield curve
- fiscal development,
- exchange rate,
- capital flows.

Supply and demand

The present stage of economic development is very important for the identification of inflation pressures (mainly demand driven). In particular evaluation of the output gap is a topical issue. Due to this fact aggregate as well as detailed data on supply and demand are required:
- domestic and aggregate demand (incl. components),
- GDP, production,
- net external demand,
- current account of balance of payments, foreign trade.

Labour market

Employment and unemployment as well as wages are analysed as both demand and cost factors. Apart from absolute figures relative variables are also used for analytical purposes, e.g. labour productivity and unit labour cost.

Other cost factors

Various groups of prices influence the CPI and have a significant effect on the inflation forecast (which is able fairly precisely to be calculated since they are often known earlier). A wide range of costs / prices are used:
- production price indices in main trade partner countries,
- prices of raw materials (oil, gas, metals, agricultural products),
- the exchange rate,
- the price of imports,
- domestic producers prices.

Measurement of inflation expectations

While the above mentioned areas of statistical data have always been used more or less there is one completely newly established statistical survey – measurement of inflation expectations. The measurement of inflation expectations occupies a particularly important place in the inflation targeting scheme.

Financial analysts are the most sophisticated group of respondents. The present group co-operating with the CNB has 12 members, 6 of whom represent Czech companies and 6 foreign entities and was drawn from traders on both the money and capital markets who are highly active in these market segments. Standardised questionnaires are used for their forecasts for the following indicators at monthly intervals:
- the annual CPI at the one-year and three-year horizons;
- the 1W PRIBOR (money market rate), 1Y PRIBOR, 5Y IRS (interest rate swap) and 10Y Government bonds at the one-month and one-year horizons;
- the CZK/EUR exchange rate at the one-month and one-year horizons.

The financial indicators together reflect the market participants' evaluations of various financial assets and their expectations of the future trend. This information serves primarily for monetary policy purposes, i.e. how inflation expectations are developing and whether they are consistent with those of the CNB and the subsequent real trend. It is also used for comparison with financial market expectations ascertained indirectly from yield curves and for any correction of those expectations.

Members of management in non-financial corporations represent the second group of respondents. The group consists of 200 respondents. This number makes it possible to obtain a representative sample of expectations also in the sphere of producer prices. There are two main questions in the standardised questionnaire at quarterly intervals:
- the annual CPI at the one-year horizon,
- the annual price index of their own final production at the one-year horizon.

Households are the third group of respondents. The question is simple: the annual CPI at the one-year horizon. The group contains 600 respondents.

The time horizon for the expected development of inflation was set at the beginning of the measurement. While maintaining the inflation targeting policy, the response of economic agents on monetary policy decisions has been a topical issue for research. The time lag between monetary policy action and the most efficient impact on inflation is four to six quarters. From this point of view the one-year time horizon mainly used in the survey is broadly in line with the time lag.

Publication of statistical data

It is widely accepted in the inflation targeting scheme that the more credible and transparent the central bank's policy is the more efficient and less costly are the results. The inflation report is the main tool for communication with the public in this context. This is also a challenge for statistics to publish a wide and standardised range of statistical information. The inflation reports are published at the CNB web site and a statistical annex is included. The structure follows all above-mentioned statistical information used within the inflation targeting framework. In addition, information about monetary policy instruments used by the CNB and the main relative variables (measured in GDP terms) are also included.

The CNB web site offers a much wider range of statistical data. Under the special section of "Statistics" much statistical information is available:
- statistical data mainly produced by the CNB (monetary, balance of payments),
- data on inflation,
- statistical publications (Indicators of monetary and economic development, Money and banking statistics)

Conclusions

The variables and indicators used for analytical purposes and for publication as well shows that there is an impact resulting from the introduction of the inflation targeting strategy. Some areas had not been observed during the previous monetary policy scheme or at least had not been the subject of primary interest. The introduction of measurement of inflation expectations, the detailed breakdown of the CPI and the greater interest in both demand and cost factors could be considered as an implication of the policy changeover. Generally speaking, while monetary development had been of primary interest while the former strategy was in operation other areas have become more important during the period of present strategy.

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Gathering predictive information for implementing inflation targeting: the case of Peru

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I. Price Assessments

A. CPI inflation, Core inflation and Non-core Items

The inflation target in Peru is 2.5 percent with a range of 1 percentage point above and below. This target is defined in terms of the annual growth of the Consumer Price Index (CPI), which is the best-known inflation indicator. This index is calculated and published every month by the National Statistics Office, a public institution independent from the Central Reserve Bank of Peru (BCRP).

The Consumer Prices Index (CPI) used to measure inflation has transitory and non-transitory components. The BCRP's goal – price stability – requires an indicator that only includes the permanent component of the inflation path. This indicator – called *Core Inflation* – prevents monetary policy from generating more volatility, by isolating permanent rises and drops from simple transitory movements in CPI.

Different methods for measuring *Core Inflation* are available. Four different methods are explained briefly:
* Excluding the relatively more volatile components (food, energy, for example), as long as this isolation does not overestimate or underestimate inflation over long periods.
* Trend inflation, calculated by using moving averages.
* Limited Influence Estimators, obtained through the weight median of variations in the items composing the consumption basket or through the bounded average of the variations in these items.
* Core Inflation as the result of an econometric model that relates inflation with the nominal variables explaining inflation.

Core Inflation must register the generalized and permanent prices path and is used as a guide for monetary policy purposes. The set of characteristics that should reflect a good *Core Inflation* Indicator are:
* Easily calculated, so it can be understood by agents in the market and the general public.
* Stable, with no need for significant or frequent reviews.
* Reliable, with no long-term departure from actual inflation.
* Timely available, releasing at the same time of actual inflation.
* Lower variability than headline inflation or similar variability as fundamentals (output gap or monetary aggregates, for instance).
* Forecasting capability, moving according to trend inflation even though observed inflation departs from trend.

A measure of *Core Inflation* was defined for Peru, meeting the mentioned conditions and also neutralizing more comprehensively the effects of *Supply Shocks*. This indicator excludes from CPI the items with more variability in monthly percentage variation of prices in the period 1995–2001. It must be noted that fuels, public services, and transport are excluded regardless the variability degree of their prices.

Thus, 31.7 percent of goods and services composing the basket was excluded, of which food stands for 14.8 percent, fuels 3.9 percent, transport services 8.4 percent, and public services 4.6 percent.

As Table 1 shows, the *Core Inflation* Indicator shows a cumulative variation similar to the one in headline inflation or CPI, thus meeting the condition of not overestimating or underestimating

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[1] *The views expressed are those of the author and are not necessarily shared by the Central Reserve Bank of Peru.*

the CPI variation over a long period of time (1995–2001). Likewise, this indicator shows a lower volatility than the one observed in headline inflation.

Table 1 – Headline and Core Inflation
(In percentages)

	Observed		Core	
	Monthly	12-month meses	Monthly	12-month meses
2001				
January	0.19	3.86	0.25	3.00
February	0.25	3.61	0.02	2.83
March	0.51	3.58	0.07	2.54
April	-0.42	2.62	0.13	2.42
May	0.02	2.63	0.24	2.41
June	-0.06	2.51	0.04	2.20
July	0.17	2.16	-0.09	1.88
August	-0.30	1.37	0.01	1.62
September	0.06	0.87	0.08	1.53
October	0.04	0.68	0.09	1.44
November	-0.49	0.12	0.15	1.28
December	-0.09	-0.13	0.06	1.06
2002				
January	-0.52	-0.83	0.03	0.85
February	-0.04	-1.11	-0.01	0.82
March	0.54	-1.08	0.04	0.78
April	0.73	0.05	0.11	0.77
May	0.14	0.17	0.01	0.53
June	-0.23	0.00	0.12	0.61
% Excluded	0.0%		31.7%	
Var. % 95-01	50.4%		52.9%	
Std. Deviation	0.47		0.35	

Graph 1 – Headline and Core Inflation
(Last 12-month percentage variation)
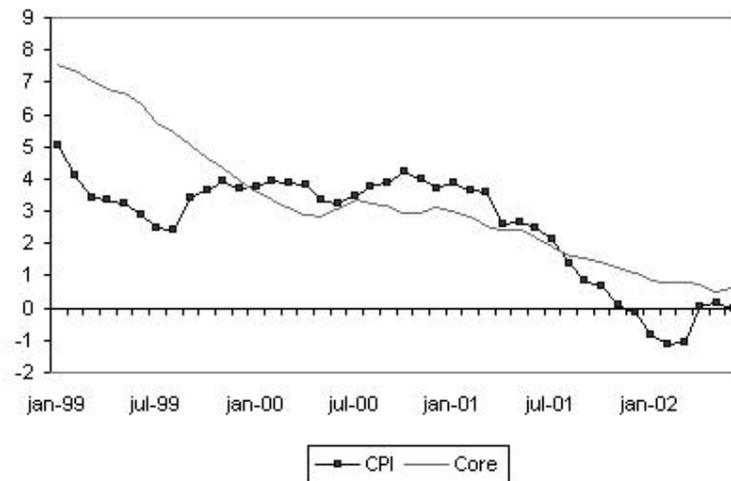
Recent evolution of the CPI inflation and core inflation shows the higher variability of the first one. In 2001, the variability of CPI inflation dropped from 3.7 percent in 2000 to –0.13 percent in 2001, and the variability of core inflation from 3.1 percent in 2000 to 1.1 percent in 2001.

Graph 2 – Inflation and Core Inflation
(Cumulated percentage change)
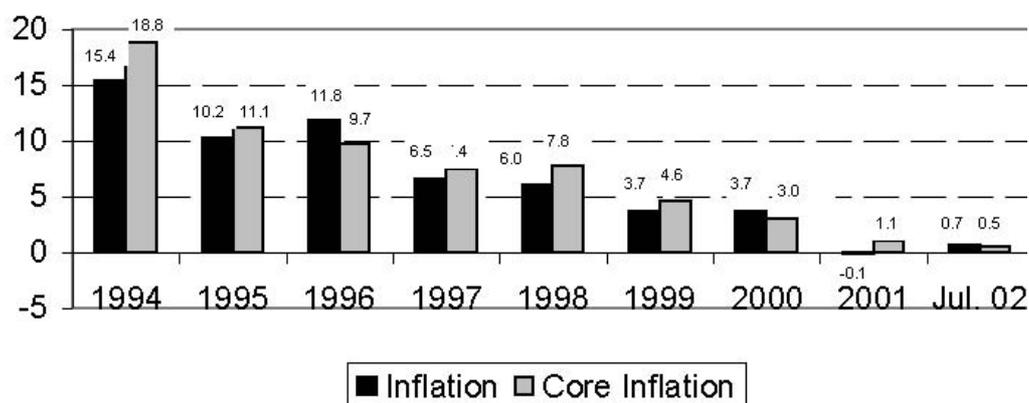
Table 2 – Annual inflation rates
(Percentage changes)

	1994 weights	2001	2002 (as of June)
Core Inflation	68.3	1.06	0.31
Goods	41.8	0.66	-0.01
Foods and beverages	20.7	-0.60	-0.95
Textiles and footwear	7.6	1.94	0.65
Other industrial goods	13.5	2.19	1.07
Services	26.6	1.65	0.83
Restaurants	12.0	1.29	0.36
Education and health	6.4	3.78	2.24
Other services	8.1	1.37	0.41
Non-core Inflation	31.7	-2.82	1.26
Foodstuffs	14.8	-1.16	1.59
Fuel	3.9	-13.14	5.14
Transportation	8.4	-0.02	-0.67
Public utilities	4.6	-2.73	0.35
CPI Inflation	100.0	-0.13	0.62

Non-core inflation items explain the difference, as Table 1 shows:
- In 2001, fuel prices declined 13.1 percent following international quotations of crude oil and derivatives (oil quotation diminished 32 percent in 2001). A direct proportional relationship between domestic and international fuel prices is actually not being observed since its domestic price results from both the international quotation and the excise tax on domestic sales.
- The average fee of public services reduced as result of a decrease in electricity charges explained by the recently created *Fondo de Compensación Social Eléctrica* (FOSE) and lower generation-distribution costs, as estimated by the electricity sector's regulator *Osinerg*.
- Food prices decreased 1.2 percent as a whole in 2001. Most important items were citrus fruits, fresh vegetables, sugar, potatoes, eggs and horticulture products. The decrease in food prices obeys to the increase of domestic production under favourable climatic conditions.

There are two other main inflation measures: the wholesale price index (WPI) inflation and the percentage change in GDP deflator. These alternative inflation measures usually work as a reliability check to CPI inflation's trend. A simple way to assess the hypothesis of a common trend shared by these three series may be the following graph.

Graph 3 – CPI Inflation, WPI Inflation and GDP Deflator change
(Annual percentage changes, same quarter last year)
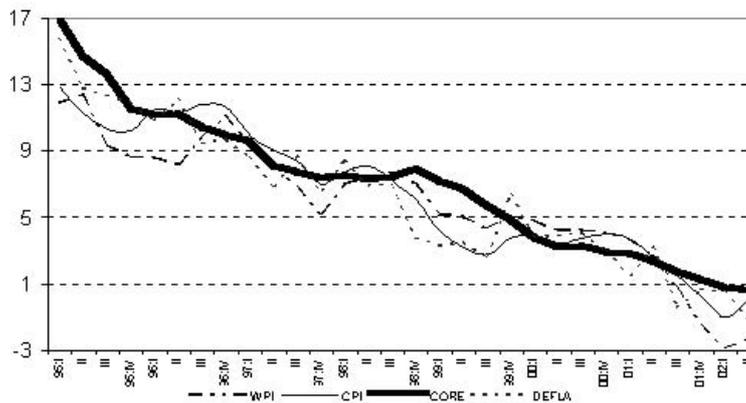
Although emphasis is not on the differences among these indicators but on their common trend, it may be worth mentioning GDP deflator inflation is strongly affected by terms-of-trade fluctuations, a feature illustrated by the 1998-2000 deterioration in terms of trade affecting high-commodity-exports countries in the aftermath of the Asian financial crises.

B. Terms of trade and external price indexes

Under the inflation targeting scheme, economic activity indicators are crucial in order to anticipate future inflation pressures. In the Peruvian economy business cycles are highly correlated with terms of trade fluctuations. Graph 4 shows the behavior of monthly series of the cyclical component of terms of trade and tje output gap. The former variable has been estimated using the Hodrick-Prescott filter, while the latter results from the difference between actual GDP and potential GDP (this variable results from the estimation of a production function, see section II:D)

Terms of trade is a highly volatile variable, the evolution of which is commonly difficult to forecast, specially for countries like Peru whose raw-material exports traditionally represent an important share of total exports. Peruvian commodity exports represent 67 percent of total exports.

Former methodology for the construction of the index, a Paasche-type index with a fixed annual base (1994=100), was considered appropriate because of the main characteristics of trade flows in Peru: the commodity share volatility during the last decade (the share range was 64.4 to 71.4 percent). However, the main disadvantage of the Paasche-type index is the difficulty to compare one non-base-year period to another, because price change is highly influenced by trade basket structural change. Recently, this problem was magnified after the *Antamina* project increased zinc & copper concentrates export value (lower relative price products) and its share as well.

The new terms of trade index is a Fisher-type factor-chain index, which allows minimizing both the substitution bias (the main Laspeyres-type index's problem) and the underestimation effect resulting from using current basket as the relevant base one (the main Paasche-type index's problem). The simple Fisher-type index is just the geometrical average of these two indexes but the enhanced factor-chain index minimizes the problem associated to a fixed base by using the last period as base period and chaining this with previous periods results.

As a result, the new index calculation reduced internal volatility. Percentage change of the export price index of 2001 was corrected from –7.0 percent with Paasche-type index to –4.9 percent with the Fisher-type factor-chain index. Import price index change was corrected from –4.2 percent to –3.0 percent. The corresponding terms of trade percentage change was corrected from –2.9 percent to –2.0 percent.

Lower index volatility will also be profitable in terms of predictive information value. In the case of the terms-of-trade index, predictive information value can be assessed with respect to theoretically related variables such as the real exchange rate, primary production sectors' activity and "imported" or external inflation.

An evaluation of a set of measures of the *real exchange rate* may be also considered. For instance, the set of information being published to assess the real appreciation of the nuevo sol considers the nominal appreciation of the dollar against the currencies of Peru's main trade partners. The fall of the multilateral real exchange rate index of 4.3 percent in 2001 is mainly explained by the depreciation of yen (13.5 percent), euro (0.5 percent), Chilean peso (16.4 percent) and real (20.3 percent).

Graph 4 – Cyclical components of GDP and Terms of Trade* 1993-2002
(Monthly series)

* In percentage of trend components.
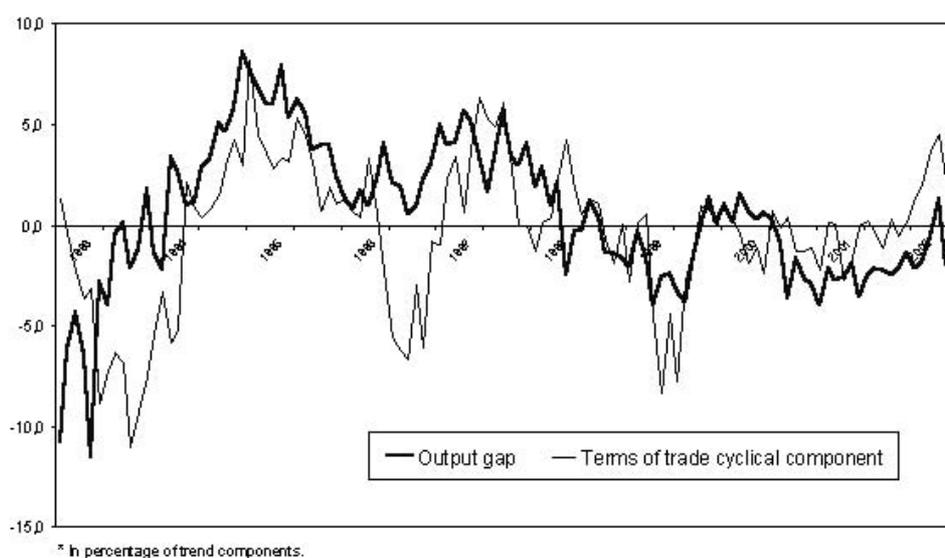
However, the table also shows how 2000-2001 volatility contrasts with other real exchange rate measures', such as the relative prices between CPI-tradable and CPI-non-tradable goods.

The exchange rate is related to the evolution of the price level through three channels. These channels configure what is called the "pass-trough effect" (the exchange rate elasticity in the price level equation is currently estimated at 0.12 percent in Peru). The first channel is based on the direct link between the exchange rate and import prices. The second channel is the well-know relationship between the trade balance (component of aggregate demand) and the real exchange rate. Finally, there is an important connection between the exchange rate and aggregate demand, that operates through the so-called "balance sheet" effect. This last effect is particularly relevant in a country with financial dollarization as Peru.

II. Real Activity Assessment

An important component of the forecasting process is the development of a set of indicators of economic activity, disposable income and domestic demand. Special attention is paid to the seasonal adjustment process of the variables and to the attainment of their trends. These calculations include

Table 3 – Nominal and real devaluation
(Cummulative percentage changer)

	1999	2000	2001	2002[1]
Nominal Depreciation	11.0	1.0	-2.4	1.3
External Inflation				
a. Bilateral[2]	2.7	3.4	1.6	1.7
b. Multilateral	-2.9	-2.5	-2.1	-2.6
Domestic Inflation	3.7	3.7	-0.1	0.6
a. Tradable Goods	3.9	4.7	-1.0	-1.0
b. Non-tradable Goods	3.6	3.1	0.5	0.7
Real Depreciation				
a. Bilateral PPP[2]	10.1	0.5	-0.8	2.4
b. Multilateral PPP[3]	4.0	-5.1	-4.3	-1.9
c. Tradable / Non-tradable[4]	0.3	1.6	-1.5	-1.6

[1] First semester.

[2] With respect to USA, which represented 27,5 percent of Peruvian total trade in 2001.

[3] Considers nominal depreciation and external-domestic inflation differential.

[4] Tradable-good/Non-tradable-good relative price.

not only information of output by sectors, but also indicators of domestic demand and disposable income, constructed using data of international trade, terms of trade, public sector expenditure, among other. For the time being, the X-12 ARIMA statistical method is being used for seasonally adjusted figures, but progress is being made to evaluate the switch to TRAMO-SEATS after a couple of months of familiarization with the program. Graphs 5 to 7 show the evolution of seasonally adjusted series of GDP, disposable income and domestic demand, estimated using TRAMO-SEATS software.

The first indicator that is being observed is the GDP seasonally adjusted figures within its trend-cycle. Graphical evidence shows an upward trend. During the first quarter of 2002, the output gap (difference between current and potential GDP) is negative. Therefore, there is a loose monetary policy.

Graph 5 – GDP
(Millions of nuevos soles of 1994)
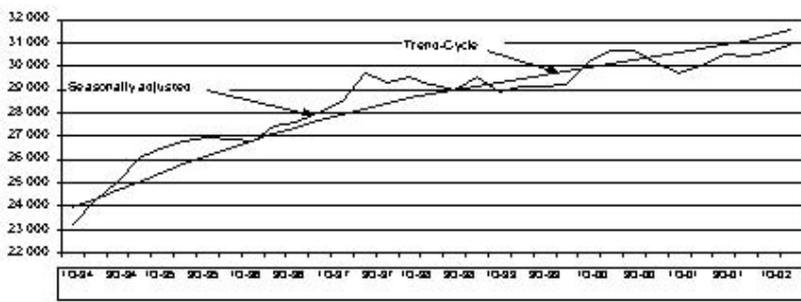
Seasonally adjusted disposable income, which is derived from GDP after considering investment income from abroad, terms of trade and current transfers from the balance of payments, shows an upward trend due to an improvement in the terms of trade.

Graph 6 – Disposable Income
(Millions of nuevos soles of 1994)
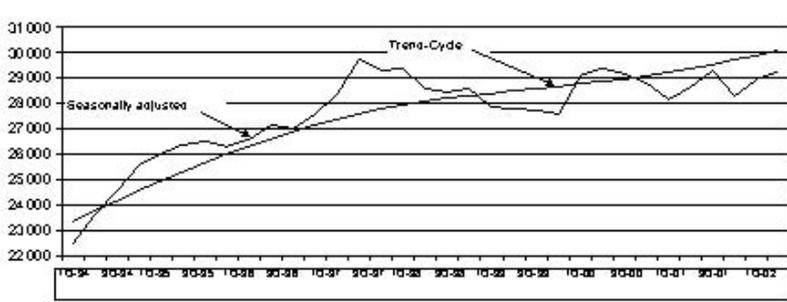
Domestic demand reflects the fact that despite the recovery in private consumption, private investment has not yet initiated a steady growth.

Graph 7 – Domestic Demand
(Millions of nuevos soles of 1994)
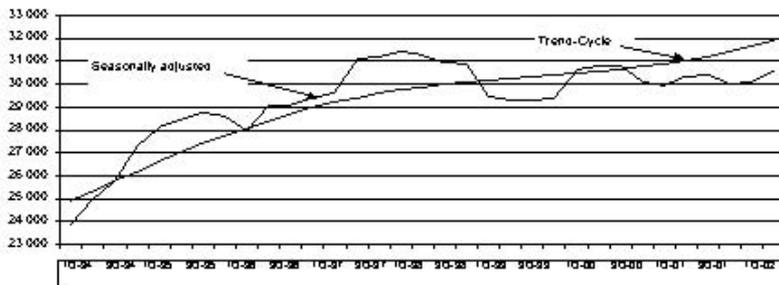
A. Supply Side: GDP by industry

Production growth is mainly used as a fundamental variable for business and government decisions. Planning investment and corporate budgeting is not feasible without a sound measure of future market development. Sound public policy design requires tracking both production and demand indicators.

The production approach is the most common approach to measuring monthly and quarterly GDP. To some extent it reflects the availability of data in the majority of countries. In the case of Peru, the high degree of informality introduces difficulties for an accurate measurement of GDP. The challenges ahead include the developing of better indicators to address this difficulty.

As a matter of fact, many of the monthly figures are estimated by using indirect measurements or what is called internally "the known GDP" which consists of data coming from large to medium-scale companies representing all sectors of the economy. This indirect measurements are being used for example in the case of manufacturing activities that present a high degree of informality such as garment and metallic products, which estimation is based on raw materials consumption. In a similar way commerce is being estimated by the flow of goods method. The challenges ahead include the developing of better indicators to address these difficulties.

As seen from the structure of GDP by industry in the next table, 81 percent is generated in the non-primary sectors, which in turn are associated with demand factors, while 19 percent is generated in the primary sector mainly related to supply factors.

Within the non-primary sectors, services are the main contributors to GDP accounting for more than half and at the same time having the highest degree of informality, especially among the traditional services.

Table 4 – GDP by Industry

	Weight (%)
GDP primary sectors	19.0
Agriculture and livestock	9.0
Fishing	0.5
Mining and fuel	6.0
Manufacturing based on raw materials	3.5
GDP non-primary sectors	81.0
Non-primary manufacturing	11.4
Construction	4.8
Commerce	14.2
Other services	50.6
GDP	100.1

Source: National Statistics Office

The Central Bank, recognizing the relevance of a sound statistical system, has recently subscribed an agreement with the National Statistics Office from which some improvements are being developed by the statistical offices in particular in agriculture (development of new methodologies for information gathering according to type of farming based on geographical conditions), manufacturing (by the directory update), and services (development of ad-hoc surveys for direct measurement).

B. Domestic Demand

As well as in the case of the production side, work is being done to improve demand indicators. Especially important is the direct estimation of short-term aggregates such as private consumption, private investment and inventories. Current methodology relies on partial information provided by the production side (manufacturing durable and non-durable consumer goods and capital goods), the balance of payments (imports of durable and non-durable consumer goods and capital goods), and financial statements of a sample of 120 large companies. Surveys for direct measurement are also being developed by the National Statistics Institute to improve our quarterly estimates.

Table 5 – GDP by Expenditure

	Weight (%)
I. Global demand	117.1
1. Domestic demand	99.4
a. Private consumption	71.9
b. Public consumption	9.7
c. Gross fixed investment	17.9
- Private	14.7
- Public	3.2
2. Exports of goods and services	17.7
II. Global supply	117.7
1. GDP	100
2. Imports of goods and services	17.1

Source: National Statistics Office

C. External Demand

Assessing external demand requires a measure of main partners' economic activity, which is usually built upon their GDP or industrial production indexes. Forecasting their future evolution is usually the task of foreign agencies. BCRP is currently using Consensus Economics' forecasts of 20 of its main trade partners.

Table 6 – Consensus forecasts' World GDP growth: Main trade partners*
(Percentages)

	2001 Trade Weights[1]	2001	2002E	2003E
United States	33.6	1.2	2.8	3.6
United Kingdom	9.2	2.2	1.8	2.8
Chile	6.6	2.8	2.9	4.7
Japan	6.3	-0.4	-0.4	1.1
People's Republic of China	5.1	7.3	7.5	7.7
Brazil	4.6	1.5	2.1	3.6
Germany	4.1	0.6	0.9	2.4
Colombia	3.7	1.5	1.7	3.1
Spain	3.5	2.8	2.1	3.0
Venezuela	3.0	2.7	-3.8	0.7
South Korea	2.7	3.0	6.2	6.4
Mexico	2.7	-0.3	1.6	4.4
Argentina	2.4	-3.7	-13.4	0.5
Italy	2.4	1.8	1.1	2.5
Canada	2.2	1.5	3.5	3.7
France	2.1	2.0	1.4	2.8
Belgium	1.6	1.1	1.2	2.6
Taiwan	1.5	-1.9	3.1	4.1
Bolivia	1.4	1.0	2.0	3.4
Netherlands	1.3	1.1	0.9	2.7
Trade Partners' GDP	**100.0**	**1.6**	**1.9**	**3.4**
North America	38.5	1.1	2.8	3.7
Europe	24.1	1.8	1.5	2.7
Asia	15.7	2.6	3.7	4.5
Latin America	21.7	1.4	-0.3	3.1

* Weighted according trade (excluding oil) of 2001.
1/ Source: Consensus Forecast, july 2002.

July 2002's forecasts yield World GDP (with respect to Peru) will grow at 2.0 percent rate in 2002 and 3.4 percent rate in 2003. In addition to the relationship of World GDP growth on main partners' monetary policy, their inflation rates and policy interest rates, there is a direct relationship with export and import prices and terms of trade. Aforementioned main partners GDP growth is consistent with a 4.9 percent increase in export prices in 2002 and a 4.2 percent increase in 2003, implying terms of trade increases of 4.6 percent and 2.4 percent, respectively.

D. Output Gap and Potential Output

In order to estimate an output gap indicator (difference between current and potential GDP), as the one shown in Graph 4, a production function needs to be estimated. The annual estimation for 1950-2001 has used a Cobb-Douglas function with constant returns to scale that incorporates labour, capital and total factor productivity. The labour variable (L) is measured with the labour force reported by the National Statistics Institute. The stock of capital (K) is estimated using the perpetuated inventories formula considering an assumption for the initial stock of capital and a depreciation rate of 5 percent. Labour share in output (a) is assumed as 0,49, according to national accounts. Total factor productivity (A) is estimated as a residual between actual GDP and capital and labour contributions. Thus, potential GDP is estimated as:

$$Potential\,GDP = AL^a K^{1-a}$$

III. Expectations Assessment

A. Surveys about expectations of main macroeconomic indicators

In order to track expectations of inflation and other macroeconomic variables, BCRP began to produce and release surveys carried out among analysts of the private sector, and treasurers of financial institutions. Surveys provide the Central Bank information about what the public thinks, and provide guidance for specific policy issues such as future levels of exchange and interest rates, growth of GDP and inflation. Surveys are also useful for assessing the public's level of fear, concern, or optimism about future tendencies of specific variables. Surveys also provide additional data that take into account many sources of information that is not normally available

The survey on macroeconomic expectations among treasurers of financial institutions started being conducted by the Bank in July 1999. Later on, in October 2001, the survey was extended to the top 430 companies of the non-financial sector and recently, since March 2002 the survey incorporated 40 analysts of the private sector. Aggregate results of these three sources are published in the Central Bank weekly bulletin at the end of the month and are posted on its web site.

Table 7 – Main economic indicators: 2002-2003 forecasts

	Consensus Forecasts [1]	Central Reserve Bank's Surveys [2]	
		Financial Institutions	Private Sector's Analysts
2002			
Inflation	1.8	2.0	1.7
Real GDP Growth	3.3	3.0	3.0
Nominal Exchange Rate [3]	3.54	3.53	3.50
Inter-Bank Interest Rate [3]	-.-	3.0	2.8
2003			
Inflation	2.2	2.5	2.1
Real GDP Growth	3.7	3.5	3.9
Nominal Exchange Rate [3]	3.66	3.60	3.60
Inter-Bank Interest Rate [3]	-.-	-.-	3.5

[1] Source: Consensus Economics, May 2002.

[2] June 2002 Survey.

[3] December (e.o.p. quotation).

Consensus Forecasts, a compilation of private consultants' and investment banks' forecasts, are being taken as a benchmark. The BCRP Survey's results are similar to Consensus Forecasts.

The BCRP is working towards a wider diffusion of survey results, allowing for convergence between surveys forecasts and the actual realization of main indicators data. The higher agents' confidence on monetary policy, the faster the convergence.

Considerations to conduct the surveys

a. Sample or Population?

a.1.Treasurers of financial institutions: In this case the whole population is surveyed including 30 institutions (banks, insurance companies, loan institutions, local government credit institutions, and private pension companies) that conduct formal financial business in Peru. These companies were readily identified because they report their monetary statistics to the Bank or to the Superintendency of Banking and Insurance.

a.2 Analysts and non-financial institutions: In both cases a sample was chosen from the population in a non-statistical manner including the most important and most representative cases among their categories. In the case of analysts, 40 senior economists from local and foreign investment banks, private organizations and associations representing the different sectors of the Peruvian economy, and heads of academic departments of Economics in local universities were chosen. In the case of non-financial institutions, the top 430 largest companies were selected from the list of the top 10 thousand Peruvian companies for 2001. The list gave the order of the companies by sales volume and provided information on each company's activities and the name and address of both the chief executive officer and the chairman of the board, which had to be updated.

b. How are the surveys conducted

The Central Bank´s surveys are monthly conducted by fax or e-mail. Every 15 of the month questionnaire attached to a letter from the Bank's Economic Studies Division Manager are sent to the list of financial and non-financial institutions as well as analysts of the private sector. In this letter the purpose of the surveys is stated; respondents are informed how and why they were selected; why their answers are important; the person to call if help is needed to complete the form is given; assurances of confidentiality are provided; the response efforts are presented as well and respondents are thanked for their cooperation while assuring them a date to deliver aggregate results. An alternative procedure of posting the questionnaire on the web site was evaluated and was discharged because it represented additional work for our surveyed.

c. Questionnaires

The questionnaire is designed for completion within a very short period of time. Respondents are requested to fill answers to a number of statements in the blank spaces. The number of questions per survey has steadily grown, from 4 in the first survey (July 1999) to 15 in the last one (July 2002) as in the case of financial institutions and from 4 in the first survey (October 2001) to 20 in the last one (July 2002) as in the case of non-financial institutions. All surveys have maintained the same 4 original questions so as to permit comparative analysis over time.

d. Data Collection

Essential to a good data collection phase is the monitoring of responses (and non-responses) and a continuing effort to get the responses. Special effort is displayed to get the same number of responses every month by calling the respondents and reminding them how important their answers are in the survey. A team of young economists previously trained to that end does this follow-up procedure. Generally, it is attempted to attain a response rate of 75 to 95 percent, which is the generally accepted standard of the survey research community. The response rate is generally 100 percent among financial institutions, and 80 percent among non-financial institutions. At the moment the Central Bank is working to increase the response rate among analysts of the private sector, which varies between 50 and 60 percent.

The result of having a short questionnaire along with a short reference period (that is the period for which data are requested), the application of follow-up techniques and the delivery of prompt results has produced an increasing number of participants in the surveys revealing the importance of macroeconomic variables among their annual forecasts, especially in the case of non-financial institutions.

Data Processing and Analysis

Data is processed analyzing one question at a time and looking for outliers or odd numbers. If necessary, calls are made to the respective bank, company or analyst that presented the uncertain data to verify the information received in order to avoid any random errors. The next step is to estimate certain statistical measures, such as the mean and median. The median was chosen over the mean as the most appropriate central tendency measure avoiding the influence of extreme values and the size of the sample. It represents a better measure of what any financial institution, analyst from the private sector or large company would expect to happen in the near future regarding inflation, exchange rate, GDP or interest rates.

For December 2002 inflation expectations of financial institutions are between 1.6 and 2.0 percent as seen in the tables below. Treasurers of financial institutions have not changed their expectations on inflation during the last 3 months but have increased their forecasts for exchange rate.

Table 8 – Macroeconomic expectations survey on Financial institutions
(Median[1])

	Surveys made in		
	May	June	July
Inflation (%)			
August 2002	-.-	-.-	0.2
As of December 2002	2.0	2.0	2.0
As of December 2003	2.5	2.5	2.5
Exchange rate (S/ per US$)			
August 2002	-.-	-.-	3.54
As of December 2002	3.50	3.53	3.55
As of December 2003	3.60	3.60	3.65
Interbank interest rate (%)			
In nuevos soles			
August 2002	-.-	-.-	2.9
December 2002	3.0	3.0	3.3
In US dolares			
August 2002	-.-	-.-	2.0
December 2002	2.5	2.4	2.4
Growth rate of GDP (%)			
June 2002	3.0	3.0	3.5
July 2002	-.-	3.0	3.0
August 2002	-.-	-.-	2.5
2002	3.0	3.0	3.0
2003	3.5	3.5	3.4

Expectations on inflation and on GDP growth have remained unchanged among the non-financial institutions while they have also increased their expectations on exchange rate.

Table 9 – Macroeconomic expectations survey on Non-finanbcial institutions
(Median)

	Surveys made in		
	May	June	July
Inflation (%)			
As of December 2002	2.0	2.0	2.0
As of December 2003	2.5	2.5	2.5
Exchange rate (S/ per US$)			
December 2002	3.52	3.55	3.58
December 2003	3.61	3.65	3.67
Growth rate of GDP (%)			
2002	3.0	3.0	3.0
2003	3.5	3.5	3.5

Among analysts, a lower inflation rate is expected (still within the Central Bank inflation target range) while a higher exchange rate is forecast by the end of this year. In the same direction they have adjusted their expectations on GDP growth from 3.0 to 3.2 percent for 2002.

Table 10 – Macroeconomic expectations survey on Analysts
(Median)

	Survey		
	May	June	July
Inflation (%)			
August 2002	-.-	-.-	0.2
As of December 2002	1.6	1.7	1.6
As of December 2003	2.3	2.1	2.1
Exchange rate (S/ per uS$)			
August 2002	-.-	-.-	3.54
December 2002	3.50	3.50	3.55
December 2003	3.57	3.60	3.64
Interbank interest rate (%)			
In nueves soles			
August 2002	-.-	-.-	2.7
December 2002	2.9	2.8	2.8
December 2003	3.5	3.5	3.5
Growth rate of GDP (%)			
June 2002	-.-	3.4	4.0
July 2002	-.-	-.-	3.0
2002	3.1	3.0	3.2
2003	4.0	3.9	3.5

Survey on business conditions

As part of the monthly macroeconomic expectations survey among non-financial institutions, the survey on business conditions, which started in April of this year, intends to provide the appreciations of the private sector with regard to the future development of economic activity. The table below shows that the percentage of Peruvian entrepreneurs that see a better situation 12 months ahead has improved over the previous month by 5 percentage points.

Table 11 – Survey on macroeconomic expectations and business conditions [1]
(As a percentage of total responses)

Survey Made in	Compared to the current situation, how would you expect the situation in:					
	the economy in 12 months?			your company in 12 months?		
	Better	Same	Worse	Better	Same	Worse
April	70%	19%	11%	78%	17%	5%
May	70%	21%	9%	76%	21%	3%
June	54%	28%	18%	66%	27%	6%

[1] *Sample of 430 top companies from all economic activities.*

B. Yield curves and forward exchange rate

Other financial data is being used to gather financial market information on inflation and depreciation expectations. Yield curve of domestic-currency securities usually provides important information about expectations on future interest rates and inflation. Therefore, in a partially dollarized economy, the creation of benchmarks for financial assets in domestic currency is important in order to assess economic agents expectations. The development of monetary operations of the Central Bank with its own certificate of deposits (called CDBCRP) has allowed the interest rate of these securities to become benchmarks for different maturities (up to one year) in domestic financial markets. Those benchmarks have been complemented by the recent development of Treasury Bonds in nominal terms (with maturities up to three years).

Graph 8 – CDBCRP and Treasury bonds (BTB) yields by term
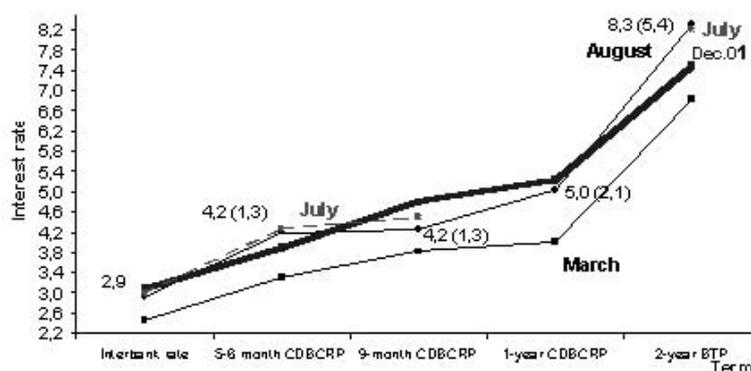
I/ Secondary market rates where data for primary market were not available. Figures in parenthesis indicates spreads over interbank rates.

In Peru, as in other emergent economies, the only relevant market of derivatives is the forward market of foreign exchange. Banks are the main suppliers in this market because of their adequate infrastructure and their participation into money and credit markets. In July 31 of 2002, forward sales and purchases balances were US$ 1 305 millions and US$ 328 millions, respectively. Data of amounts and quotes corresponding to forward transactions constitutes an important tool for the Central Bank in order to assess exchange rate expectations.

IV. Dollarization Assessment

A. Dollarization indicators

Peru is the first partially dollarized country adopting inflation targeting aimed at directly relating monetary policy decisions, based on an operative target, with the inflation outcome. There are three types of dollarization indicators: financial dollarization (financial sector's assets and liabilities dollarization), payments dollarization (known as currency substitution) and real dollarization (*pass-through* from depreciation to inflation).

Peruvian disinflation experience shows asset dollarization persistence recently observed cannot affect monetary policy independence when both real dollarization and payments dollarization are low.

- Low real dollarization: about 95 percent of prices used to calculate the CPI are set in domestic currency and so are residents' wages, so depreciation-inflation pass-through is only about 12 percent:
- Low payments dollarization: dollarization ratio of low-value transactions in cash machines is below 33 percent and has recently experienced a slight reduction (32.6 in 2000; 30.3 percent in 2001).

Table 12 – Cash machines operations
(Monthly average)

	2000	2001
1. Number of transactions		
a. In domestic currency (thousands)	6439	6908
b. In foreign currency (thousands)	1084.5	1188.8
c. Dollarization ratio [b/(a+b)]	14.4%	14.7%
2. Transactions' value		
a. In domestic currency (S/. millions)	981	1051
b. In foreign currency (S/. millions)	474	456
(US$ millions)	136	130
c. Dollarization ratio [b/(a+b)]	32.6%	30.3%

Both arguments favour monetary policy independency has been prevailing and disinflation goals were attainable. Both real dollarization measures (30-35 percent of transactions value) are much lower than financial dollarization ratios (70 percent of broad money and 78 percent of broad credits). An even stronger indication of low real dollarization can be gauged from depreciation-inflation pass-through estimates (about 12 percent).

B. Financial Dollarization Risks

There are two basic financial risks for a partially dollarized economy's central bank to monitor: (i) maturity mismatch between its assets and liabilities in foreign currency and (ii) currency mismatch between non-tradable-sector enterprises' cash flows and debts to the banking system (exchange rate risk).

- To prevent liquidity risk there is a reserve requirement on dollar deposits. Currently the average reserve requirement is 33 percent of deposits with a marginal rate of 20 percent.
- In the Peruvian case there are high standards of prudential requirements for the financial system in order to be able to face negative shocks on the quality of loans. The most important change in the regulatory regime for banks has been the introduction of counter-cyclical provisions (2000). In this way, in economic booms banks will have to make higher provisions, while in economic activity slowdowns provisions will be eased. This avoids pro-cyclical behaviour of banks and markets: they underestimate risks during boom time and overestimate them during recession.

V. Final Remarks

The Central Bank of Peru adopted an explicit inflation targeting framework at the beginning of 2002, becoming the first case of partial dollarized economy adopting this regimen. Under this new framework, the BCRP has implemented an inflation forecasting system to asses monetary policy stance. A small open economy like Peru faces not only challenges related to data quality and data collection, but also the challenge of processing relevant information (such as surveys of expectations), to assess future scenarios and making it available for monetary policy decisions.

Abstract

Peru has adopted an inflation targeting regime since January 2002. Under this scheme, the Central Reserve Bank of Peru (BCRP) manages its instruments and operational target (commercial banks' demand deposits at the Central Bank), according to forecasts about future pressures on the price level. This feature makes gathering leading information about inflation especially important for monetary policy implementation in Peru.

Under the new regime, monetary policy decisions require a broader set of economic indicators to assess future economic environment. This paper describes the Central Bank of Peru's main statistics-related features specific to prices, real activity, expectations and dollarization. The last topic is particularly relevant since Peru is the first partially dollarized country adopting an inflation targeting framework

It is worth mentioning that Peru is one of the subscribers of the Special Data Dissemination Standard (SDDS) since August 1996. The SDDS was established in 1996 to guide countries seeking access to international capital markets in the dissemination of economic and financial data to the public. Currently, 49 of 50 subscriber countries are in full observance of the SDDS, a system that demands high quality and transparency in the elaboration of economic and financial statistics through the set up of 4 dimensions: data coverage, periodicity and timeliness; access by the public; integrity and quality. It should be noted that this system is permanently in revision in order to enhance good statistic practices.

As a conclusion, a small open economy like Peru faces not only challenges related to data quality and data collection but also the challenge of processing relevant information to assess future scenarios for monetary policy decisions.

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New challenges for a central bank under dollarization: the experience of Ecuador[1]

Amelia Pinto (Central Bank of Ecuador)

I. Introduction

The Central Bank of Ecuador (CBE) is an institution under public law established for an indefinite duration. It is a technical, autonomous agency responsible for implementing monetary, financial, credit and exchange policy. Under the reforms introduced in the March 2000 Law for the Economic Transformation of Ecuador, the monetary system is based on the principle of full U.S. dollar circulation. The CBE is not empowered to issue new sucres banknotes, but can mint subsidiary coins, which have been placed in circulation only in exchange for the sucres banknotes that were in circulation or U.S. dollar banknotes.

This institution has traditionally been strong in statistics, since its founding in 1927. Macroeconomic statistics are the responsibility of the CBE, which has a robust Economic Statistics Department, in the General Directorate of Studies. It compiles balance of payments, monetary and financial, public financial and national accounts statistics. It is also responsible for merchandise trade statistics, labor market statistics, private-sector conjuncture surveys and economic previsions for the economy.

Most of the information prepared by the Central Bank is disseminated on its web site *(http://www.bce.fin.ec)* and is available in the CBE's weekly, monthly, quarterly and annual publications. The department also prepares and disseminates methodological publications about the data, in *"Cuadernos de Trabajo"* and other publications to help users interpret the information.

Before the decision to dollarize the economy, most statistics were compiled and published in sucres, the national currency. At present, only national accounts are prepared and published in sucres, but the Statistics Department is investigating, with French cooperation, the methodology to dollarize those data, as well.

Regarding legal aspects, Monetary Board Regulation No. DBCE-097-BCE of May 16, 2001, and Executive Decree No. 1589 (published in Official Registry No. 356 of June 13, 2001), stipulate that the CBE must compile and publish, on a timely basis information on monetary, financial, fiscal, external and real statistics; and prepare the statistical synthesis and previsions for the real sector.

a) Subscription to the Special Data Dissemination Standard (SDDS)

The CBE has always shown interest in compiling its statistics according to recommendations by international manuals prepared by statistical organizations, receiving expert technical missions and training staff members to continuously improve data quality. Accordingly, the CBE was interested in subscribing to the IMF's Special Data Dissemination Standard (SDDS) (March 28, 1998). For some years previously, work had been undertaken to assure the data dissemination and to meet the SDDS requirements. Some months later, Ecuadorian metadata were posted on the IMF's Dissemination Standard Bulletin Board (DSBB) (September 14, 1998).

That is the reason why the CBE made considerable efforts to compile labor market statistics in accordance with the SDDS requirements, as the National Institute of Statistics and Censuses (INEC) was publishing labor market statistics twice a year with a timeliness of several months. Agreements between the CBE and the Universities of Cuenca, Guayaquil and Quito have enabled us to bring out monthly labor market surveys since 1999 with a timeliness of only one month.

The leadership of the CBE, with the help of the INEC, the Ministry of Economy and Finance (MEF) and the universities, enabled a small country such as Ecuador to subscribe to the SDDS and to meet the international requirements regarding the standard dissemination.

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1 *Prepared by Amelia Pinto, Economist, Economic Statistics Department, CBE, for the Conference on "Challenges to central bank statistical activities", Basel, 20 - 22 August 2002.*

Many other aspects have been improved to prepare not only data but also some legal aspects necessary to subscribe to the SDDS. In fact, a code of conduct, with a calendar for data dissemination, has been prepared and published on the CBE's web site, every January, so users can know in advance the precise date when data are going to be released. This instrument has contributed to organizing the work inside the department and to strictly meeting release deadlines. The transparency of data is very important for the CBE and the information is published for all interested parties at the same time, on CBE's web site and in hard copy a few days later.

The legal basis for compiling and publishing of CBE's data is the Statistics Code of Conduct: "Norms for production and dissemination of CBE statistics". This code establishes guidelines for the compilation and dissemination of macroeconomic statistics[1].

Ecuador was the thirtieth country to meet SDDS requirements, on July 14, 2000. Since that date, all information has been disseminated on time, in accordance with the advance release calendar prepared for the IMF.

There is a link on the CBE web site *"Normas Especiales para la Divulgación de Datos del FMI"* (IMF's Special Data Dissemination System) where users can access the National Standard Data Page (NSDP) for Ecuador in English (and in Spanish, so local users can access to information in their own language). There is also the background information about how Ecuador has subscribed and met the SDDS requirements and a link to Ecuador and other countries of the DSBB.

b) The ROSC Mission in Ecuador

The CBE authorities are interested in data quality, particularly at the present time, when they need to have the most accurate information in order to design economic policies to stabilize the economy. Accordingly, in April, 2002, the CBE received a Report on Observance of Standards and Codes (ROSC) mission from the IMF's Statistics Department to evaluate the quality of Ecuadorian data. National accounts, price indices (consumer and producer), balance of payments, public finance and monetary and financial statistics were evaluated, based on the Data Quality Assessment Framework (DQAF) of the IMF. This framework considers five dimensions of quality: integrity, methodological soundness, accuracy and reliability, serviceability and accessibility.

The conclusions of the ROSC mission are as follows[2]:

- Ecuador observes all SDDS requirements; it meets SDDS specifications for coverage, periodicity, and timeliness of data and for dissemination of advance release calendars. In some cases, the periodicity and/or timeliness exceed SDDS requirements.
- The quality of most statistics, in general, is good, but some (particularly public finance) don't disseminate enough detail to make possible an exhaustive fiscal analysis or timely situational follow-up. National accounts series are not available in dollars at present. However, work has been undertaken to improve these statistics. There are data base insufficiencies and the method used to estimate some balance of payments transactions and the sectorization of bank accounts present some problems.
- The CBE is in charge of preparing and disseminating most of macroeconomic aggregates. An open disclosure policy allows the public to access this information by hard copy and on the CBE web site. Nevertheless, the statistics will be more useful if the CBE introduces some improvements in coverage, availability of metadata (information about methodology, statistical techniques, and data base) and data presentation.
- To achieve continuous improvement in macroeconomic statistics and efficiency of preparation, it would be necessary to give priority to a national statistical policy, modernize the Statistical Law and formalize the cooperation links between the CBE and the Ministry of Economy and Finance for compilation of fiscal statistics.

This mission will help the CBE improve data quality according to international standards, especially in the aspects of implementing a data review policy and an ongoing users survey. The statistical department has conducted users surveys but not regularly. The information collected by the surveys will help the CBE consider users' actual needs and match our statistical products to those needs.

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1 *These norms are available on the CBE's website.*
2 *These conclusions are taken from the first draft of the April, 2002 ROSC mission and are subject to change. The CBE is waiting the mission's last version and the revised version will be posted on the IMF's website, and an abstract in Spanish will also be published on the CBE's website.*

II. The experience of the CBE: principal changes in statistics due to dollarization

Since January 2000, the greatest challenge of the Statistics Department has been to compile and calculate economic statistics in dollars. At that time, most statistics were compiled and published in sucres, the national currency.

a) Monetary and financial statistics:

The foremost difficulty was to calculate international reserves, and especially, to distinguish the most liquid reserves. In dollarization, this aspect is particularly important because international reserves are considered as the economy's cash. The CBE also took advantage of the opportunity to compile the data in accordance with the guidelines of the IMF's Monetary and Financial Statistics Manual (2000).

Because the economy of Ecuador is dollarized, currency issue is no longer a function of the Central Bank, except for the limited amount of subsidiary coins in circulation. Consequently, traditional monetary aggregates are no longer useful indicators of economic policy. Similarly, owing to the difficulty in measuring the amount of dollars circulating in the economy, which come from different sources of income, the narrowly defined money supply (M1) cannot be calculated.

The following are derived from analytical accounts of the financial system:
• Currency in circulation: subsidiary coins issued by the CBE held by the public.
• Demand deposits: the broadly defined money supply includes private-sector demand deposits with the banking system, monetary deposits of non-financial public enterprises and local governments with the CBE.
• Quasi-money: includes savings deposits, time deposits, restricted deposits, repos, and other deposits.

The CBE's monthly statement of analytical accounts describes the country's external position, and money and credit activities; it provides balances in millions of dollars.

The analytical structure of the monetary accounts of the central bank is as follows:
• Financial liabilities, consisting of subsidiary coins placed in circulation in exchange for U.S. dollars, required and voluntary deposits of the public and private financial system with the Central Bank, and monetary deposits of local governments, non-financial public enterprises, and the private sector with the Central Bank.
• Net domestic assets, consisting of net credit to the central government, net credit to social security funds, credit to the financial system (monetary corporations, other deposit corporations, and financial intermediaries), credit to the private sector, and unclassified net assets.
• Net foreign assets, consisting of international reserves (freely available assets on non-residents) and other reserve assets.

b) Public finances[1]

Data are compiled on the basis of the Government Finance Statistics Manual published by the International Monetary Fund in 1986 and subsequent recommendations issued by the IMF.

The government finance information system records general government operations, and the analysis focuses on non-financial public sector economic transactions as reported in their budget implementation documents. Revenue is divided into tax and non-tax revenue and transfers, while expenditure is divided into current and capital expenditure and transfers. The balance corresponds to the deficit/surplus of the non-financial public sector above the line. Financing of the deficit or application of the surplus is presented in net external financing and domestic financing.

On January 10, 2000, Ecuador dollarized the economy. Since February 2000, the exchange rate of 25,000 sucres per dollar has been used to convert operations from sucres into dollars. For time series flows, the CBE's average monthly selling rate on the intervention market was used and for stock time series the selling exchange rate on the intervention market at the end of the period.

Data on general and central government operations are prepared and published by the CBE. The data base on central government operations comes from the Ministry of Economy and Finance and the other data bases for the general government are provided directly by other public entities.

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1 *The CBE publication: "Estadísticas de finanzas públicas en el Ecuador: 1971–1999" (Financial public statistics in Ecuador: 1971-1999), Cuadernos de Trabajo No. 128, Quito, 2000, illustrate the methodological changes for these statistics.*

c) Balance of payments[1]

Quarterly and annual data are disseminated in millions of U.S. dollars showing the following analytical components: the current account balance (exports and imports of goods; exports and imports of services; net income account; net current transfers) and the capital and financial account (net capital account, foreign direct investment, portfolio investment, other investment with a further breakdown in assets and liabilities, and net errors and omissions). It also includes the global balance of payments and the financing broken down into reserve assets, use of Fund credit and exceptional financing.

The CBE also prepares and publishes the standard balance of payments presentation. The annual International Investment Position is also prepared and released in millions of dollars, since June 29, 2002.

Ecuador's quarterly and annual balance of payments are recorded in millions of U.S. dollars as prescribed by the fifth edition of the IMF Manual of 1993. Most of balance of payments transactions are recorded originally in dollars, as in the case of foreign trade, the external debt, and international reserves. Until March 2000 (that is, before Ecuador adopted the dollar as its currency), for all other operations the average (of the buying and selling rates on the free market or official market was used), depending on the type of operation, for converting sucres to dollars.

The data are compiled according to the methodology of the fifth edition of the IMF Balance of Payments Manual, since November, 2001.

d) National accounts[2]

The CBE is completing the task of changing the base year (1993 = 100) for annual national accounts and incorporating the recommendations of the most recent version of the System of National Accounts (SNA 1993) Manual.

Ecuador's national accounts include all the central framework, proposed by the SNA93: input-output tables for goods and services (at current and constant 1993 prices) and the integrated economic accounts for institutional sectors, with all the accounts recommended by the Manual: current and accumulation accounts and balance sheets. The national accounts have been prepared for the Central Bank since 1977, with the help of French experts and funding, with some methodological improvements proposed by the European System of Accounts (1977).

At present, data on annual national accounts are prepared and published in sucres. Work has been undertaken to transform national accounts into dollars, but this work is not easy, as we have found difficulties, especially in the relative prices of most goods and services. There is also a problem with stocks, which must be valued in dollars at an exchange rate that increases constantly, while stocks in dollars dwindle. French cooperation is supporting research and analysis with local experts to find a methodology to dollarize Ecuador's national accounts.

Ecuador's tradition regarding quarterly national accounts is interesting. Since 1987, with the help of French experts, the CBE begun to prepare quarterly national accounts data in constant 1975 sucres by expenditure category (household consumption, government consumption, gross fixed capital formation, changes in stocks, and exports and imports of goods and services) and by economic activity (11 branches, using a classification system broadly consistent with the 33 branch breakdown used in the annual national accounts). At present, this information is also available in current sucres. When national accounts in dollars are available, quarterly national accounts will be prepared and disseminated in that currency.

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1 *Regarding the balance of payment methodology, the CBE has published the following documents: "La balanza de pagos de Ecuador: notas metodológicas y resultados (año 1993)" (Ecuador's balance of payments: methodological notes and results (1993 year)) in Cuadernos de Trabajo No. 124, August 2000 and "La balanza de pagos del Ecuador serie 1993-2000" (Ecuador's balance of payments 1993-2000 series), October 2001". The publication "Las remesas de ecuatorianos en el exterior" (The Ecuadorian remittances from abroad), Cuardernos de Trabajo No. 130, August, 2001, provides information about this important new flow of current transfers from abroad.*

2 *Most of Cuadernos de Trabajo publications are methodological notes on national accounts. The most recent ones, "Los sectores institucionales en la contabilidad nacional ecuatoriana" (Institutional sectors in the Ecuadorian national accounts", Cuaderno de Trabajo No. 120, October, 1999; "Cuentas nacionales del Ecuador 1993. Cambio de año base y adopción del SCN93" (1993 National Accounts of Ecuador. Change of base year and adoption of the NAS93), Cuaderno de Trabajo No. 121, April, 2000; "La cuenta satélite del sector petróleo" (The satellite account of the petroleum sector), Cuaderno de Trabajo No. 122, May, 2000; "Las clasificaciones de industrias y de productos del Sistema de Cuentas Nacionales 1993 aplicadas a la economía ecuatoriana" (Industry and product classifications for the 1993 National Accounts System applied to the Ecuadorian economy), Cuaderno de Trabajo No. 126, October, 2000; and "Propuesta metodológica para la elaboración de las Cuentas Provinciales del Ecuador" (Methodological proposal for preparation of the Provincial Accounts for Ecuador), Cuaderno de Trabajo No. 129, May, 2001.*

e) Other statistics

Monthly data on merchandise trade have always been compiled in dollars. If the data are transacted in another currency, the exchange rate of the day will be used to transform the other currency into dollars. Export and import data are available on the CBE's web site with detailed information by product and by country, in thousands of dollars.

In the case of the conjuncture surveys for the private sector, since March 2000, the information is compiled in dollars. Quarterly surveys include the agriculture, manufacturing and construction sectors. The CBE also compiles monthly information gathering opinions from the managers of mayor companies and publishes the findings on its web site. This is an indicator about private-sector activities which is very important to monitor a dollarized economy.

Economic previsions are prepared in current and constant 1975 sucres, at present time. When the transformation of national accounts is completed, economic previsions data will be compiled and released in dollars.

III. New challenges for the future[1]

The dollarization regime has made it possible to introduce a confidence shock into the Ecuadorian economy and reduce exposure to international turbulence derived from exchange volatility. However, the CBE has lost the capacity to conduct monetary policy, and there are fewer instruments available to protect the economy from any negative impact that could affect aggregate demand. It is necessary, for instance, to have solid structures as a shield from internal and external imbalances, to guarantee ongoing appropriate inflow of currency.

Experience shows that selection of an optimal exchange regime is not enough to assure stability or economic growth over time. Moreover, under dollarization, the effort necessary to achieve those goals is more complex.

The CBE must accomplish its institutional mission to "Guarantee operation of the monetary regime of dollarization and promote country's economic growth" by developing a strategic agenda, including the following objectives:
• Promote the sustainable economic growth in the time.
• Strengthen the financial system through new financial architecture.
• Enhance the country's levels of productivity and competitiveness.
• Insert the country into the global economy.

These core issues have been selected in response to the macroeconomic rationality that views dollarization as a dynamic process involving all stake holders and requiring certain minimal conditions. These issues are closely interlinked with each other in a kind of virtuous circle.

The CBE has coordinated this effort with other institutions such as the Ministry of Economy and Finance, the Superintendence of Banks, the National Council on Competitiveness and also private-sector participation (chambers of financial institutions, banks, cooperatives and microcredit) and non-governmental organizations.

For each goal, economic information is essential to measure the activities achievements.

a) Economic growth

Economic growth is essential for policy makers in most economies. This variable has significant economic policy implications for present and future people's welfare and other economic variables. Therefore, the CBE has included this important subject in its strategic agenda.

Much research will be undertaken: a study on the economy's potential growth to estimate the mid- and long-term GDP trend, based on national accounts data. Also it is crucial to monitor the equilibrium real exchange rate, in order to evaluate potential external sector imbalance.

All available macroeconomic information is important to measure economic growth: annual and quarterly national accounts, price indices, labor market statistics, monetary and financial statistics, etc.

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1 *The Conference "Agenda económica del Banco Central del Ecuador" (Economic Agenda of the CBE), was organized by the CEMLA and the CBE, to celebrate the CBE's 75th anniversary, in Quito, Ecuador, 5 - 6 August, 2002. The CBE's paper: "Una propuesta de plan estratégico de desarrollo de largo plazo para el Ecuador" (A proposal for a strategic long-term development plan for Ecuador) was presented during the conference, Quito, July, 2002.*

b) New financial architecture for Ecuador

Financial system strengthening is based on a new financial system architecture for Ecuador, involving both private and public institutions.

The new architecture must meet two lines of demands:
• Long-term national development.
• Strategic insertion into the international economy, under the new global and regional conditions facilitating not only financial system internationalization but also the country's effective integration.

These goals can be summarized in the following points:
• Reach financial deepening.
• Extend the financial services to all sectors of the population.
• Overcome the structural problems of credit market segmentation.
• Help move savings toward productive investment.
• Enhance the efficiency of market stakeholders.
• Reduce moral risk and adverse selection.
• Strengthen the financial security network.

To achieve these goals, the Statistic Department must play an active role by providing all the information that will be needed and preparing new data to evaluate the current and future situation of the financial system. The CBE has an agreement with the Superintendence of Banks, which allows to work with the data base provided by this entity. This information is used by the CBE to produce monetary and financial statistics for Ecuador. This data base will also provide information to prepare new indicators – such as leading indicators – appropriate to measure the performance of financial institutions. It is very important to establish a data base of financial system borrowers and to evaluate according to the sectoral economic growth the likelihood that loans will be repaid.

The current project to sectorize financial system accounts will also make it possible to identify operations with residents and non-residents and by institutional sectors, with national accounts classification. This new information will be very helpful to evaluate the operations of financial institutions.

c) Productivity and competitiveness

Productivity and competitiveness are essential for the economy in order to guarantee the influx of dollars. Therefore, the CBE is researching this subject and preparing indicators for situational analysis.

Effective competitiveness is the capacity to produce high-quality goods and services efficiently. For instance, competitiveness is based in improvements in productivity (reductions in real costs) and improvements in quality and the variety of goods and services produced. This kind of competitiveness must be encouraged and measured by the CBE.

The CBE has prepared and published an overall competitiveness indicator, the Competitiveness Trend Index (CTI) with quarterly and annual periodicity[1]. It has also compiled an Index about actions to enhance productivity. The CBE is also preparing quarterly and annual indicators to measure productivity and competitiveness by economic sectors, based on merchandise trade and national account statistics. This information will be available the first week of September, 2002[2].

Other research includes an analysis of the labor market, relationships between market concentration and productivity and sectoral studies for key sectors of the economy. Coordination with economic statistics is important to produce those research inputs.

d) Insertion into the global economy

Adequate, equitable insertion of Ecuador into the world economy can increase income and contribute to raising the population's standard of living, as long as there is a feedback process increasing the country's international commercial, financial and technological participation.

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1 *The CBE publication "Boletín de Competitividad" (released in July, 2002) and methodological notes about the index are available on the CBE website.*
2 *Those data are being prepared with the national accounts using the new base year of 1993 and the SNA93 recommendations. This will update the CBE's study: "La competitividad del comercio exterior y la especialización productiva en el Ecuador: 1970-1996" (The competitiveness of merchandise trade and productive specialization in Ecuador: 1970-1996), in Notas Técnicas No. 29, April, 1996.*

It is, for instance, essential to identify an agenda for a healthy process of integration, based on a diagnosis of institutional, legal, productive and financial conditions, in order to identify the necessary prerequisites to formulate growth and negotiation strategies for international fora.

Our research includes studies about merchandise trade and the direct investment trends, a review of customs tariff policy and reforms, an analysis of the current status and prospects for regional, bilateral and multilateral trade commercial negotiations, and an analysis of the institutional framework for Ecuadorian foreign trade.

Active participation by the Statistics Department will help achieve these activities, as the CBE has all the information about merchandise trade and direct investment. National accounts will also be helpful for this research.

The relationship between the Statistics Department and other departments of the General Directorate of Studies, (Policy and Research) is very close. All activities are coordinated, and economic information is produced as needed.

IV. Conclusions

The CBE has traditionally been a strong statistical entity, providing the main macroeconomic statistics on Ecuador's economy. Its human and technological resources enable the CBE to respond queries by other private and public institutions on many subjects, especially in those aspects where the CBE presents advantages, such as data treatment, compilation techniques, use of specialized software, etc.

Due to dollarization, the monetary policy actions are limited and some monetary and financial statistics are not prepared anymore, particularly the M1. However, this has not reduced activities in the Statistics Department, or the monetary and financial department. On the contrary, many other activities have been undertaken to monitor the economy.

The CBE takes advantages of available data on merchandise trade, external debt, financial and other data bases (through agreements with other entities such as INEC and Superintendence of Banks and Companies). This information enables the CBE to produce macroeconomic statistics in accordance with the requirements of economic policy makers and the economic researchers, inside the CBE, and external and international organizations and users. The CBE has a good relationship with the National Statistical Institute and other public and private entities, which guarantees an adequate data flow for the CBE statistics.

However, a new challenge to the Ecuadorian statistical system is to prepare a new Statistical Law, with the input from all private and public institutions that compile economic statistics. The most important issue is to make it mandatory for these entities to provide the requested information. Under the current law, enforcement is so insignificant that statistical agencies depend on the good will of the information providers.

Another challenge for the Statistics Department is to provide the information required by other Departments of the General Directorate of Studies according to the CBE's strategic agenda. Workshops attendance has always been heterogeneous, with active collaboration by researchers, policy makers and statisticians. This has led out a new vision and better results, because they all contribute their special strengths to achieving overall.

Other important challenge for the Statistics Department is to optimize the mechanisms to disseminate statistical products via the web site and hard copy instruments. This explains the change in our web site's layout, by sectors rather than publications. With this new arrangement, users will find all the information relevant to the requested subject, independently of the publication source or data periodicity.

However, the CBE is still concerned that new users should be able to use information and that old users should have no difficulty to assimilating changes in publication formats and contents (due to the methodological changes recommended by international agencies, for example). To solve this problem, the Statistics Department is designing a product dissemination strategy involving presentations to media, researchers, students and the general public. These actions will enhance the statistical culture which enjoy most developed countries.

Transparency dissemination is not enough. Creative new mechanisms must be developed to increase the number of statistical users who can use our data and contribute to analyzing and solving the problems of Ecuador's economy.

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The value of discrepancies

Grazia Marchese[1] (Banca d'Italia)

Introduction

The completion of the ESA95 Manual represents a milestone for European national accounting. The Manual fully incorporates the principles put forward by the revised System of National Accounts (SNA93), adding valuable specifications to the concepts and definitions thereby laid out, to the benefit of a "true" and viable cross-country harmonisation of a set of statistics – the national accounts – whose importance is crucial for economic analysis and policy-making.

The main feature of the ESA95 Manual, inherited from the SNA93, lies in its capability to offer an accounting description of the economic system which is complete, internally coherent and fully integrated. This goal is achieved by setting the rules for defining, recording and evaluating economic transactions in such a way that a logical sequence of accounts can be constructed, whereby, at each stage of the accounting cascade, the balancing item of one account is, at the same time, the opening item of the following account. Since the financial account is the last one in the sequence of transaction accounts, its balancing item is not carried forward to another account: it is identical to the balancing item of the preceding one, namely the capital account[2].

In the ESA95 world, the theoretical equivalence between capital and financial balances is the core of the system. Since the two accounts are derived separately, the extent to which the two balancing items actually differ gives as a synthetic information about the overall consistency and soundness of the sources and methods applied to compute the various components of the system.

In such a world, "discrepancies" are symptoms of "weaknesses", so that statisticians may have a strong incentive to minimise their amount. Of course, the existence of discrepancies reveals the existence of methodological weaknesses, while the non-existence of discrepancies is not necessarily a proof of methodological soundness. While the willingness to reduce discrepancies could be seen a desirable feature "per se", acting as a North Star on the way to Accurateness, the desirability of the outcome is conditional to the nature of the reaction from the compilers. Statisticians could react in a perverse way, by simply obscuring the light coming from the North Star. As an extreme example, they could force the equality between the two balancing items by spreading observed discrepancies over the various components of the system in some way or other. Just this behaviour would produce results that, while being cosmetically perfect, could actually be light-years distant from economic reality.

Most likely, the risk of such undesirable outcome was not disregarded by the authors of the ESA95 Manual themselves. In § 5.15 a sentence can be found that mitigates the pressure on compilers stemming from the demanding conceptual scheme of the accounts: *"In the system the balancing item of the financial account is identical with the balancing item of the capital account. In practice, a discrepancy will usually be found between them because they are calculated on the basis of different statistical data".* The same assumption was considered by the legislator in designing the financial account tables to be transmitted to Eurostat, where a line for recording sector discrepancies vis-à-vis capital account balances is explicitly inserted.

We argue that, quite apart from legal requirements, there is a value in discrepancies: these are a powerful tool for compilers as well as for users of national account statistics by sector to evaluate the degree of confidence that can be attributed to the data. Such information could then be used by data producers to investigate, when necessary, possible ways to increase the accuracy of the estimates, and by researchers to properly consider the effects of data uncertainty on proposed analysis and policy implications.

Furthermore, the "value" of discrepancies would be the bigger, the more transparent are statistical practices behind them: statisticians could well have good reasons and good methods for

bringing capital and financial balances close to equality and hence to show limited or no discrepancies between the two, but the reader of the results should be given the possibility to formulate his own opinion on them and to properly distinguish between genuine and seeming consistency across the system of accounts, a fact that, in turn, would itself be beneficial to further progress in methodology.

1. Discrepancies: an old and honourable story.

Just to counterweight any excessive uneasiness about discrepancies, it could be useful to recall that a rigorous framework linking non-financial and financial accounts is a relatively recent achievement in the history of economic statistics. The first attempt to design a comprehensive system was actually realised by the SNA68 and it took 25 years to be brought to full consistency, with the publication of the SNA93.

The modern predecessors of the two sets of accounts – the SNA47 for NA and the *Moneyflows* by Morris Copeland (1952) for the FA – date back to decades before the first analytical reconciliation effort was made. Furthermore, the developments of the national accounts and that of the financial accounts were driven by distinct policy needs and were consequently sponsored by different agencies.

The conceptual framework of the SNA47 was shaped by the information needs of the Keynesian policies. Their widespread penetration after the second World War favoured the development of the national accounts system in a context of international standardisation, under the aegis of the United Nations. The predominant role attributed to fiscal policy in achieving macroeconomic equilibrium explains the main features of the system at that time: the distinction of productive units between those belonging to the "public administration" and the "enterprises"; the definition of production in terms of final aggregate demand components and, as a consequence, the recording of transactions at their market value on accrual basis.

On the other end, Copeland's *Moneyflows*, although coming after the SNA47, were largely based on pre-Keynesian theoretical references. The main interest behind their construction was to understand the influence of monetary variables on the economic cycle and to investigate the discretionary role of the banking system in allocating financial resources. The intimate linkages with the functions of the central banks are pretty clear. As a consequence, central banks were actually the institutions that, up to the seventies, gave most impetus to the development of the financial accounts. Their compilation process was organised around the data sources typically available to CBs for monetary and supervision policies. It is still deeply rooted on them nowadays. Analytically, the focus of the system was placed on the distinction between intermediaries and other economic agents. These, in turn, were further classified according to their attitude to expand their ordinary monetary expenditure by financing them trough additional borrowing; to contract monetary expenditures by accumulating net lending; or to have a passive role in the process. The central role played by monetary transactions also explains the lack of any attempt to isolate final from intermediate transactions or to measure imputed transactions; the preference for non consolidated accounts; the recording of flows on a cash basis.

To summarise, over the past decades the differences in sources and methods used to compile real and financial accounts – and the resulting discrepancies between the respective sector balances – can be viewed as the legacy of the different policy objectives and institutional actors that originally drove the development of the two statistical systems. The task of establishing a comprehensive theoretical framework linking together the two sets of accounts, firstly pursued by the SNA68, accelerated afterwards. At the European level, the ESA79 Manual already incorporated substantial progress in this field; however the compilation methods and sources actually used, as one could have expected, were adjusted only with a lag. The advent of the ESA95 Manual, having the status of an EU Regulation, marked a turning point even in the implementation process.

2. The causes for discrepancies

This paragraph attempts to define a taxonomy of the causes for discrepancies. Given the large number of items that contribute to each sector's capital and financial account balances, and taking also into account the possible interrelations among them, a list of possible causes could help in addressing efforts to reduce discrepancies.

Let us consider two different states of the world: state1 is the world before the implementation of ESA95; state2 is the world after the implementation of ESA95.

Under state1, a possible, and perhaps incomplete, list of causes could be the following:
- systemic deviations:
  - non-matching theoretical definitions between real and financial transactions
  - non-matching definitions of the sectors between real and financial accounts
  - different recording of transactions
  - different valuation criteria
- failures in the compilation process
  - measurement errors
    – wrong input data
    – sampling errors
    – estimates based on erroneous assumptions
    – omissions
  - use of different sources
    – differences in coverage
    – differences in periodicity/timeliness
  - differences in revision policies

Under state2, the first four causes for discrepancies are no longer there. Actually, in state1 they originated from the lack of internal consistency of the theoretical framework, while in state2 such consistency is achieved. Of course, the mere fact that the theoretical scheme requires consistency does not imply that such consistency is automatically reflected in the data. For example, erroneous sector classifications of units might well occur under state2, but they would represent a sort of measurement error and not a source of systemic deviation of the capital account balancing item from the corresponding financial accounts balancing item.

While the importance of the first two systemic causes for discrepancies could have been limited even in state1, certainly the third and the fourth were significant. To give some examples, in the case of the Italian financial accounts, recording medium and long term bonds issued by the Central Government on an accrual instead of on a cash basis, and using market prices instead of face values, would have increased the assets of the institutional sector "Households and NPISHs" by 3 per cent; considering accrued liabilities of the same sector for taxes and social contributions would have increased its liabilities by 67 per cent. The net effect on the sector financial balance would have been a reduction in the surplus by more than 8 per cent (5.5 millions).

As a consequence of the removal of the first four causes listed above, under the assumption that data sources did not change much from state1 to state2 and that statistical methods had a similar soundness, one should expect a reduction in observed discrepancies in state2 with respect to state1. If discrepancies turned out to be no smaller in state2, two different explanations could be envisaged. One possibility is that, while in state1 systemic deviations partially compensated for measurement errors and other failures in the compilation process, now such failures appear clearly in the data. A second possibility is that sources and/or methods under state2 are of a less good quality than under state1.

In the first case, the scope for a revision of sources and methods, in order to detect and possibly reduce existing failures in the compilation process, would depend on the amount of residual discrepancies. If they were small, the North Star could well be obscured, provided that discrepancies are spread over the various components of the system in a way that avoids altering the quality of the data. In the second event an accurate and systematic revision of sources and methods would be mandatory.

3. A look at the data.

This paragraph gives a first review of the data. Due to time constrains, only a limited set of available data from the national and financial accounts of the European countries was considered. This, in turn, limited the choice of indicators that could be used to measure the importance of discrepancies and reduced the spectrum of comparative analysis under several dimensions. Furthermore, both the national and the financial accounts data, especially those produced before the switch to ESA95, may not correspond to the most accurate "vintage" actually available for each country (i.e. the latest published)[1]. As a consequence, results should be considered as preliminary and should be

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1 *The data produced prior to the implementation of ESA95 were taken from Massaro-Di Giacinto (1999). The data produced according to the ESA95 methodology were mostly drawn from Eurostat-Newcronos; for some countries (Denmark, France, Finland, the Netherlands) revised and/or supplementary figures were kindly provided by the national experts.*

used as a reference point for discussion rather than as conclusive evidence from which to derive clear-cut conclusions or methodological recommendations.

3.1. The dicrepancies before and after the implementation of ESA95.

The comparison between pre-ESA95 and post-ESA95 discrepancies is carried out only for Italy and the United Kingdom; for the latter country only two sectors are considered: Non-financial corporations (NF) and Households including NPISHs (HT).

Table 1 shows for the two countries the differences between capital and financial balances at sector level (in millions of ecu/euro) before and after ESA95. For Italy, pre-ESA95 data for the Rest of the World (ROW) differ from those presented in the national publications. The methodology followed at that time forced the ROW financial account balance to be equal, and opposite in sign, to the BOP current account balance (excluding net capital transfers), while under ESA95 the two sets of accounts are derived independently. To properly compare discrepancies, in Table 1 the pre-ESA95 ROW financial account balance is shown before the statistical adjustment just described.

In the case of Italy, over the three years for which both pre and post-ESA95 data are available, only the sector "General Government" (GG) shows a marked reduction of the discrepancy under the ESA95 methodology. Some improvement is also evident for the ROW, albeit the 1997 discrepancy is actually bigger under ESA95. For the sector "Financial Corporations" (FC) a remarkable reduction is only achieved for 1997, while for the previous two years the discrepancies actually increase. For NFs a better result is also evident only for 1997, while for HTs and FCs the situation is clearly worse under ESA95.

Since in a number of cases the methodology for financial accounts makes use of estimates to split assets and, to a lesser extent, liabilities between NFs and HTs, a further row is added to consider the sum of the two (PS = Private non-financial Sector). For Italy, the PS discrepancy shows a substantial reduction in 1997 under ESA95. Considering that, for several items of the financial accounts, the PS's assets/liabilities are obtained as a residual and that 1997 is a fairly good year for the discrepancy of the other sectors, this evidence suggests that the methodology used to split between corporations and households may be a candidate for further revisions and improvements.

Looking at the whole time range available for pre and post-ESA95 data one gets broadly the same picture: across time, both the largest and the smallest sector discrepancies are lower in post-ESA95 data for GG, ROW and NFs; for the first two sectors the average of the absolute values of the yearly discrepancy is also lower for post-ESA95 data. The opposite is true for the remaining sectors.

To summarise, in the case of Italy, the comparison between pre and post-ESA95 discrepancies gives a mixed picture: the new data show a better consistency only for three out of five sectors, though a significant improvement is apparent only for one sector; furthermore, discrepancies for the remaining sectors deteriorate considerably, mostly for the FCs.

For the UK, only two overlapping years are available for the two sets of data. They show a reduction of discrepancies as a result of the implementation of ESA95 both for the Non-financial corporations and the Households, with remarkable improvements especially for the first sector. Also for the UK there seems to be evidence of misallocation between the two sectors, especially for pre-ESA95 data, where discrepancies always have opposite signs and compensate almost entirely in 1995. Over the whole time range, however, consistency seems to be greater for ESA95 data only for the NFs, for which the average of the absolute annual discrepancies is lower than for pre-ESA95 data, while the opposite is true for HTs.

The evidence described so far, albeit limited and far from conclusive, doesn't seem to support the hypothesis that, for the two countries considered, ESA95 accounts are, overall, strikingly better in terms of internal consistency.

3.2. Focusing on ESA95 data.

In what follows, an attempt is made to conduct a more comprehensive review of ESA95 data, examining observed discrepancies between capital and financial accounts for twelve EU countries.

A difficulty that has to be faced in examining discrepancies and comparing them across sectors and countries is to find a way to summarise them compactly. In the literature discrepancies are commonly represented as ratios to GDP or to the sectors' gross saving. Using GDP as the denominator is useful for cross-country comparison, but it has the same information value as the pure

Table 1 – Discrepancies between capital and financial account balancing items

(1990-1998: Ecu millions; 1999-2000: Euro millions)

Italy

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Non-financial corporations											
pre-ESA95	24449	-3079	-6972	2914	1545	14546	9954	-12943	n.a.	n.a.	n.a.
post-ESA95	n.a.	n.a.	n.a.	n.a.	n.a.	17750	10343	-9991	-136	-8671	15734
Households + NPISHs											
pre-ESA95	-23045	-25148	-6352	-16767	7363	5440	8510	1209	n.a.	n.a.	n.a.
post-ESA95	n.a.	n.a.	n.a.	n.a.	n.a.	4599	29255	11388	12133	-12349	-29478
NF corpor. + Househ.and NPISHs											
pre-ESA95	1403	-28226	-13323	-13852	8909	19986	18464	-11734	n.a.	n.a.	n.a.
post-ESA95	n.a.	n.a.	n.a.	n.a.	n.a.	22349	39598	1397	11997	-21020	-13744
Financial corporations											
pre-ESA95	-4820	7227	-9985	3668	-5963	-4350	-18778	20603	n.a.	n.a.	n.a.
post-ESA95	n.a.	n.a.	n.a.	n.a.	n.a.	-22378	-19985	3082	-3878	22745	16614
General Government											
pre-ESA95	-5483	7953	8989	4677	-1280	-5885	2809	-7373	n.a.	n.a.	n.a.
post-ESA95	n.a.	n.a.	n.a.	n.a.	n.a.	2146	3450	1625	1561	3700	3499
Rest of the world											
pre-ESA95	-7546	-7409	3547	-12605	-3043	-16253	-23714	-3678	n.a.	n.a.	n.a.
post-ESA95	n.a.	n.a.	n.a.	n.a.	n.a.	-2020	-23087	-6137	-13928	-4373	-6456

United Kingdom

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Non-financial corporations											
pre-ESA95	11584	5885	11208	6640	3691	8255	5025	n.a.	n.a.	n.a.	n.a.
post-ESA95	n.a	n.a.	n.a.	n.a.	n.a.	4550	6407	-199	16167	904	548
Households + NPISHs											
pre-ESA95	-12016	-13467	-7242	-589	-5036	-8251	-10064	n.a.	n.a.	n.a.	n.a.
post-ESA95	n.a.	n.a.	n.a.	n.a.	n.a.	-6503	-10929	-12450	-9305	2375	11594
NF corpor. + Househ.and NPISHs											
pre-ESA95	-431	-7582	3966	6051	-1345	4	-5039	n.a	n.a.	n.a.	n.a.
post-ESA95	n.a.	n.a.	n.a.	n.a.	n.a.	-1953	-4522	-12649	6862	3279	12142

amount of the discrepancies when the objective is to evaluate the degree of distortion to each sector's account. To the last purpose, a sector variable – like gross saving – is obviously preferable. However, unless one could assume a high quality for such variable on the basis of some "a priori" information, in general results should be interpreted cautiously: the denominator – which is fairly

close to one of the terms of the comparison (the capital account balance) – would actually be itself endogenous to the system. [1]

To analyse discrepancies a mixed strategy has been used here. A graphical representation of discrepancies is used to show the distance of each couple of sector capital and financial balances from the 45° line representing the condition of equality between the two; the sectors' distances were also actually computed[2]. To facilitate cross-country comparisons, a synthetic index for each country was constructed as the ratio of the sum of the absolute values of sectors' discrepancies to nominal GDP[3].

To better appreciate the degree of distortion to sector accounts, a second index was calculated (called "relative index" in what follows) as the ratio of the above defined distances to the sum of the absolute values of the total flows of financial assets and liabilities for each sector[4]. The idea behind the choice of the denominator is to relate the errors represented by the discrepancies to a measure of the volume of transactions to which they apply[5]. A ranking of the countries was also obtained by considering, for each of them, the frequency distribution of the values of the relative index across sectors and time. To this purpose, four characteristics of the frequency distribution for each country were compared with those of the overall distribution: the median; the tails (in terms of quintiles) and the maximum value. Four separate rankings were obtained and their mean values were used for the final ranking. Similar statistics are presented for the set of all country – sector - years.

The synthetic index helps to compare cross-country the overall magnitude of the sectors' discrepancies (Table 2). Among the considered group, Denmark is the sole country for which the capital account balance equals the financial account balance across all sectors and years: consequently, the synthetic index is always zero. Excluding Denmark from the comparison, the values of the index range from a minimum of 0.5 per cent of the GDP for Spain in 1999 to 10.7 per cent for Austria in 1998. On average, over the entire period, the lowest values are recorded by Spain (0.8 per cent) and Germany (1.3 per cent). Portugal, the UK and the Netherlands also show fairly modest values, between 1.7 and 2.5 per cent, with France following afterwards (3.2 per cent). The average value for Portugal, however, includes zero values for the last two years, when all the sector discrepancies vanish, signalling the likely occurrence of a significant change in the methodology or the adoption of a "full re-balancing" technique. The average for Italy is 5.3 per cent, while those for Finland, Austria, Sweden and Belgium range from 6.5 to 8.6 per cent.

It is interesting to note that, among the group of countries showing the lowest values of the ratio, only in two cases – UK and Netherlands – capital and financial accounts are compiled by the same institution, namely the national statistical office; in the case of Spain the National Institute for Statistics is jointly responsible with the Bank of Spain for the financial accounts' methodology, but not for the compilation process. Leaving Denmark and Portugal aside, for none of the countries considered the ratio shows a clear tendency to decrease over time. Furthermore, in the cases of Italy and Austria the variability of annual data is also quite high, a fact that could point some sort of instability in methods and/or sources. However, a persistent decline of the ratio over the last three available years is evident in five cases: the Netherlands, Austria, Belgium, Finland and Sweden. The ratio for Germany appears to partially revert in the year 2000, after the unusual upward swing recorded in 1999.

The inspection of the values of relative index, measuring the degree of distortion to sectors' accounts, adds some qualifications to the previous picture (Table 3).

First of all, the distribution of the index across all country – sector – years (last row) gives some information on the consistency of the ESA95 accounts by sector at the European level. As a rough indication of a fairly good consistency, one should expect that a large fraction of the values is pretty close to zero and that deviations from zero are not very big. The index appears to behave somewhat differently. Its values range from 0 to a maximum of 105.2. The frequency of cases equal to zero is 15.8; the $0 < x \leq 1$ interval is the modal interval, but the associated frequency is not very high,

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1   *This is not the case for GDP, that is generally estimated independently from sectors' accounts.*

2   $Di = \dfrac{|SRi - SFi|}{\sqrt{2}}$*, where SRi and SFi are, respectively, the capital and financial account balancing items for sector i.*

3   *S-Index = Σ |SRi - SFi| / GDP * 100.*

4   $R\text{-}Index^{\,i} = \dfrac{|SRi - SFi|/\sqrt{2}}{|AFi| + |PFi|} \times 100$*, where AFi and PFi are respectively the flows of total financial assets and total financial liabilities of sector i.*

5   *From a conceptual point of view this is not different from using ratios to the sectors' gross saving; the choice was mainly dictated by practical reasons of data availability.*

Table 2 – Synthetic Index

Country	1995	1996	1997	1998	1999	2000	mean	std.dev
Denmark	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Spain	1.64	0.60	0.51	0.68	0.48	0.65	0.76	0.44
Germany	1.41	0.42	0.75	0.57	3.17	1.66	1.33	1.02
Portugal	2.60	2.44	3.42	1.66	0.00	0.00	1.69	1.42
United Kingdom	1.68	2.84	2.27	3.54	0.75	2.23	2.22	0.96
Netherlands	2.57	2.96	2.41	2.43	2.25	2.16	2.46	0.28
France	3.91	4.53	3.68	2.29	2.16	2.54	3.18	0.98
Italy	5.83	8.87	3.13	2.96	4.68	6.16	5.27	2.21
Finland	3.94	9.59	6.64	7.09	6.43	4.93	6.44	1.95
Austria	n.a.	7.30	4.63	10.74	6.14	4.30	6.62	2.60
Sweden	7.16	7.76	9.45	5.54	5.35	n.a.	7.05	1.69
Belgium	5.78	9.88	8.53	9.53	9.49	8.30	8.59	1.50

* Weighted mean based on all available country data for each year; gdp shares used as weights.
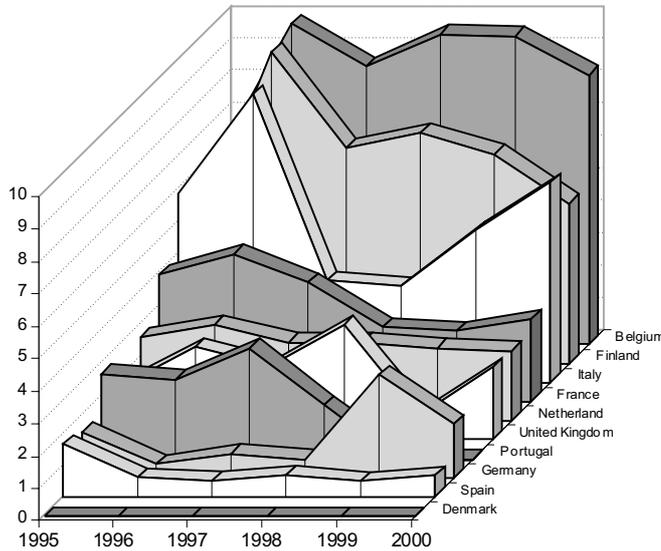
Only countries with a complete data-set over the period 1995-2000 are reported.

amounting to 32.5 per cent. The mean and the median values are respectively 4.7 and 1.2. The frequency of values greater than the mean is 26 per cent. The tails of the distribution, covering twenty per cent of the cases, are delimited by the values of .003 and 6.7 respectively.

Looking at country figures, it can be seen that the group of countries for which the overall sector discrepancy over GDP is smaller also show a lower distortion to sectors' accounts. However, the ranking obtained from the characteristics of the frequency distribution of the relative index is rather different from the one resulting from the values of the synthetic index. In addition to Denmark, whose relative index is always equal to zero, Spain and Portugal again place themselves at the top: for them, the relative index assumes values ≤ 1 with a frequency of 76.7 and 73.3 per cent respectively; the values delimiting the last quintile of the distribution are 1.1 and 3.5; the maximum values are 4.6 and 6.8. The Netherlands, the UK and Germany follow afterward, with the index assuming values ≤ 1 in more than half of the cases (60 per cent for Netherlands and Germany) and the last quintile being delimited by values around 3-4 per cent. France is again in the intermediate position, with a frequency of 50 per cent for the values ≤ 1, a median value of 1.1 and 7.3 as the marker for the last quintile. Sweden, with a frequency of 27.6 per cent for values of the index ≤ 1, appears to have a smaller distortion to sectors' accounts than Austria, Belgium, Italy and Finland; for the last four countries the respective index distributions are quite difficult to compare, with Italy showing better characteristics in the right-end tail and the vice versa.

Table 3 – Relative Index's descriptive statistics

(sectors: GG, NF, FC, HT, RoW – all years)

	N° of obs.	mean	std. dev /n	freq. obs. ≤ 1	median	Rank 1	20th perc	Rank 2	80th perc	Rank 3	Max	Rank 4	Average rank
AT	25	8.73	0.41	16.00	3.54	*8*	1.44	*11*	13.25	10	36.06	*9*	*9*
BE	30	8.81	0.30	23.33	6.44	*12*	0.67	*9*	19.71	12	25.79	*8*	*11*
DE	30	1.77	0.08	60.00	0.75	*5*	0.01	5	3.92	6	10.41	6	*6*
DK	30	0.00	0.00	100.00	0.00	*1*	0.00	1	0.00	1	0.05	1	*1*
ES	30	0.64	0.04	76.67	0.11	*3*	0.00	4	1.05	2	4.56	2	*2*
FI	30	10.44	0.43	20.00	4.91	*11*	1.01	10	18.72	11	54.54	*11*	*12*
FR	30	3.66	0.17	50.00	1.10	*7*	0.24	7	7.30	7	18.33	7	*7*
IT	30	7.68	0.32	13.33	4.16	*10*	2.13	*12*	9.68	8	49.38	*10*	*10*
NL	30	1.60	0.08	60.00	0.45	*4*	0.00	3	2.78	3	10.21	5	*4*
PT	30	1.23	0.07	73.33	0.01	*2*	0.00	2	3.46	5	6.77	4	*3*
SE	29	11.42	0.76	27.59	3.61	*9*	0.15	6	13.13	9	105.23	*12*	*8*
UK	30	1.64	0.06	53.33	0.86	*6*	0.28	*8*	3.23	4	6.49	3	*5*

Needless to say, both the synthetic and the relative indexes, especially when looking at their overall characteristics without focusing on details at sector level, only help to appreciate inconsistencies that are apparent in the system of accounts. As was suggested in the first paragraph, this is different from evaluating the "quality" of the accounts, since the possibility cannot be a priori ruled out that observed discrepancies are, in some cases, a pale residual of the original brightness of the North Star. Even if the existence of some "screening" technique were known, not much could be said about quality without a thorough explanation of such technique. Among the group of countries under review, for Denmark and, starting from 1999 data, also for Portugal, the observed equality between the capital and the financial balancing items across all the sectors is most likely the result of some "ex-post" reconciliation process that eliminated residual discrepancies after a first run of the accounts. In the case of Denmark, no information is available to infer the possible impact of the applied re-balancing technique, if any; for Portugal, assuming that no re-balancing procedure was applied to the data previous to 1999, a rough indication of the importance of the overall adjustments made afterwards can be derived by looking at the amount of discrepancies over the period 1995-1998: according to the synthetic index, they appear to be fairly modest, ranging from a minimum of 1.7 of the GDP in 1998 to a maximum of 3.4 per cent in 1997. For Spain, the other "top rank" country according to both the synthetic and the relative index, it is known that a partial reconciliation process is undertaken which leaves the Non-financial corporations and the Households sectors with some residual discrepancies; however, the adjustments to sector balances are not separately identifiable in the accounts.[1]

While obviously not substituting for any information gap on methodology of the kind just mentioned, the charts showing, for each country and sector, the distance of the real and financial balances from the line representing the condition of equality give a more detailed description of the features of each country's accounts (Chart 1, in the Annex). To this purpose, it is useful to bear in mind some basic relations of the system. Theoretically, both for the capital and the financial accounts, sector balances should add to zero, since the sum of the internal sectors' balances should be equal and opposite in sign to the ROW balance. If such equalities hold, the sum of the sectors' discrepancies is also equal to zero. The basic relationship among sector balances is not always respected by the country data considered here: this is the case for the financial balances of Austria, and Italy and for the capital account balances of Sweden. When the basic equalities are respected for a country and larger discrepancies between capital and financial balances concentrate on a few sectors, they clearly appear to compensate each other in the chart.

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1   *The paper by the Banco de España gives for each sector the algebraic sum of the annual adjustments applied to the financial balances over the period 1995-2000 as a ratio to GDP: the highest value is -1.6 for the Financial Corporation sector.*

Starting from countries showing the smallest inconsistencies in their system of accounts, the chart for Denmark obviously consists, for each sector, of a number of points lying exactly on the 45° line. The chart for Spain reveals for all the sectors, except for the Non-financial corporations and the Households, only very minor deviations from the 45° line. For the two "deviating" sectors the distance tends to diminish over time, a part from the widening observed for HT in the year 2000 (the last available year). The relative index is larger for HT than for NF; respectively the values range from 4.6 and 3.8 in 1995 to 0.7 and 0.1 in 1999 and in the year 2000 (Table 4, in the Annex). The PS sector, representing the sum of the two, lies almost always on the bisector, as expected: as a consequence of the reconciliation process, it absorbs the counterpart adjustments to the accounts of the Financial Corporations, the General Government and the Rest of the World, which is then allocated between the two components (HT and NF) according to some estimation methods. The distance from the bisector observed for PS in the year 2000, perhaps revealing a still incomplete reconciliation exercise for that year, is mostly mirrored by a similar divergence for the ROW.

In the chart for Portugal all the sectors lie on the bisector in 1999 and in the year 2000. Over the previous period noticeable deviations are observable for HT and for NF, with values of a similar magnitude for the relative index (between 3.5 and 6); however they compensate each other almost entirely, leaving the PS sector very close to the 45° line. The GG lies almost always on the bisector, with a small deviation only in 1998, mainly compensated by a similar deviation for the FC sector.

For the Netherlands, the accounts for the General Government and the Financial Corporations appear to be the most accurate. Significant deviations from the 45° line occur for the Households and the Non-financial corporations (the largest values for the relative index, respectively 5.5 and 10.2, are recorded in 1995; they come down to 2.4 and to 1.7 in the year 2000): they compensate each other to a large extent but not fully, so that the PS sector does not lie exactly on the bisector; the ROW seems to be the candidate for the disturbances affecting the overall private sector's accounts.

The chart for Germany shows clearly the deterioration in the consistency of accounts for the last two available years, already signalled by the synthetic index. In 1999, this result is mainly due to two sectors: the NF corporations and the ROW, whose respective discrepancies largely compensate each other. In year 2000 the largest deviation is observed for the Financial Corporations sector, with the ROW again largely compensating for it. The relative index shows that the distortion to sector accounts is more important for NF than for HT: in the first case it reaches the values of 10.4 and 5.3 respectively in 1995 and 1999, while the highest value for HT is 1.3 in year 2000. Furthermore, it has to be noted that the points representing HT balances lies exactly on the bisector for the first three years, perhaps suggesting the recourse to some re-balancing method that was discontinued afterwards. For the General Government, no discrepancy is observed up to 1997; in the following years the (negative) capital account balance is persistently higher than the financial account balance, with the relative index reaching the value of 6.7 in the year 2000.

The chart for UK shows fairly small distortions for the General Government over the whole time range. Discrepancies are quite significant for the HT sector, with the relative index peaking at 6.5 in 1996 and coming down to 3.5 in year 2000. For the NF sector discrepancies are, on average, more contained, peaking in 1998 when the relative index is equal to 3.8. In general, since discrepancies are non-negligible for most of the sectors, it is difficult to detect any possible compensating effect. However, some relationship seems to exist between the large deviation for NF in 1998 and the one observed in the same year for the FC sector, and in the year 2000 between those for HT and, again, the FC, with the ROW also contributing to a lesser extent.

For France, again the General Government sector is the closest to the 45° line. The largest distances from the bisector are recorded by the Households and the Non-financial Corporations, whose relative indexes peak respectively to 18.3 in 1996 and to 11.7 in 1997; however, in both cases the discrepancies tend to reduce significantly over the last three available years, with the relative index halving for HT and coming down to 1.5 in 1998 and then to 0.4 in the year 2000 for NF. Furthermore, as shown in the chart for PS, these imbalances compensate each other to a large extent, with a noticeable exception in 1996. Some deviation from the 45° line is evident also for the FC sector over the last three years. The counterpart to the observed discrepancies for PS and FC is evident in the chart for the ROW.

In the case of Sweden, the largest deviations from the 45° line are observable for the ROW and the NF corporations, whose discrepancies, excluding year 2000, compensate each other to a large extent. The points representing the GG's balances lie quite close to the bisector; nevertheless the discrepancies are significant in relation to the sector's transactions, as is signalled by the relative index that assumes fairly high values from 1997 onward. On the opposite, it has to be noted that the Swedish HT accounts, whose points lie almost always on the bisector, seem to be the most consistent, together with those for Germany, among the group of countries considered. Obviously, nothing can be said about the nature of the statistical process behind the results.

The inspection of the chart for Austria does not point to obvious signs of possible direct links among observed sectors' discrepancies, as they are spread all over the sectors. Unlike in most other countries, the points representing GG accounts are also highly dispersed around the bisector; a convergence is however observable in the year 2000.

For Belgium, if one aggregates NF corporations and Households, that show the largest distances from the 45° line (the relative index ranges from 20.1 to 8.2 for NF; it reaches 25.8 in year 2000 for HT), the resulting discrepancies are considerably lower and appear to be largely compensated by those observed for the Financial corporations. This sector, in turn, has a financial balance close to zero over the whole time range, while the capital account balance is always positive. A possible explanation could be that the sector coverage is somewhat incomplete in the capital account. Data for the GG sector appear to be quite accurate, with appreciable deviations from the 45° line only in 1997 and 1999. The ROW lies always on the bisector, most likely as a result of a "forced" equality. In this case, the observed discrepancies for some of the resident sectors could incorporate the counterpart of the adjustment to the ROW accounts.

In the case of Italy, only the General Government lies always close to the 45° line. The amounts of distortion is fairly high especially for HT and NF. For the former sector the relative index ranges from 17.5 to 2.6; for the latter it varies between 26 and 0.1. The best results are achieved respectively in 1995 and 1997. In both cases the index shows a marked deterioration in the last year, when the values are respectively 14.9 and 7.8. Looking at the results for the PS sector, which is equal to the sum of the two, the main sources of disturbances seems to lie in the accounts of the ROW and of the Financial Corporations. In 1997, when the discrepancies for NF corporations and Households nearly cancel out, both the balances of the ROW and of the Financial corporations are closer to equality. On the opposite, in "bad" years, like 1996 and 1999, at least one of the two sectors lies very far from the 45° line.

Analogously, for Finland the Financial corporations sector appears again as the main candidate source of disturbance to NF corporations' and Households' accounts. Both sectors show important deviations from the line representing the equality between capital and financial account balances: the largest discrepancies are observed in 1996, when the relative index peaks to 54.5 and to 25.4 respectively for HT and NF; again, pooling the two together in the PS sector, the residual discrepancy is considerably reduced, although a clear pattern to convergence over time cannot be detected. The GG balances show very little discrepancies, with visible deviations from the bisector only in 1995 and 1999.

To complete the descriptive evidence, Chart 2 (in the Annex) represents, for each country and sector, the evolution of the "relative" index over time. To appreciate the results achieved in terms of coherence between capital and financial accounts, not only the amount of discrepancy between the respective balances is relevant; the concordance/discordance of their algebraic signs is also important. The occurrence of opposite signs is represented in the chart by the dark colour of the corresponding histogram. All the countries, except for Belgium, show a substantial reduction of sector inconsistencies from the first to the last available year; in the case of Belgium, the deterioration in 2000 with respect to 1995 appears mainly in the households accounts. Half of the countries (Austria, Belgium Finland, Portugal, Sweden and UK) had sector capital and financial balances with opposite signs in the first year; apart from Austria and Belgium, such anomalies have been eliminated in the last year. While for Austria the discordance remains limited to the Financial Corporations sector, in the case of Belgium the General Government adds to the list, which already included both the Financial and the Non-financial corporations. On the opposite side, Italy shows dark bars for the Financial corporations and the ROW in 2000 but not in 1995.

Finally, Chart 3 provides for each year a synthetic description of the consistency of the accounts at European level. By pooling together all countries and sectors, it shows the yearly distributions of the points representing each couple of capital and financial balances around the 45° line. At a visual inspection, the points seem to be on average closer to the bisector over the last three years than in the previous period; the proximity seems to be the highest in 1998, while some relaxation appears to occur afterwards: that, in turn, could be explained by a more provisional character of the accounts. However, the cross-year comparison is somewhat altered by the fact that the number of points is not homogeneous over time, being lower in 1995 and in the year 2000, due to the partial availability of the data for some of the countries considered.

Chart 3 – FAB (x-axis) and CAB (y-axis); all sectors (except RE) and countries

Mean and normalized st. dev. are computed on the R-Index
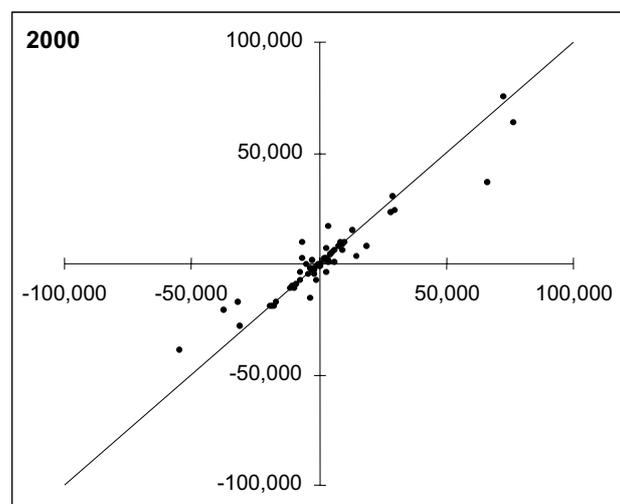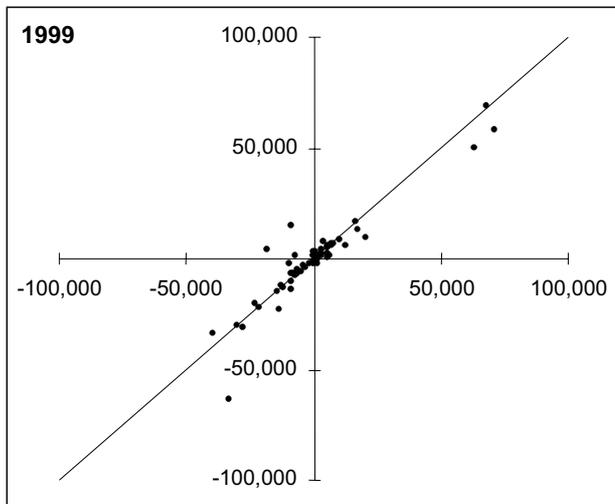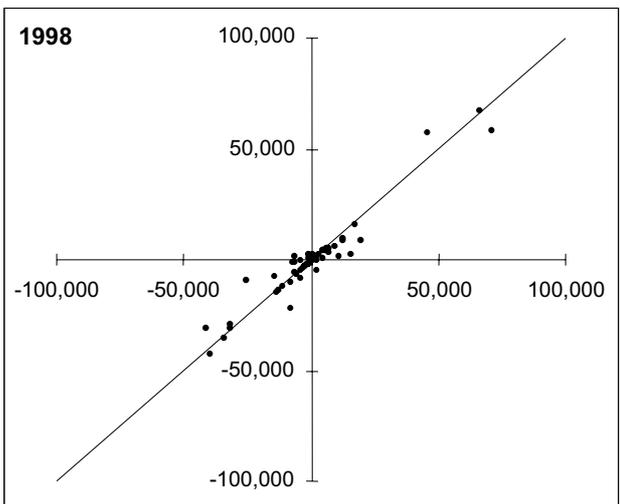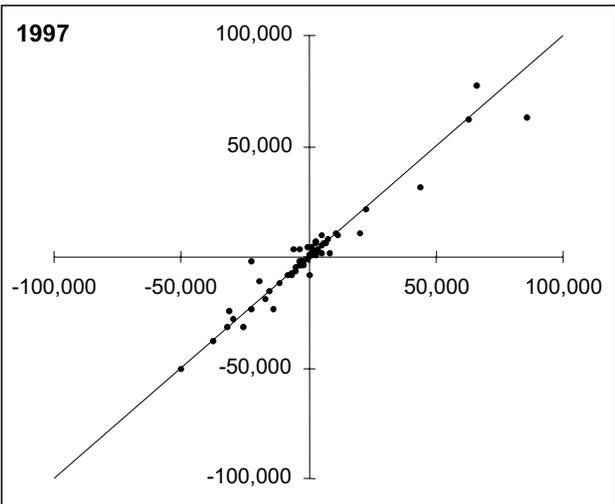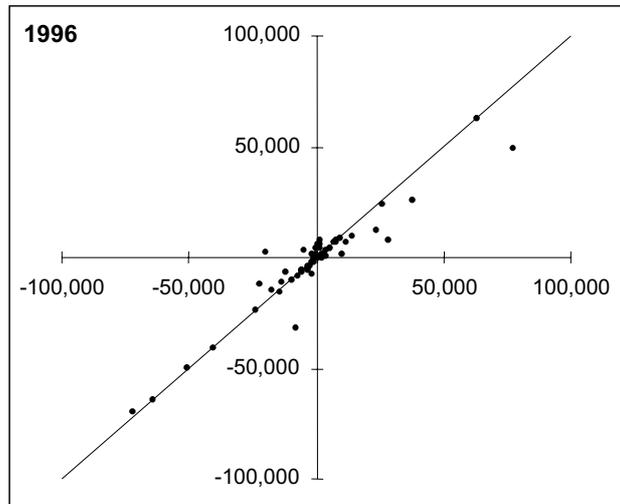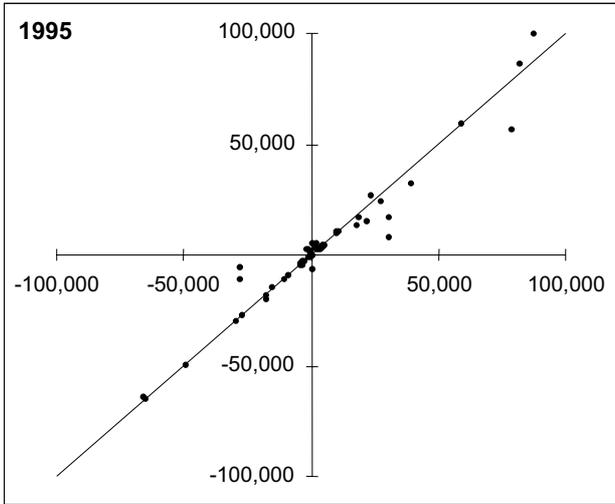
A clearer picture of the degree of consistency across time is given by the characteristics of the frequency distribution of the relative index, reported in Table 5; in particular, the second part of the table shows the results for the subset of countries for which a complete data-set is available.

Table 5 – Relative Index's descriptive statistics

(sectors: GG, NF, FC, HT, RoW – all countries)

year	n. of obs.	mean	std.dev	std.dev/n	20th perc.	median	80th perc.
1995	55	6.54	15.80	0.29	0.001	1.06	9.96
1996	60	6.01	10.04	0.17	0.002	1.72	9.82
1997	60	5.15	10.36	0.17	0.005	1.18	8.26
1998	60	4.15	7.20	0.12	0.103	1.20	5.25
1999	60	3.73	6.28	0.10	0.010	0.91	5.21
2000	59	2.92	5.17	0.09	0.003	0.70	3.49

(sectors: GG, NF, FC, HT, RoW – all countries except Austria)

year	N° of obs.	mean	std.dev	std.dev/n	20th perc.	median	80th perc.
1995	55	6.54	15.80	0.29	0.001	1.06	9.96
1996	55	5.47	9.63	0.18	0.00	1.69	9.02
1997	55	5.11	10.76	0.20	0.003	0.79	7.72
1998	55	3.06	5.08	0.09	0.063	1.06	4.80
1999	55	3.46	6.16	0.11	0.002	0.84	4.92
2000	54	2.87	5.26	0.10	0.002	0.62	3.49
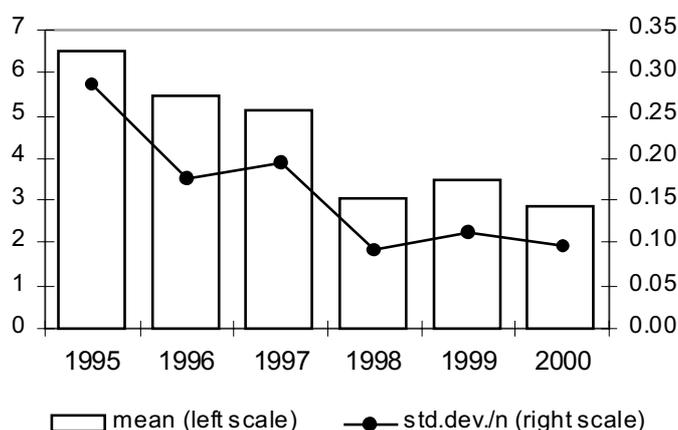
Most parameters actually point to a higher consistency in the period 1998-2000 than in the previous one. There also seems to be some improvement from 1998 to the last available year, as suggested by the decreasing values for both the median and the tails of the distribution. The tendency of the frequency distribution to progressively assume a more desirable shape, with a higher concentration around a decreasing left hand tail, is also signalled by its histogram representation, as shown in Chart 4 below.

Chart 4 – R-Index's frequency distribution

All sectors and countries except Austria
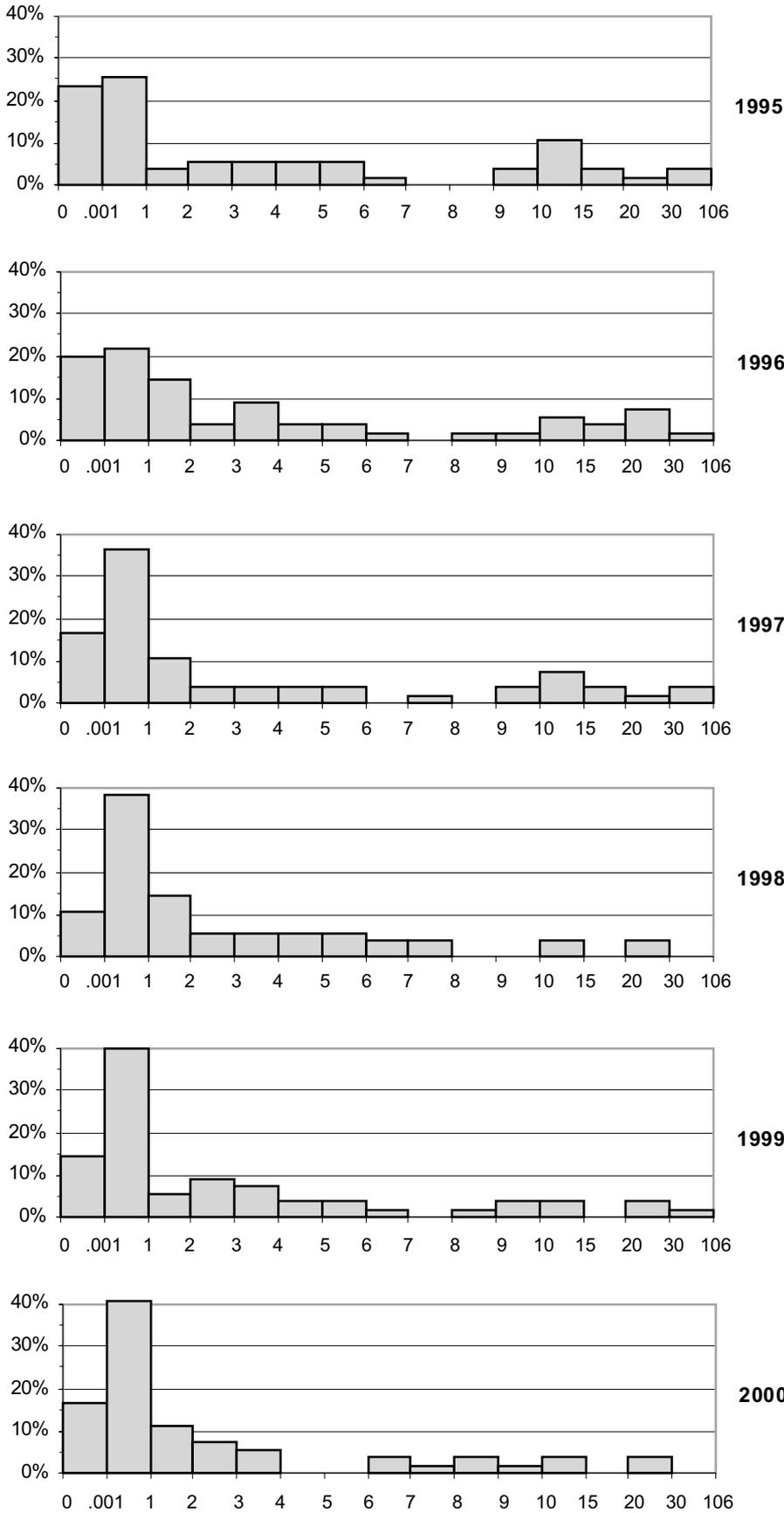
4. Some tentative conclusions

Before attempting to draw some conclusions from the data inspection conducted so far, it is important to remark that ESA95 accounts are a relatively new product. We could well say we are still in a transitional period, in which methods and sources are gradually adjusted over time. Signs that such a process is actually under way can be found in the last tables and charts presented here. Perhaps the need to go through this process is particularly strong for the financial accounts, for which the innovations introduced by ESA95 – above all the principle of recording on an accrual basis – required substantive changes to the previous methodology and the activation of totally new sources. These changes, in turn, could have proved especially demanding for those countries where the sources traditionally used for the compilation of the financial accounts were mainly those available to the Central Banks, mostly shaped to satisfy the information needs related to monetary policy and supervision and not necessarily conforming to the accrual principle. Furthermore, given the limited number of years for which ESA95 accounts have been computed, only a few observations are available to analyse the behaviour of discrepancies over time and detect systematic trends on which to concentrate analytical efforts to achieve better results.

The tentative analysis conducted so far, albeit far from conclusive, points to some areas that could deserve further and closer examination. On the methodological side, at least for the financial accounts, the separate identification of the transactions carried out by the NF corporations and the Households is certainly a major issue: exchanging national experiences and expertise in this field could help identifying best practices and adapting the methods consequently. In several cases, the similarity between capital and financial balances is also very poor for the Financial Corporations: assuming that Central Banks should largely be endowed with good quality data sources for this sector, a closer co-operation between CBs and National Statistical Institutes could bring considerable improvements. Furthermore, not surprisingly, the ROW accounts seem to be, in several cases, a major source of disturbance for the system of accounts: here we could expect some progress to be achieved in the medium term, as a result of the efforts undertaken at the national and European levels to harmonise and ameliorate the collection systems and the statistical methods used to compile the balance of payments. Last, but not least, much can be done, in general, to improve the accurateness in terms of coverage and data quality, of the basic sources, as well as to co-ordinate revision policies when different agencies are mainly responsible for the production of capital and financial accounts. On the other end, the fairly good consistency achieved by the vast majority of the countries for the General Government accounts could be, at least partially, the outcome of the need to monitor closely the accurateness of the estimates produced for those macro-variables that are placed at the core of economic policies of the Union. Similarly, one could expect significant improvements in the overall quality of sector accounts to follow the further enforcement of statistical requirements to satisfy policy needs, on the way traced by the EMU Action Plan.

To conclude, ESA95 accounts, as a recent achievement, still face a long way to go to reach full maturity. The term "full maturity" should be understood as a state of the accounts under which residual sector discrepancies are fairly small and the reliability of each contributing cell can be assessed with a reasonable degree of confidence. Under such conditions the recourse to re-balancing methods – like for example the Stone method – could actually increase the overall consistency of the system. Under the present circumstances, instead, we should not underestimate the (informative) value of discrepancies between capital and financial accounts: to show – rather than to conceal – them, to the purpose of monitoring their magnitude and reacting to gradually reduce it over time, could be of a much greater help to a genuine progress of the internal consistency of the system.

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An extensive annex to this paper is available on the IFC Web site
(http://www.ifcommittee.org/S1marcheseanx.pdf).

Quarterly Monetary Union Financial Accounts for ECB Monetary Policy Analysis

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Rational decision making requires the determination of an objective, the specification of options of how to achieve this objective, the illustration of the physical and economic restrictions, and achieving the maximum goal under the given restrictions.[2] To design the accounting framework and to compile quarterly Monetary Union financial accounts (MUFA) is seen as such a decision-making process.

*For the European Central Bank, the specification of an **objective** – to compile quarterly MUFA – is mainly determined by monetary policy purposes, focusing predominantly on the analysis of the transmission mechanism. Based on the available options, a single **strategy** has to be chosen as a step-by-step approach: starting with the compilation of the quarterly Table on Financing and Investment (TFI) of non-financial sectors, work has already continued to expand the TFI from three to seven sectors. Further steps will extend the seven-sector approach to a fully integrated and timely system of accounts with who-to-whom relationships between sectors and areas and with sufficient detail of instruments for stocks and flows. Following such an approach, various **constraints** have to be taken into account, which avoid a quick 'optimisation' **process**. Such obstacles are mainly related to constraints on available statistical data and human resources. The note deals with these four elements of the decision making process, the design of the envisaged accounting framework as the objective, the step-by-step approach as the preferred strategy, the constraints, and the implementation so far.*

1. The design of the envisaged accounting framework as the objective

To design the envisaged accounting framework of quarterly Monetary Union financial accounts (MUFA) the various users have to be taken into consideration. These are predominantly economists and financial analysts preparing and analysing ECB monetary policy decisions.

1.1. The design from a perspective of ECB monetary policy analysis

ECB monetary policy analysis centres on what is called the transmission mechanism: How does monetary policy affect the economy; through what channels does monetary policy operate? Some major transmission channels are of specific interest: As ECB monetary policy strategy assigns a prominent role to money, monetary financial institutions (MFI) play a dominant role in the transmission of monetary policy. Financial markets are also seen as an important transmission channel. Furthermore, the increasing globalisation and cross-border ownership as well as new financial instruments seem to have resulted in a faster transmission of policy and other effects, perhaps more oriented towards sectors rather than countries.

To analyse monetary policy and the transmission mechanism of policy decisions, quarterly MUFA have to be designed in such a way that they provide a broad financial context for monetary aggregates and credit, which are essentially derived from MFI balance sheet statistics. While different sectors regularly take decisions in which types of assets they invest and how they finance their investments, the sectoral framework leads to an extended monetary analysis covering monetary aggregates vis-à-vis short-term financial investment as well as other short-term and long-term investment and financing. For example, long-term securities and shares reflect predominantly long-term instruments of financial investment and financing.

1.2. The design from a perspective of financial analysis

The 'portfolio-equilibrium approach' seems to be the most appropriate framework to comply with financial analysis: households, corporations, financial or non-financial, and government are seen as the institutional units in an economy managing efficiently their portfolios, i.e., their stocks of assets and liabilities, including money (though, as noted above, money as the transactions medium may be considered to have specific features and importance).[1] Management comprises, beside the structure of stocks, also decisions on transactions (financial and non-financial, like the net acquisition of assets, the net incurrence of liabilities, production, income, consumption, or saving) and other flows – especially changes in prices (measured as holding gains or losses). The basic accounting tools reflecting these activities are balance sheets as well as transactions and other flow accounts. These are linked to the corresponding macroeconomic accounts as summarised in sector balance sheets, transaction and other flow accounts, after appropriate aggregation and consolidation.

The approach concentrates on the consideration of wealth-holders' decisions on investment – financial or non-financial – and represents a generalisation of the treatment of money, with its special characteristics, as one among the wide range of assets, which are alternative ways of holding wealth. The demand for money is seen as a decision in the formation of an optimal portfolio, the choice among assets being determined by a trade-off between rates of return and "liquidity services." All transactions are covered, which contribute to the accumulation of assets held and liabilities incurred by sectors within a period. Saving, net capital transfers, and net incurrence of liabilities (financing) are used to acquire non-financial and financial assets (investment). There is a strict requirement for each sector that its investment must be equal to its financing.

A further implication of the 'portfolio-equilibrium approach' is to monitor the structure of interest rates and asset prices as well as the corresponding income and expenditure components resulting from assets and liabilities. Asset prices may be derived from price changes as part of changes in stocks allowing for the evaluation of holding gains and losses of the various sectors.

While a dichotomy is evident between financial and non-financial analysis, this is neglected in the 'portfolio-equilibrium approach'. The activities of the non-financial sectors and the financial sectors are treated simultaneously, since sectors' portfolio decisions are seen as interrelated. Nevertheless, assets and liabilities are broken down in relation to their economic use, liquidity and maturity, as well as their tradability and volatility, etc.

1.3. The design from a statistical point of view

The design of quarterly MUFA follows closely an integrated approach as outlined above and reflected in the System of National Accounts (SNA 93) and in the European system of national and regional accounts in the Community (ESA 95).[2] Quarterly MUFA cover accounts for transactions, financial balance sheets and other flows. Transactions register the movements of the financial instruments from the sectors that used them as financing sources, directly or through financial intermediaries, to those sectors that use them for investment (financial assets). Financial balance sheets provide an overview of the stocks of financial assets held and of the liabilities incurred by the institutional sectors at the end of the quarter. Changes in these stocks reflect, besides transactions, other changes in the volume of assets and revaluations during the quarter covered in the other flow accounts.

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1 *David Backus, William C. Brainard, Gary Smith, and James Tobin, A model of U.S. Financial and Nonfinancial Behaviour," Journal of Money, Credit, and Banking 1, no. 12 (May 1980), pp. 259-292.*

2 *Commission of the European Communities – Eurostat, International Monetary Fund, Organisation for Economic Co-operation and Development, United Nations, World Bank (1993): System of National Accounts 1993 (SNA 93), Brussels, Luxembourg, New York, Paris, Washington, D.C. and Council Regulation (EC) No 2223/96 of June 1996 on the European system of national and regional accounts in the Community (ESA95), Brussels 1995.*

Quarterly MUFA are to be linked to non-financial accounts to reflect a comprehensive picture of financial and non-financial transactions and other flows within the euro area, and a frequent snapshot of outstanding amounts of assets (financial and non-financial) and liabilities.

Furthermore, who-to-whom information has to be integrated as much as possible into the framework to comply with statistical as well as analytical requirements. A "basic principle of compiling institutional sector accounts is making use of counterpart information; that is, in any transaction involving two parties, information can be collected from the party from which it can be most efficiently collected."[1] Consequently, quarterly MUFAs are seen as a powerful instrument for achieving consistency in high-frequency financial data provided by money and banking, balance of payments, capital market, and government finance statistics.

2. The step-by-step approach to compile quarterly MUFA

It is intended to implement quarterly MUFA as a step-by-step approach based on the availability of timely financial statistics for the euro area.[2] Work is nearly complete on the Table on Financing and Investment (TFI) of non-financial sectors in the euro area.[3] A further step will be to expand this table to full sector coverage (six resident sectors) including the rest of the world. Further consecutive steps will be to include a full set of instruments, the non-financial accounts (as much as possible) and who-to-whom information.

Nevertheless, basic principles as described in ESA 95 have to be followed in implementing the step-by-step approach. These are the selection of the instrument and account categories as well as the institutional sectors. Others are implicitly covered by selecting ESA 95 as the basic methodological framework like time of recording, market valuation and residency.

2.1. Instrument and account categories

To enhance the analytical usefulness of the data, assets and liabilities are classified by their nature into instrument categories following ESA 95. A distinction is drawn between financial transactions as shown in the financial transactions account, non-financial transactions as shown in the capital account and in other non-financial accounts, other flows as shown in the other changes in the volume of assets and revaluation accounts, and stocks as shown in the balance sheets.[4]

2.1.1. The financial transaction account

In the financial transaction account, seven categories of financial transactions are distinguished in ESA 95. They are classified according to their liquidity and their legal characteristics. Provision is made for further breakdowns, mainly according to original maturity and type of instrument (account has also been taken of financial derivatives, which were not previously included in the accounts). Shares and other equity are further broken down by quoted and unquoted shares, other equity and mutual fund shares.

First, a sub-set of financial instruments has been selected as the main financial investment and financing components, which are covered in the TFI of non-financial sectors in the euro area. By balancing of the financial investment and financing components of all euro area sectors and the rest of the world data may be reconciled for the selected financial instruments. In a further step, the balancing process may be extended to all financial instruments according to the coverage shown in the ESA 95 Transmission Programme, including some breakdowns by original maturity and type as shown in Table 1.

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1 *International Monetary Fund, Quarterly National Accounts Manual, Washington DC 2001.*

2 *European Central Bank. Statistical information collected and compiled by the ESCB, May 2000.*

3 *European Central Bank, Financing and financial investment of the non-financial sectors in the euro area, Monthly Bulletin, May 2001.*

4 *The financial transaction account, the capital account and the other flow accounts (other changes in the volume of assets account and revaluation accounts) are parts of the accumulation account.*

Table 1 – Coverage of financial transactions

TFI-related approach (selected components)	Extended approach (full coverage)
F.1 Monetary gold and special drawing rights (SDRs)	F.1 Monetary gold and special drawing rights (SDRs)
F.11 Monetary gold	F.11 Monetary gold
F.12 Special drawing rights (SDRs)	F.12 Special drawing rights (SDRs)
F.2 Currency and deposits	F.2 Currency and deposits
	F.21 Currency
	F.22 Transferable deposits
	F.29 Other deposits
F.33 Securities other than shares, excluding financial derivatives	F.3 Securities other than shares
	F.33 Securities other than shares, excluding financial derivatives
F.331 Short-term	F.331 Short-term
F.332 Long-term	F.332 Long-term
	F.34 Financial derivatives
F.4 Loans	F.4 Loans
F.41 Short-term	F.41 Short-term
	o/w Consumer credit
F.42 Long-term	F.42 Long-term
	o/w Mortgage loans
	F.5 Shares and other equity
	F.51 Shares and other equity, excluding mutual fund shares
F.511 Quoted shares	F.511 Quoted shares
	F.512 Unquoted shares
	F.513 Other equity
F.52 Mutual fund shares	F.52 Mutual fund shares
O/w Money market fund shares	*O/w Money market fund shares*
F.6 Insurance technical reserves	F.6 Insurance technical reserves
F.61 Net equity of households in life insurance reserves and in pension fund reserves	F.61 Net equity of households in life insurance reserves and in pension fund reserves
	F.611 Net equity of households in life insurance reserves
	F.612 Net equity of households in pension fund reserves
F.62 Prepayments of insurance premiums and reserves for outstanding claims	F.62 Prepayments of insurance premiums and reserves for outstanding claims
	F.7 Other accounts receivable/payable
	F.71 Trade credits and advances
	Trade credits
	Advances
	F.79 Other

2.1.2. The capital account, the other flow accounts and the balance sheet

The financial account may be extended by combining it with the capital account resulting in the accumulation account due to transactions. As shown in Table 2, the capital account comprises the (net) acquisition of non-financial assets as well as net saving including net capital transfers. The acquisition of non-financial assets is, for each sector, the gross capital formation (excluding consumption of fixed capital) and the net acquisition of non-produced non-financial assets. Saving and capital transfer receipts excluding payments appear as net amounts available from the capital account for investment purposes. Financial instruments are shown in the financial account as net acquisition of financial assets or as net incurrence of liabilities by each sector. Saving, net capital transfers, and net incurrence of liabilities are the various sources, which could be used to acquire non-financial and financial assets.

All financial transactions of a sector are combined into a net lending or net borrowing that is either the excess of the sector's financial investment over its external financing or, vice versa, the excess of the sector's saving including net capital transfers over its non-financial investment. Consequently, two basic constraints on Table 2 apply: First, for each sector, total investment is the sum of non-financial investment and financial investment, which is by definition equal to financing shown for each sector. Second, on any row of the table the sum of all investments of the sectors is equal to the sum of all sources of financing used by the sectors.

Table 2 – Sequence of institutional sector accounts

Production and income account	
Uses	Resources
Accumulation account	
Changes in assets	Changes in liabilities and net worth
Capital account	
Non-financial investment (acquisition of non-financial assets)	Saving, net
	(Current external balance: for the euro area as a whole)
Gross capital formation	
Consumption of fixed capital (-)	Capital transfers, net
Changes in inventories	Capital transfers, receivable
Acquisitions less disposals of valuables	Capital transfers, payable (-)
Acquisitions less disposals of non-produced non-financial assets	

Financial account	
Financial investment (net acquisition of financial assets)	Net incurrence of liabilities
Monetary gold and SDRs	Currency and deposits
Currency and deposits	Securities other than shares
Securities other than shares	Loans
Loans	Shares and other equity
Shares and other equity	Insurance technical reserves
Insurance technical reserves	Other accounts payable
Other accounts receivable	

Other changes in the volume of assets account; and revaluation account	
Non-financial assets	Liabilities
Financial assets	
Monetary gold and SDRs	Currency and deposits
Currency and deposits	Securities other than shares
Securities other than shares	Loans
Loans	Shares and other equity
Shares and other equity	Insurance technical reserves
Insurance technical reserves	Other accounts payable
Other accounts receivable	

Balance sheet	
Assets	Liabilities and net worth
Non-financial assets	
Financial assets	Liabilities
Monetary gold and SDRs	
Currency and deposits	Currency and deposits
Securities other than shares	Securities other than shares
Loans	Loans
Shares and other equity	Shares and other equity
Insurance technical reserves	Insurance technical reserves
Other accounts receivable	Other accounts payable
	Net worth

For a fully integrated system of accounts the other non-financial accounts (production and income account), the other flow accounts (other changes in the volume of assets account and revaluation account) and full balance sheets will have to be introduced. The selection of components as shown in the tables of Annex 1 may provide a starting point.

An overall aim is to apply the integrated system in a way that it allows identification of variables and indicators, which are of specific analytical and political interest, like M3, private, government or external debt, net lending/net borrowing or deficit/surplus by sector, GDP, disposable income, consumption, gross saving, gross capital formation, net acquisition of financial assets, net incurrence of liabilities, or holding gains and losses.

2.2. Euro area sectors

While the quarterly TFI currently compiled by the ECB only covers three non-financial sectors (non-financial corporations, general government and households including non-profit institutions serving households), the seven-sector approach also includes three financial sectors (monetary financial institutions (MFIs), other financial intermediaries other than insurance corporations and pension funds including financial auxiliaries, and insurance corporations and pension funds). Cross border transactions and positions of these euro area sectors with the rest of the world are reflected in the accounts of the rest of the world (seen from the perspective of the euro area) (Table 3).

Table 3 – Sectors according to the TFI, the seven-sector approach and the extended approach

ESA 95 code (national economy)	Euro area sector	TFI	Seven-sector approach	Extended approach
S. 11	Non-financial corporations	X	X	X
S.121/122	Monetary financial institutions(MFIs)		X	X
	Eurosystem			X
	European Central Bank			
	National Central Banks			
	Other monetary financial institutions			X
	Credit institutions			X
	Money market funds			X
S.123/124	Other financial intermediaries, other than insurance corporations and pension funds, and financial auxiliaries		X	X
	European Investment Bank			X
	Other			X
S.125	Insurance corporations and pension funds		X	X
S.13	General government	X	X	X
	European Union (Budgetary) Institutions			X
				X
	Central government			X
	State government			X
	Local government			X
	Social security funds			
S.14/15	Households and non-profit institutions serving households	X	X	X
S.2	Rest of the world		X	X

The quarterly data as specified in the current draft regulation on quarterly financial accounts for the government sector would allow a further breakdown of the euro area general government sector into the sub-sectors central government, state government, local government and social security funds. For a full coverage of euro area general government transactions and positions, further financial data are needed for several European institutions like the European Union (budgetary) in-

stitutions and the European Investment Bank (the ECB is part of the MFI sector). Additional sub-sectors may be included, especially within the financial corporations sector, depending on analytical needs and available data.

2.3. Step one – the quarterly TFI of non-financial sectors in the euro area

2.3.1. The structure of the quarterly TFI

As a first step towards the compilation of quarterly MUFA, the TFI of non-financial sectors in the euro area has been compiled and currently published as Table 6.1 of the euro area statistics section of the ECB Monthly Bulletin. Table 4 provides an overview of these data. It covers the main items under the financing and financial investment of the non-financial sectors in terms of the amounts outstanding as at end-2001.

Table 4 – Financial investment and financing of non-financial sectors in the euro area at end-2001

Amounts outstanding

Main financial assets	EUR billions	%	Main liabilities	EUR billion	%
Total	**15.084**	**100,0**	**Total**	**15.821**	**100,0**
Currency and deposits	**5.365**	**35,6**	**Loans**	**7.726**	**48,8**
Currency	240	1,6	a) taken from		
Deposits with	5.125	34,0	Euro area MFIs	6.899	43,6
Euro area MFIs	4.959	32,9	Other financial corporations	827	5,2
Non-MFIs	166	1,1	b) granted to		
Securities other than shares	**1.885**	**12,5**	General government	891	5,6
Short-term	221	1,5	Short-term	50	0,3
Long-term	1.664	11,0	Long-term	841	5,3
Shares	**4.462**	**29,6**	Non-financial corporations	3.469	21,9
Quoted shares	2.619	17,4	Short-term	1.219	7,7
Mutual fund shares	1.843	12,2	Long-term	2.250	14,2
o/w Money market fund shares	264	1,7	Households	3.366	21,3
Insurance technical reserves	**3.373**	**22,4**	Short-term	283	1,8
Net equity of households in life insurance and pension fund reserves	3.039	20,1	Long-term	3.083	19,5
Prepayments of insurance premiums and reserves for outstanding claims	334	2,2	**Securities other than shares**	**4.396**	**27,8**
			General government	3.881	24,5
			Short-term	435	2,7
			Long-term	3.446	21,8
			Non-financial corporations	515	3,3
			Short-term	137	0,9
			Long-term	378	2,4
			Quoted shares		
			issued by non-financial corporations	**3.281**	**20,7**
			Deposits		
			liabilities of central government	**164**	**1,0**
			Pension fund reserves		
			of non-financial corporations	**253**	**1,6**

Source: ECB.

The financial instruments currently covered by the TFI are in bold.

MFIs – Monetary financial institutions; OFIs – Other financial intermediaries (excluding insurance corporations and pension funds) and financial auxiliaries; ICPFs – Insurance corporations and pension funds; NPISH – Non-profit institutions serving households.

These categories are currency and deposits, loans, securities other than shares (excluding financial derivatives), shares (excluding unquoted shares) and insurance products. Most of the financial instruments are either mediated through financial corporations to non-financial sectors or traded on capital markets.

Broken down by original maturity, short-term financial investment relates predominantly to holdings of broad money (M3) of the euro area non-financial sectors, supplemented by certain investments in financial assets vis-à-vis other financial intermediaries. Long-term investment comprises long-term deposits and securities, insurance technical reserves, and shares. Deposits that are part of long-term financial investment are those with an agreed maturity of over two years and those redeemable at over three months' notice. The major components of financing granted to non-financial sectors are securities, loans and quoted shares. Non-financial sectors' net financial investment (stocks or transactions) may be derived by subtracting financing (liabilities or transactions in liabilities) from total financial investment (financial assets or transactions in them).[1]

Table 5 shows a breakdown of the TFI by short-term and long-term financial investment and financing. Short-term financial investment covers currency, short-term deposits, money market fund shares, short-term debt securities and prepayments of insurance premiums and coincides mainly with monetary aggregates. Nevertheless, most of the financial investments are long-term comprising deposits, debt securities, shares and insurance technical reserves. This also applies to financing of which approximately 15% of total is short-term and 85% long-term.

Table 5 – Financial investment and financing of non-financial sectors in the euro area by original maturity at end 2001

Amounts outstanding

Main financial assets	EUR billions	%	Main liabilities	EUR billions	%
Total	**15.084**	**100,0**	**Total**	**15.820**	**100,0**
Short-term financial investment	**5.479**	**36,3**	**Short-term financing**	**2.288**	**14,5**
Currency	**240**	**1,6**	**Loans**	**1.552**	**9,8**
Deposits with euro area MFIs	**4.255**	**28,2**	General government	50	0,3
Overnight deposits	1.690	11,2	Non-financial corporations	1.219	7,7
With agreed maturity up to 2 years	949	6,3	Households	283	1,8
Redeemable at notice up to 3 months	1.360	9,0	**Securities other than shares**	**572**	**3,6**
Repurchase agreements	117	0,8	General government	435	2,7
Deposits of central government	139	0,9	Non-financial corporations	137	0,9
Deposits with non-MFIs	**166**	**1,1**	**Deposits of central government**	**164**	**1,0**
Money market fund shares	**264**	**1,7**	**Long-term financing**	**13.533**	**85,5**
Securities other than shares	**221**	**1,5**	**Loans**	**6.174**	**39,0**
Prepayments of insurance premiums and reserves for outstanding claims	**334**	**2,2**	General government	841	5,3
Long-term financial investment	**9.605**	**63,7**	Non-financial corporations	2.250	14,2
Deposits with euro area MFIs	**704**	**4,7**	Households	3.083	19,5
With agreed maturity over 2 years	668	4,4	**Securities other than shares**	**3.825**	**24,2**
Redeemable at notice over 3 months	36	0,2	General government	3.446	21,8
Securities other than shares	**1.664**	**11,0**	Non-financial corporations	378	2,4
Shares	**4.198**	**27,8**	**Quoted shares issued by non-financial corporations**	**3.281**	**20,7**
Quoted shares	2.619	17,4	**Pension fund reserves of non-financial corporations**	**253**	**1,6**
Mutual fund shares (excluding money market fund shares)	1.579	10,5			
Net equity of households in life insurance reserves and pension fund reserves	**3.039**	**20,1**			

Source: ECB.

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1 *The framework behind this approach is based on the Council Regulation (EC) No 2223/96 of June 1996 on the European system of national and regional accounts in the Community (ESA95), which need to be amended to give guidance on compiling quarterly accounts in the euro area.*

2.3.2. Some shortcomings of the quarterly TFI of non-financial sectors in the euro area

Further work has to be done to fully reconcile all short-term financial investment components vis-à-vis M3. This relates predominantly to holdings of money market fund shares, money market paper and debt securities (with an original maturity up to 2 years) issued by euro area MFIs. For these items information on holdings of non-residents is available but not on the breakdown by resident sector. For currency there is no information on residency and sector of the holder.

   A further shortcoming of the table is that also no data are shown in the TFI on the holdings of monetary aggregates by sectors other than non-financial. These are non-MFI financial institutions as well as non-residents of the euro area. Integrating also the financial institutions (such as insurance corporations and pension funds as well as other financial intermediaries including financial auxiliaries) and the rest of the world into the TFI would lead to an extension of the TFI to seven sectors.

2.4. Step two – the extension of the TFI to seven sectors

The extension of the TFI to seven sectors will complete the coverage of sectoral data for monetary aggregates as well as for the other financial instruments currently shown in the TFI. Extending the table in this direction would allow the data to be balanced, amounts outstanding as well as transactions, instrument by instrument (Chart 1).

Chart 1 – The TFI covering the financing and investment components for all euro area sectors

Financial investment
(net acquisitions of financial assets as as changes in assets)

Financing
(net incurrence of liabilities changes in liabilities and net worth)

Main financial assets	EUR billions	%	Main liabilities	EUR billions	%
Total	**15.084**	**100,0**	**Total**	**15.820**	**100,0**
Short-term financial investment	**5.479**	**36,3**	**Short-term financing**	**2.288**	**14,5**
Currency	**240**	**1,6**	**Loans**	**1.552**	**9,8**
Deposits with euro area MFIs	**4.255**	**28,2**	General government	50	0,3
Overnight deposits	1.690	11,2	Non-financial corporations	1.219	7,7
With agreed maturity up to 2 years	949	6,3	Households	283	1,8
Redeemable at notice up to 3 months	1.360	9,0	**Securities other than shares**	**572**	**3,6**
Repurchase agreements	117	0,8	General government	435	2,7
Deposits of central government	139	0,9	Non-financial corporations	137	0,9
Deposits with non-MFIs	**166**	**1,1**	**Deposits of central government**	**164**	**1,0**
Money market fund shares	**264**	**1,7**	**Long-term financing**	**13.533**	**85,5**
Securities other than shares	**221**	**1,5**	**Loans**	**6.174**	**39,0**
Prepayments of insurance premiums and reserves for outstanding claims	**334**	**2,2**	General government	841	5,3
Long-term financial investment	**9.605**	**63,7**	Non-financial corporations	2.250	14,2
Deposits with euro area MFIs	**704**	**4,7**	Households	3.083	19,5
With agreed maturity over 2 years	668	4,4	**Securities other than shares**	**3.825**	**24,2**
Redeemable at notice over 3 months	36	0,2	General government	3.446	21,8
Securities other than shares	**1.664**	**11,0**	Non-financial corporations	378	2,4
Shares	**4.198**	**27,8**	**Quoted shares issued by non-financial corporations**	**3.281**	**20,7**
Quoted shares	2.619	17,4	**Pension fund reserves of non-financial corporations**	**253**	**1,6**
Mutual fund shares (excluding money market fund shares)	1.579	10,5			
Net equity of households in life insurance reserves and pension fund reserves	**3.039**	**20,1**			

Chart 1 also indicates (in bold) which financial instruments are currently covered by the TFI and for which a full coverage across the various sectors is aimed at. These sectors are the three non-financial sectors (non-financial corporations, general government and households including non-profit institutions serving households) complemented by three financial sectors, namely MFIs, insurance corporations and pension funds (ICPFs), and other financial intermediaries including financial auxiliaries (OFIs). The seventh sector is the rest of the world (meaning all economic agents outside the euro area).

Detailed accounts will have to be drawn up of further sub-sectors of general government and financial corporations. This work will be closely related to the users' needs, especially related to monetary policy analysis. For general government, quarterly non-financial and financial accounts will be available in the near future following the draft European Parliament and Council regulations on quarterly accounts. Specific analytical interest relates to central government and social security funds. One option is to use these data together with quarterly accounts for ICPFs to evaluate the economic and financial behaviour of the sub-sectors in the light of ageing populations in the euro area. Similar analytical needs are seen in relation to institutional investors in the euro area, principally financial corporations other than MFIs. For that purpose a further separation of mutual funds from OFIs may be useful.[1]

2.5. Step three – the extension of the TFI by including a full set of financial instruments

In step three all financial instruments not covered in the current TFI will be added. These are financial derivatives, loans (granted by non-financial sectors), unquoted shares, other equity and other accounts receivable and payable (trade credit, advances and other financial assets and liabilities). Further work is needed on the collection and valuation of such data. Inclusion of these categories will complete the coverage of financial instruments according to ESA 95 and will allow net lending/net borrowing to be derived.

A starting point for the collection of such data will be the annual data already available for national financial accounts as outlined in Tables 6 and 7 of the ESA 95 Transmission Programme (Annex 2).

2.6. Step four – the extension of the TFI by integrating saving and non-financial investment

A further extension of the current TFI relates to the incorporation of saving and non-financial investment, to complete the coverage of investment (financial and non-financial) and financing (net saving, net capital transfers and net incurrence of liabilities (Chart 2).

Chart 2 presents the accumulation account as a combination of the financial account with the capital accounts. It covers all transactions of the euro area and its sectors, which contribute to the accumulation of stocks of assets - non-financial or financial and held by the euro area and its sectors - and liabilities incurred within the accounting period.[2] There is a strict requirement in the accumulation account for each sector and the economy as a whole that the investment must be equal to the financing.

Net lending/net borrowing does not appear in the accumulation account. It would be artificial to show it because no corresponding item appears in the changes in (non-financial and financial) balance sheets. The balancing item of the accumulation account is (net) saving.

The basic accounting tools reflecting these activities are balance sheets as well as transaction and other flow accounts of institutional sectors such as households, non-financial corporations, financial corporations and government. The management of their portfolios comprises, besides the structure of stocks, also decisions on transactions (e.g. consumption and income) and decisions taking into account other flows – especially changes in values (measured as holding gains or losses).

Following this line of reasoning statistical discrepancies are shown between saving compiled via the accumulation account and saving compiled via the use of income account, or form a new category "error and omission" being either part of the use of income account or the accumulation account.

The accumulation account will be complemented by components taken from the production and income accounts. The link with real variables allows the interrelation between financial and

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1 *OFIs may include mortgage finance vehicles etc. which are not "institutional investors."*
2 *Changes of stocks are also due to revaluations and other changes in the volume of assets.*

Chart 2 – The TFI covering saving, financing and investment (a numerical example)

Changes in assets   **Changes in liabilities and net worth**

Rest of the World	Euro area	Nonfinancial corporations	Financial corporations	General government	Households and NPISH	Transaction	Nonfinancial corporations	Financial corporations	General government	Households and NPISH	Euro area	Rest of the World
						Financing	205	236	132	260	833	50
						Changes in net worth due to saving and capital transfers	65	4	-38	199	230	-38
						Saving, net	48	11	-10	184	233	
						Current external balance						-42
						Capital transfers, receivable	33		6	23	62	4
						Capital transfers, payable	-16	-7	-34	-8	-65	-1
						Net incurrence of liabilities	140	232	170	61	603	88
49	834	205	236	132	261	**Investment**						
	192	134	-1	12	47	**Non-financial investment**						
	376	250	9	37	80	Gross fixed capital formation						
	-222	-137	-10	-30	-45	Consumption of fixed capital (-)						
	28	26			2	Changes in inventories						
	10	2		3	5	Acquisitions less disposals of valuables						
		-7		2	5	Acquisitions less disposals of non-produced/non-financial assets						
49	642	71	237	120	214	**Net acquisition of financial assets**						

real variables to be studied, which also relates to the monetary policy transmission process, as reflected in income and wealth effects.

2.7. Step five – who-to-whom quarterly MUFA

2.7.1. Who-to-whom information in the current TFI

The current TFI as published in the ECB Monthly Bulletin shows only partly who-to-whom information. The kind of data mainly relates to deposits and loans, which are not traded on markets and, therefore, easily identifiable by counterpart sector. For instance, the data taken from MFI balance sheet statistics allow deposits acquired or loans incurred by the individual non-financial sectors vis-à-vis MFIs anywhere in the euro area to be shown. Non-financial sectors' deposits and loans vis-à-vis MFIs outside the euro area are not covered by the MFI balance sheet statistics.

Euro area aggregates derived from quarterly national financial accounts mostly provide a breakdown by counterpart residency (resident and non-resident) from a national perspective. The more detailed split of the data into other MU and extra-MU (which is required for the derivation of the rest of the world accounts) is not yet available for most of the national data.

To overcome these obstacles the national data need to be provided with a split by counterpart residency into resident, other MU and extra-MU. For instance, to derive proper euro area aggregates and to show which sectors (in the euro area) acquire quoted shares issued by resident corporations data have to be provided from a national perspective with the breakdown as indicated in Chart 3.

Chart 3 – Provision of data on the issuance of quoted shares from a national perspective

Debtor area / debtor sector	Creditor area / creditor sector								Exra-MU
	Resident				Other MU				
	Non-financial corporations	Financial corporations	General government	House-holds	Non-financial corporations	Financial corporations	General government	House-holds	
Resident non-financial corporations	1A	1B	1C	1D	1E	1F	1G	1H	1I
Resident financial corporations	2A	2B	2C	2D	2E	2F	2G	2H	2I

The same applies to the collection of national data on holdings of quoted shares: The national data provided by the Member States should cover series on quoted shares held by resident sector (columns) which are issued by resident, other MU and extra-MU non-financial and financial corporations (Chart 4).

Chart 4 – Provision of data on holdings of quoted shares from a national perspective

Debtor area	Debtor sector	Resident creditor sector			
		Non-financial corporations	Financial corporations and sub-sectors	General government and sub-sectors	Households
Resident	Non-financial corporations	1A	1B	1C	1D
	Financial corporations	2A	2B	2C	2D
Other MU	Non-financial corporations	3A	3B	3C	3D
	Financial corporations	4A	4B	4C	4D
Extra-MU		5A	5B	5C	5D

In financial accounts the restriction always applies that, as for this example, the sum of quoted shares held by residents (which are issued by residents and non-residents) is equal to the sum of quoted shares issued by residents (which are held by residents and non-residents) – on a national as well as on an euro area level. If for instance the euro area comprised two countries (c_1 and c_2), the matrix of Chart 5 would have to be constructed in the following way:

For instance, the holdings of quoted shares by non-financial corporations (column 1) in the euro area would comprise: The sum of the holdings vis-à-vis corporations (non-financial and financial) in country 1 and in country 2 belonging to the MU as well as vis-à-vis corporations which are not residents of the MU. Based on this who-to-whom information the data on holdings vis-à-vis specific sectors as reported by country 1 should correspond to the data reported on the issuances vis-à-vis specific sectors reported by country 2. For instance, items 3A and 1E should be identical. If discrepancies would be reported reconciliation exercises would have to be undertaken.

Chart 5 – Compilation of a who-to-whom euro area matrix for quoted shares in a two-country case

Creditor sector \ Debtor sector	Non-financial corporations	Financial corporations and sub-sectors	General government and sub-sectors	Households	Extra-MU	Total
Non-financial corporations	1A (c1..c2) 3A (c1..c2)	1B (c1..c2) 3B (c1..c2)	1C (c1..c2) 3C (c1..c2)	1D (c1..c2) 3D (c1..c2)	1I (c1..c2)	1,3A,B,C,D; 1I (c1..c2)
Financial corporations	2A (c1..c2) 4A (c1..c2)	2B (c1..c2) 4B (c1..c2)	2C (c1..c2) 4C (c1..c2)	2D (c1..c2) 4D (c1..c2)	2I (c1..c2)	2,4A,B,C,D; 1I (c1..c2)
Extra-MU	5A (c1..c2)	5B (c1..c2)	5C (c1..c2)	5D (c1..c2)		5A,B,C,D (c1..c2)
Total	1-5A (c1..c2)	1-5B (c1..c2)	1-5C (c1..c2)	1-5D (c1..c2)	1-2I (c1..c2)	1-5A,B,C,D; 1-2I (c1..c2)

2.7.2. Who-to-whom as reflected in methodological handbooks

Chapter 11.F of SNA 93 bases who-to-whom accounts (detailed flow of funds accounts) on two three-dimensional tables (Tables 11.3a/b): The first table records transactions in assets cross-classified by type of asset and by debtor sector; the second table records transactions in liabilities cross-classified by type of liability and by the creditor sector. Similar tables could also be designed for balance sheet items. The chapter also describes how to use such tables in various economic policy areas.

The ESA 95 defines such a system as a financial account by debtor/creditor (of a sector or the rest of the world), showing a breakdown of the net acquisition of financial assets by debtor sector and of the net incurrence of liabilities by creditor sector (paragraph 5.13). The same applies for the financial balance sheet by debtor/creditor (of a sector or the rest of the world) as outlined in paragraph 7.69.

The IMF's Government Finance Statistics Manual 2001 outlines the importance of classifying transactions in (and stocks of) financial assets and liabilities by (counterpart) sector. It stresses that, for a full understanding of financial flows and the role they play in government finance, it is often important to know not just what types of liabilities a government unit uses to finance its activities, but also which sectors are providing the financing. In addition, it is often necessary to analyse financial flows between subsectors of the general government sector. Table 8.4 of the Government Finance Statistics Manual is an extended version of the 'government part' of Tables 11.3a/b of SNA 93. Financial assets and liabilities are both classified by the residence and the sector of the unit that issued the financial asset or holds the liability. Even for the non-resident units (referred to collectively as the rest of the world) it is important to know not only the amount of financing received from non-resident units, but also the types of non-resident units supplying the financing by sector.

The IMF's Quarterly National Accounts Manual as well as handbooks dealing solely with the rest of the world account like the Balance of Payments Manual, 5th edition, refer to the importance of showing detailed counterpart information. By definition, assets and liabilities of the euro area rest of the world account are presented in relation to its counterparts, the resident sectors. For instance, whether debt is depends on the residence status of the creditor and debtor. For external debt, the institutional sector presentation follows the concept described in SNA 93.

To conclude, the three-dimensional tables as described in the SNA 93 cover the breakdowns by instrument, debtor and creditor sector necessary for a detailed who-to-whom presentation - either designed for the whole euro area or for specific euro area sectors and subsectors. The tables allow an analysis of who is financing whom, to which amount and by which instrument. Questions could be answered like: What are the counterpart sectors of financial investment and financing decisions of a sector or a subsector? Which are the corporations (financial or non-financial, resident or non-resident) in which the government sector holds participations? Alternatively: who is holding the government or corporations debt in the euro area or abroad?

2.7.3. Collection of who-to-whom statistical information

To compile who-to-whom quarterly MUFA, counterpart information has to be collected for the various financial instruments held and incurred by the institutional sectors, like deposits, loans, securities, and shares including other equity. To extract who-to-whom information from the most reliable statistical source, data derived from the various accounting systems of institutional units should be used – amended by statistical information taken from capital markets. Usually, no detailed quarterly counterpart information is available for non-financial corporations and households including non-profit institutions serving households. Even from other financial statistics, only partial who-to-whom information is accessible.

2.8. Step six – an integrated system of quarterly MUFA

For a fully fledged system with who-to-whom relationships, work is needed on accumulation accounts and balance sheets. Major obstacles might be to develop a set of other flow accounts covering revaluation and other changes in the volume of assets accounts and to collect data for the compilation of amounts outstanding for non-financial assets; work on these aggregates for households and non-financial corporations should start.

3. Constraints in compiling quarterly MUFA

Two main restrictions have to be taken into account in compiling quarterly MUFA, relating to the quality, including timeliness, of statistical sources and to scarce human resources.

3.1. Statistical sources to compile quarterly MUFA

As derived statistics, quarterly MUFA draws on quarterly national financial accounts and – as far as possible – on relevant euro area statistics like money and banking, balance of payments, and securities issues data available at the ECB. For the time being, only quarterly balance sheet and transaction data of quarterly national financial accounts (for deposits, loans, securities, quoted and mutual fund shares, and insurance technical reserves), MFI balance sheet statistics (for currency, deposits and loans), and BIS international banking statistics (for deposits and loans) are incorporated into the quarterly TFI of non-financial sectors in the euro area.

3.1.1. Quarterly national financial accounts

Quarterly national financial accounts are provided by the Members of the Working Group on Monetary Union Financial Accounts for ten euro area Member States covering financial transaction and balance sheet data for selected financial instruments (financial assets and liabilities). The data transmitted to the ECB cover non-financial corporations, general government and households including non-profit institutions serving households. The requirements have been specified during various test data transmissions. Since the beginning of February 2002, the data sets for deposits with non-MFIs, securities other than shares (excluding financial derivatives), loans taken from non-MFIs, quoted shares, mutual funds shares and insurance technical reserves are regularly transmitted with a time lag of approximately four months.

3.1.2. MFI statistics

As shown in the ECB Monthly Bulletin (euro area statistics, Chapters 1 and 2), timely and high-frequent balance sheet and transaction data are available for the Eurosystem (s.121)[1], other euro area monetary financial institutions (other MFIs, s.122), and euro area MFIs on a consolidated basis (s.121/122). MFI statistics cover monthly and quarterly stocks and transactions as originally specified in the Regulation (ECB/1998/16)[2] concerning the compilation of the consolidated

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1 *The sector and sub-sector classifications follow ESA95.*
2 *From January 2003 replaced by Regulation ECB/2001/13 of 22 November 2001.*

balance sheet of the MFI sector.[1] The data - available from 1997Q3 onwards - are broken down by financial instrument, original maturity, institutional sector, currency, and residency. The balance sheet data are the basis for the compilation of euro area monetary aggregates.

In general, transaction data are not directly collected but derived from changes in stocks with adjustments made to remove from the flows the impact of non-transactions. While euro area Member States supply monthly adjustments on 'reclassifications' and revaluations other than exchange rate changes, they have only recently started to report quarterly adjustments for more detailed sectoral breakdowns necessary for MUFAs (data on Tables 2 and 3 of the Regulation ECB/1998/16).

3.1.3. BIS international banking statistics

For cross-border transactions and positions of banks and non-banks, the BIS international banking statistics on deposits and loans are currently used. These stock and transaction data comprise deposits and loans of euro area non-banks vis-à-vis non-euro area banks. The data are not broken down by euro area sector.

Such constrains may lead to a gradual substitution of this data source by series taken from the balance of payments and the international investment position statistics.

3.2. Quality standards of the statistical sources used to compile the quarterly TFI

3.2.1. Quality standards related to ESA 95 principles

The data sources used to compile quarterly MUFA usually comply with principles as specified in ESA 95. These are mainly the appropriate treatment of instrument classification, institutional sector and area delimitation (residency criteria), market valuation and time of recording.

3.2.2. Quality standards related to the derivation of euro area aggregates

Specific requirements are necessary to compile euro area euro area aggregates. As noted earlier, national data like quarterly national financial accounts need a breakdown of the counterpart into the categories 'residents of the national economy', 'residents of other euro area member states', and 'other non-residents', to permit the compilation of euro area sectoral accounts with a "counterpart" sector rest of the world. Few Member States in euro area can currently provide such a complete residency split; more timely and detailed quarterly data on the balance of payments and international investment position will allow gradually such a split in quarterly MUFA.

Others issues relate to the coverage of data on transactions and positions of the EU institutions. For the time being, only a subset of these data is available.

3.2.3. Quality standards related to who-to-whom information

To compile quarterly financial accounts in a who-to-whom framework, the collection of statistical data will concentrate on financial data directly collected from the respective institutional units. Such a direct reporting by institutional units allows a who-to-whom presentation of financial transactions and stocks if appropriate who-to-whom information is available.

Existing data collection systems may in time have to be amended. This may be especially necessary for households, non-financial corporations and insurance corporations and pension funds. One option will be to design surveys for these sectors covering statistical information of their financial investment and financing. For corporations, national databases which cover individual information on balance sheets, profit and loss and financial transactions should be combined to extract additional statistical information on these sectors. Security-by-security databases covering individual information on issues and holdings of securities and shares will have to be designed in such a way that who-to-whom information can be extracted.

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1   *For financial transactions, the term 'true flows' or 'flows' is used in MFI statistics.*

3.2.4. Quality standards related to metadata information

To allow an appropriate commentary and analysis of the quarterly MUFA, the transmission of national data have to be amended by metadata which provide additional information on specific developments, like major transactions, reclassifications or mergers and acquisitions, and on revisions. In this respect, the Manual on Sources and Methods for the Compilation of ESA 95 Financial Accounts disseminated by Eurostat is an essential contribution.

3.3. Human resources

Few people work on the compilation of financial accounts, compared with other areas of statistics. One reason for this might be that the development of detailed systems of financial accounts has been started in many European countries rather late – mainly influenced by the legal requirements to compile and transmit financial accounts laid down in ESA 95.

4. Steps done so far and further steps

Since the middle of last year, substantial progress has been made in the field in compiling and commenting quarterly MUFA. A sub-set of quarterly financial accounts, the TFI of non-financial sectors of the euro area, was published for the first time in the May 2001 issue of the ECB Monthly Bulletin.

4.1. Quarterly TFI

a   Commentaries in the March, June, September and December issues of the ECB Monthly Bulletin cover the quarterly TFI (e.g. the box in the June 2002 issue on the financing and financial investment decisions of the non-financial sectors in the euro area to the end of 2001).
b   The regular transmission of the quarterly supplementary financial accounts data for Table 6.1 in the euro area section of the ECB Monthly Bulletin and further development of quarterly MUFAs will be enhanced and stabilised through an ECB Guideline.
c   The regular quarterly transmission will also contain commentaries (metadata) on revisions and major events related to transactions, other changes in the volume of assets and revaluations (during the most recent quarter). The commentaries will be integrated into the MUFA compilation system, summarised in a quarterly report on revisions and major events.[1]
d   Based on the available set of supplementary quarterly national financial accounts and with euro area financial statistics (MFI, balance of payments, international investment position, government finance statistics) the system of consistency and plausibility checks within the financial accounts framework will be further developed. This will also cover further reconciliation between the short-term financial investment components and M3.
e   A first comprehensive set of quarterly national financial accounts for the central government sub-sector is expected to be received by the end of September 2002 in the framework of the (currently draft) European Parliament and Council regulation for quarterly financial accounts for the government sector. These quarterly data will be integrated into the current TFI and their consistency will be assessed with the data transmitted so far for the non-financial sectors.

4.2. Extension of the quarterly TFI

The aim is to compile and publish a broader set of quarterly euro area financial accounts (by sector) initially with the instrument coverage of the current TFI.
a   The sector coverage of the quarterly TFI will be extended by integrating additionally financial investment and financing data of ICPFs.
b   Afterwards, sectoral data of MFI and OFIs will be shown by combining money and banking statistics and related statistics already available at the ECB and supplementary national financial accounts.

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1   *The report on revisions and major events will not include confidential information.*

c   The work will also continue to compile the rest of the world financial transaction account and balance sheet using money and banking and balance of payments and external reserves sources. Within these accounts, available MFI data as well as balance of payments and international investment position data will be integrated - taking also into consideration the work already done in relation to the monetary presentation of the balance of payments.

By balancing the net acquisition of financial assets and net incurrence of liabilities – and the amounts outstanding – across euro area sectors and instrument by instrument, a set of consistent and integrated financial transaction accounts and balance sheets will be compiled for six euro area sectors and the rest of the world.

4.3. Compilation of annual financial and capital accounts for the euro area

As a further step towards a fuller set of sectoral accounts the ECB intends to publish annual sectoral financial and capital accounts based on national data. The annual data are seen as a benchmark to continue the work on quarterly MUFA as outlined above.[1]

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(http://www.ifcommittee.org/S1mink.pdf).

The International Investment Position: Measurement aspects and usefulness for Monetary Policy and Financial Stability issues

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1. Introduction

The international investment position (IIP) under the form of a balance sheet covering all the external assets and liabilities of a country is a rather new concept with respect to other statistical aggregates designed at a national level. Indeed, only in 1993, with the publication of the fifth edition of the *Balance of Payments Manual*, did the International Monetary Fund (IMF) lay down a series of common principles for the reporting and valuation of financial claims and liabilities vis-à-vis foreign countries. Until then, only a limited number of developed countries had regularly published an IIP in accordance with their own methodologies. Even today, only a few countries produce IIP aggregates: at the beginning of 2002, 78 countries provided the IMF with an IIP, of which 57 on a yearly basis and 21 on a quarterly basis. [2]

In part, IIP statistics developed slowly due to complex methodological problems relating to the construction of this aggregate, notably issues regarding stock valuation and reconciliation with flows recorded in the balance of payments. More fundamentally, the IIP has become particularly relevant in the light of the financial globalization process under way for the last twenty years. While countries recorded limited cross-border financial flows – mainly of public origin – in their balance of payments financial account, reserve assets and external public debt were sufficient to assess the net position vis-à-vis other countries. However, the huge development of cross-border private financial transactions since the early 1980s, as a consequence of the general trend of liberalization of capital flows, makes it all the more useful to have a complete and detailed IIP showing a functional (direct or portfolio investments, loans and deposits) and sectoral (general government, monetary authorities, banks and other sectors) breakdown.

The development of IIP statistics reflects both the growing internationalization process of large companies and the increasing role of capital markets in the financing of national economies. However, beside being a very topical subject, the IIP as a financial indicator remains little used and often quite unknown among economists. This situation is essentially due to objective factors, i.e. a lack of historical data as aggregates are recent, a data frequency limited on the whole to a yearly periodicity and different methodologies complicating the interpretation and comparison of national data. Yet the usefulness of the IIP is not in doubt. It provides very comprehensive information for central banks, as it makes it possible to estimate the consequences of a lasting external surplus or deficit of a country, as well as those of domestic or foreign shocks on the value of stocks of external financial assets and liabilities.

The structure of the paper is as follows. Section 2 situates the IIP within the panel of other statistical indicators and deals with a number of issues such as valuation problems that have to be considered before any analysis is made. Section 3 illustrates the usefulness of the IIP for monitoring financial stability and for assessing the impact of monetary policy decisions and section 4 presents the different possibilities of enhancing the usefulness of these statistics.

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2   *These figures do not include the ECB which has been publishing an annual IIP for the euro area from the end of 1998.*

2. What is the IIP?

2.1. The role of the IIP within the panel of other statistical indicators

The *Balance of Payments Manual (Fifth Edition)* published by the IMF provides the following definition: "*the international investment position is the balance sheet of the stock of external financial assets and liabilities. The financial items that comprise the position consist of claims on nonresidents, liabilities to nonresidents, monetary gold, and SDRs.*" The IMF recommends that IIPs be compiled on a yearly basis, but encourages their quarterly publication. The IIP has been included in the series of statistical indicators covered by the special data dissemination standard (SDDS) implemented by the IMF in 1996 and to which 50 countries have subscribed so far.

Insofar as it represents the external balance sheet of a country, the IIP is complementary to balance of payments (BOP) statistics. Indeed, flows reported in the financial account and reserve assets, together with revaluations and other adjustments, can account for the variation of the position from one period to another. It therefore makes it possible to check the consistency between both sets of statistics. This is the main reason why the IMF dealt with the IIP methodology in a joint manual with the balance of payments, adopting the same item classification for the IIP as for the financial account of the BOP.

Figure 1 – International investment position: standard components

	Position at the beginning of the year	Transactions (BOP flows)	Price variations	Exchange rate variations	Other adjustments	Position at the end of the year
Assets						
1 Direct investment						
1-1 Equity capital and reinvested earnings						
1-2 Other capital						
2 Portfolio investment						
2-1 Equity						
2-2 Bonds and notes						
2-3 Money market instruments						
3 Financial derivatives						
4 Other investment						
5 Reserve assets						
Liabilities						
1 Direct investment						
1-1 Equity capital and reinvested earnings						
1-2 Other capital						
2 Portfolio investment						
2-1 Equity						
2-2 Bonds and notes						
2-3 Money market instruments						
3 Financial derivatives						
4 Other investment						
Net position						

Source : IMF, Balance of Payments Manual (Fifth Edition)
As regards portfolio investment and other investment, four sectors must be distinguished: monetary authorities, general government, banks and other sectors.

The reconciliation process of flows and stocks is described by Committeri (2000). The IMF (1993) makes the following distinction between the different sources of changes in stocks :
- balance of payments flows related to the financial account and reserve assets. Excluding errors and omissions, these flows offset those of the current and capital accounts, thus enabling to determine the country's external surplus or deficit;
- price variations of financial assets or liabilities resulting for instance from changes in stock market prices. Except for "other investments" which are recorded for their nominal value, all other items in the IIP should in principle be valued at market prices;
- impact of currency revaluation in comparison to the previous period;
- other adjustments that do not arise from transactions, such as reclassifications, allocations of SDRs or debt cancellations.

This can be summarized by the following approximated equation for one specific security (adapted from Committeri, 2000):

$$S_n = \frac{p_n}{p_{n-1}} \times \frac{e_n}{e_{n-1}} \times S_{n-1} + \sum_{m=1}^{12} \frac{p_n}{\overline{p}_n^m} \times \frac{e_n}{\overline{e}_n^m} \times (F_n^m + NT_n^m)$$

where

S_n stands for the stock of this security held at the end of year n,

P_n the price of the security at the end of year n,

$\overline{P}_n^m$ the monthly average price of the security during month m of year n,

e_n the applicable exchange rate at the end of year n,

$\overline{e}_n^m$ the monthly average exchange rate during month m of year n,

F_n^m the monthly BOP flow for month m of year n, and

NT_n^m non-transaction changes occurred during month m of year n.

There is also a close relationship between the IIP and the external debt which in practice represents a sub-section of the IIP. As regards external debt, international organizations have made considerable efforts to improve the transparency and readability of statistics published by countries. Thus, within the framework of the SDDS, the IMF has scheduled a publication of the external debt aggregate for participating countries on a quarterly basis starting as of end of March 2003, the reference date. The methodology for compiling external debt statistics has been updated by the Inter Agency Task Force on Finance Statistics (IATFF)[1] in a guide published by the IMF in November 2001 and is entirely consistent with the methodology adopted for the IIP. In practice, the external debt covers – together with identical items – all the liabilities reported in the IIP except for equity capital in direct and portfolio investment, reinvested earnings of inward direct investment, and liabilities within the financial derivatives item. However, additional information is required for external debt statistics with a breakdown based on the remaining maturity (under one year/over a year).

Finally, the IIP is integrated in the national accounts (rest of the world account). For this reason, when the IMF laid down the foundations for the IIP methodology in the *Fifth Manual*, it favored the greatest possible integration of these statistics in the revised System of National Accounts (*1993 SNA*). The aim is to achieve a certain consistency between both sets of statistics, i.e. the balance of payments and the IIP, and the national accounts, through common methodological standards (reporting based on the same types of financial transactions, on the notion of residence and on identical valuation rules). At the same time, presentation standards still differ : national accounts focus on an analysis by financial instrument and institutional sector as outlined in the *1993 SNA*, which is more detailed and not fully comparable to balance of payments and IIP data. Another problem lies in the use by national accountants, for certain items related to the rest of the world sector, of data differing from balance of payments or IIP data e.g. when certain breakdowns are not available or valuation methods differ in practice. This matter can be solved through a reconciliation process led jointly by statisticians in charge respectively of these two aggregates. In the case of France, gaps existing before the publication of the *Fifth Manual* between the IIP and the rest of the world account have since almost entirely disappeared.

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1   *The IATFF was created in 1996. Its members are international organizations interested in financial statistics : the BIS, the Commonwealth Secretariat, the ECB, Eurostat, the IMF, the OECD, the Paris Club Secretariat, the UNCTAD and the World Bank.*

Figure 2 – Links between the IIP and the other main statistical aggregates

BOP flows

Quarterly flows (possibly monthly)	Annual stocks (possibly quarterly)	Quarterly stocks	Quarterly and annual flows and stocks
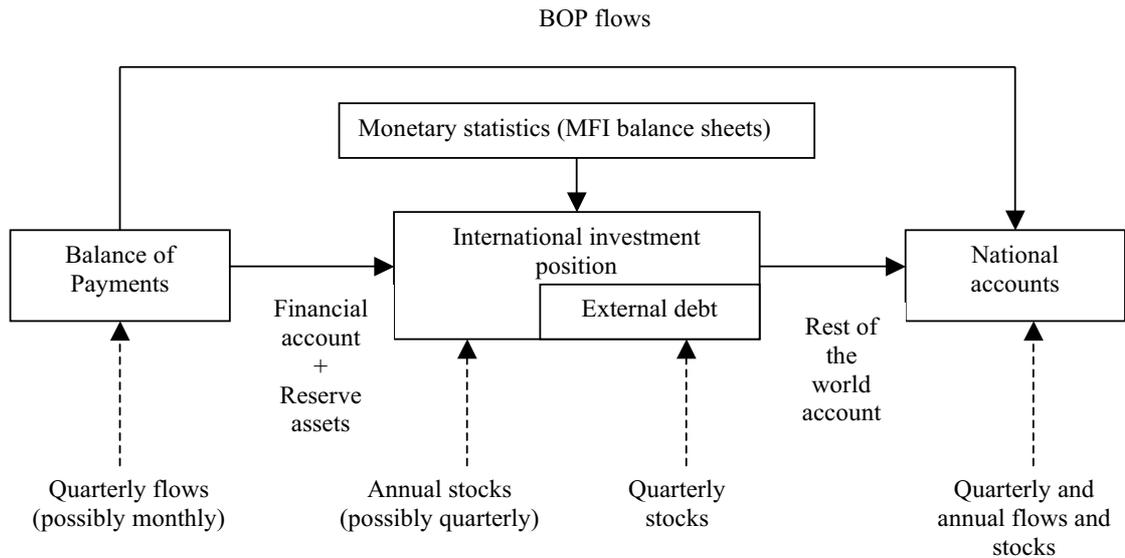
2.2. Main practical problems to be considered before analyzing the IIP

With economists tending to ask for shorter lags for the disclosure of financial information, the main disadvantage of the IIP is obviously its low publication frequency, i.e. quarterly, if not yearly, and its long production delays. The IIP is published six to nine months after the reference date [1] and a large part of it is based on estimates, e.g. direct investment and portfolio investment figures will generally be revised at the next publication when actual stock data are available.

Statisticians have to use data from various sources to compile the IIP and face problems very similar to those encountered for the compilation of the balance of payments. [2] In principle, balance sheet data are available on a monthly basis for monetary authorities and the banking sector (monetary and financial institutions or MFI) for monetary statistics purposes, though marked-to-market data may be missing. Central government data are usually available ; other central government agencies included in the general government sector also provide annual stock data. However, external claims and liabilities of "other sectors" may be less accurate. Some other sectors' financial flows may be reported by banks, since they process most of the capital transfers abroad. Yet the reporting of stocks must be obtained through surveys relating to assets (or liabilities) with non resident counterparts, like for direct investment. In addition, households and companies may show some reluctance to provide statistical reports, e.g. for privacy reasons. Besides, unlike the financial sector, non-banks are generally less used to giving marked-to-market information. [3]

Financial disintermediation makes the problem even more acute, since the increase in cross-border transactions has essentially involved other sectors in the major developed countries. In the case of the French IIP, at the end of 2000, non-banks accounted for 48% of external assets and 52% of external liabilities. These figures were both below 30% in the early 1990s.

The data collection of financial derivative stocks as well as their valuation is uneasy. It is especially hard to make the split between assets and liabilities as some of these instruments (swaps) can move from one side to the other throughout their life. Furthermore, different valuation methods can be applied (replacement cost, valuation at credit risk equivalents, stress value, etc). These problems can explain why a large number of countries which publish an IIP do not include any data on financial derivative stocks. So far the overall net outstanding amounts of these instruments has remained subdued.

Where actual stock are not available, stocks are derived from flows, taking into account exchange rate and price variations. This is probably the most sensitive part of the work, particularly in periods of high volatility of financial markets. Balance of payments flows are indeed recorded at market value at the time the transaction took place i.e. "*at the actual price agreed upon by transac-*

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1 *Within the SDDS framework, the IMF requires the IIP be published within six months after the end of the year.*

2 *The euro area IIP is particularly complex to elaborate. At present it is only compiled on a net basis, by aggregating net IIPs from all member states under the assumption that intra bilateral positions cancel out. However net assets and net liabilities should be available with the release of the IIP at end of 2001.*

3 *BIS international banking statistics can be used as mirror statistics to get data on non-banks' deposit holdings in non resident deposit institutions.*

tors" (IMF, 1993), while stocks should be valued at market price at the end of the period to which the balance sheet relates. Hence the need to revalue flows and the initial stock in order to compile an estimated final stock. In France, this revaluation is currently made under the very strong assumptions that BOP flows are evenly distributed and exchange rates and prices vary linearly over the period under review. Initial IIP estimates should therefore be considered with much caution.

Independently of the problem of deriving stocks from flows, the method of stock valuation, when actual stock data are available, is an issue in itself. One can distinguish three methods of valuation of IIP stocks:

1   the historical cost valuation (using information from the asset side of the balance sheets of investors),
2   the book valuation (information from the liability side of the balance sheets of direct investment companies, issuers or any beneficiary of foreign investments), and
3   the market valuation (using information from financial markets).[1]

Short-term and long-term loans and deposits to/from banks and non-banks are usually recorded at historical cost, while official reserve assets are valued at market prices at the end of the period.[2] However the question is more complicated for direct investments in equity capital and portfolio investments in domestic or foreign securities.

Valuation methods may differ depending on whether the financial instrument materializing the investment is quoted or not. Most portfolio investments are made in quoted instruments, for obvious liquidity reasons. On the contrary, we observe, at least in France, that the greatest part of direct investment is directed toward unquoted companies.

When the instrument materializing the investment is quoted, market value can be estimated either on an aggregate basis using market indices, or on a security-by-security basis using commercial or public databases. As shown by Committeri (2000), the results obtained by the second method are unsurprisingly much closer to actual values than aggregate estimates.

In the case of direct investment in unquoted companies, several methods may be used to estimate market value. Most of them are based on the extrapolation to unquoted companies of ratios which can be observed for quoted companies, e.g. ratio capitalization / nominal capital or capitalization / own funds at book value, price earnings ratio, etc. However, such an extrapolation requires that unquoted companies be comparable to quoted companies (comparable size, same sector of activity, etc), which may be a strong assumption.

Market value can also be estimated by discounting future cash flows to the present value. This method is commonly used by financial analysts and is easy to apply provided that future cash flows are known with certainty (as for fixed income securities) or can be estimated without much difficulty after choosing the relevant discount rate. In practice, for the valuation of direct investment stocks in equity capital, past net operating results can be used as a proxy for future cash flows, while a long-term interest rate is used as discount rate. Most of the time though, direct investment stocks both in quoted and unquoted companies included in the IIP remain at book value (no market value is estimated).[3]

The choice of a valuation method has major consequences. In 1990, the U.S. Bureau of Economic Analysis temporarily suspended the publication of the net IIP of the United States, because of concerns regarding valuation methods (Landefeld and Lawson, 1991). In the case of the French IIP, two different figures for direct investment stocks are published, one at book value and the other at market value. At the end of 2000, the market value of French inward and outward direct investment stocks was more than twice the book value. At the time, the net French IIP was positive (net assets of EUR 81.2 billion) when considering direct investment stocks at market value, but negative (net liabilities of EUR 127 billion) when taking direct investment stocks at book value. The difference reflects significant price revaluations following stock market changes. In 2001, these changes may lead to a reduction in marked-to-market direct investment stocks at the end of the year, as main stock markets have been falling almost continuously over the period.[4]

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1   *The U.S. Bureau of Economic Analysis proposes a fourth method to value direct investment at current-cost, " using a perpetual inventory model for plant and equipment, general price indexes for land, and special adjustment factors for inventories" (Landefeld and Lawson, 1991). This method relies on information from the asset side of the balance sheets of direct investment companies.*

2   *The issue of market valuation of loans or deposits is fraught with difficulties as shown by the discussion about the implementation of the "full fair value" principle to banks' balance sheets.*

3   *The ECB is considering a method mixing book valuation for direct investment in unquoted companies and market valuation for direct investment in quoted ones. However, given that a majority of member-states are currently unable to send marked-to-market data, the euro area direct investment position is still compiled at book value.*

4   *First estimates based on flows accumulation indicate a reduction in French marked-to-market direct investment stocks at end-2001 in spite of positive net flows of foreign direct investment to France and French direct investment abroad. Inward stocks thus decreased from EUR 694.4 bn at end-2000 to EUR 636.8 bn at end-2001, while outward stocks fell from EUR 1090.5 bn to EUR 1029.2 bn.*

It is therefore important to be aware of the methods of compilation and valuation before analyzing the IPP, which is the subject of the next section.

3. Use of the IIP as an analysis tool for central banks

3.1. The IIP as a measurement of the financial openness of a country and an indicator of external debt sustainability

The IIP in all its components is probably the statistical aggregate that best reveals the scale of financial openness of an economy. As cross-border financial flows have been growing during the last twenty years, the ratio of total external claims and liabilities to gross domestic product for the main developed countries soared dramatically (Graph 1).

Graph 1 : Gross Assets and Liabilities / GDP
G5 Countries
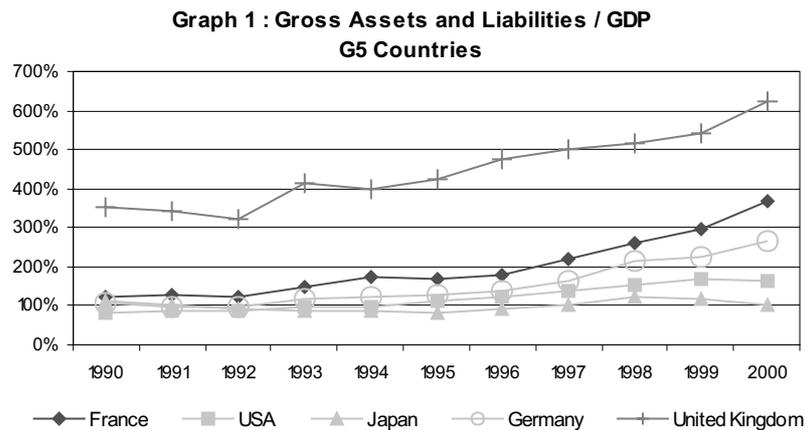
Source: IMF, International Financial Statistics

The IIP provides a comprehensive measurement of the outstanding claims and liabilities of an economy. As such, it serves as a basis for assessing the risk of a country experiencing a short-term financial crisis (liquidity crunch) or a long run financial crisis (solvency risk), in accordance with the methods of analysis commonly implemented by international organizations.

Obviously, this risk will be assessed differently according to the degree of financial development.

In the case of emerging countries, the external debt aggregate remains more relevant for measuring the risk of financial instability. Indeed, apart from reserve assets, external claims (mostly in private hands) are most of the time unavailable to cover external liabilities, particularly when these are owed by the central government or public administrations. Furthermore, the revenues drawn from the assets are generally not repatriated. This is probably the case in Argentina : last data released at end 2000 showed external liabilities amounting to USD 226.8 billion, representing 80 % of the GDP for the same year. Meanwhile, claims amounted to USD 152.4 billion (thereof 26.9 billion of reserve assets) bringing the debit balance of the IIP to USD 74.4 billion (26 % of the GDP). Yet the outstanding amounts of financial claims reported in Argentina's IIP largely reflect the extent of capital flight initiated by local private agents and therefore cannot be considered as a resource to cope with a financial crisis.

However, the IIP is useful for emerging countries as it gives retrospective information on the impact of the capital account liberalization on the different types of cross-border financial flows. The progressive dismantling of exchange control systems inevitably causes the swelling of cross-border financial flows, thus making it difficult to anticipate the behavior of economic agents and heightening risks of a financial crisis during the transition period. These risks result either from an uncontrolled (short-term) capital inflow, or from capital flight abroad. In addition to the analysis of flows via the balance of payments, the IIP can therefore be used to monitor the sequencing of liberalization through the impacts observed on the external balance sheet of the country.

In the case of developed countries, whose national currencies are internationally accepted and which do not present a default risk, the IIP seems to be the appropriate tool for assessing financial stability. Indeed, debt sustainability is in this case better assessed by considering all the external liabilities recorded in the IIP. However this assessment should not be restricted to the net position but should also cover gross stocks of external claims and liabilities which make it possible to value

the wealth effects resulting from changes in exchange and interest rates. Furthermore, this analysis of wealth effects should be conducted not only at an overall level, but also according to the various breakdowns – by instrument and by sector – available in IIP data.

3.1.1. Interpretation of the financial openness ratio

The financial openness ratio is the first indicator to be looked at. Taking into account the level of financial liberalization of the country, as well as its attractiveness to foreign investment makes it possible to size up the potential impact of external constraints on national wealth. The easiest method consists in calculating the ratio of the cumulated stock of external claims and liabilities to the gross domestic product (GDP) of a country, as shown in graph 1. The financial openness ratio is then expressed as follows:

$$FinancialOpennessRatio_{i,t} = \frac{\sum_{j \neq i} (A_{i,j,t} + A_{j,i,t})}{GDP_{i,t}}$$

where $A_{i,j,t}$ represents the assets of country i owned in country j at the end of period t.

Although this indicator or its variants are widely used among economists for comparing levels of financial openness among different countries, it does have some shortcomings. First, it compares asset stocks with flows, with GDP being used as a denominator to control for the relative sizes of countries in international comparisons. Second, unless the capital-output ratio is the same in all countries, the above ratio does not provide an adequate measurement of the actual financial openness of a country compared to another, or of the penetration of foreign capital in the economy. Intertemporal comparisons may also be biased if the capital-output ratio were to move significantly over time.[1] A better denominator may therefore be the total stock of domestic financial assets or capital.

In addition to this overall measurement, detailed IIP statistics are useful for assessing potential risks associated with financial openness. These depend on both the breakdown of assets and liabilities by counterpart countries (risk of contagion) and the structure of the IIP itself.

3.1.2. Usefulness of geographical breakdowns

Geographical breakdowns of assets and liabilities recorded in the IIP are useful to analyze the risk of contagion. For creditor countries, it is a prerequisite to calculate their full exposition toward a country with high risk of default. For debtor countries, it gives indications on their dependency vis-à-vis specific countries. Geographical breakdowns are however rarely available for all the items included in the IIP.

3.1.3. Analysis of the structure of the IIP

IIP statistics allow the analysis of both gross and net figures. As regards gross figures, calculating the ratio of the external debt, on the one hand, and of other liabilities, on the other hand, to the sum of liabilities reported in the IIP, makes it possible to obtain an idea of the capacity of a given country to attract "stable" financing (direct investment and equity portfolio investment) in comparison to fixed-term debt. As explained before, the IIP liabilities can indeed be split up in the following way:

    IIP liabilities = External debt
    + Inward direct investment in equity capital and reinvested earnings
    + Portfolio investment in domestic equities
    (+ Liabilities relating to financial derivatives which can be overlooked)

Chang-Velasco (1996) and Frankel-Rose (1996) showed that the smaller the amount of direct investment received in proportion to external debt, the higher the risk of a foreign exchange crisis. This ratio must however be considered together with other indicators related to the financial stability of a country and especially the size of the current account deficit.

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1 *This point is raised in Obstfeld and Taylor (2002).*

When analyzing the structure of the net IIP, it is useful to distinguish between the net direct investment position, which in principle represents the non liquid part of the IIP [1], and the net position for other components of the IIP.

From graph 2, it is possible to discriminate between countries according to the signs of their positions, i.e. whether or not both show the same sign.

As regards developed countries, the euro area as well as France and the United Kingdom register a positive balance for direct investment which is offset by net liabilities vis-à-vis the rest of the world for other components of the position. This pattern is different from that of the United States or Japan where both sub-positions are of the same sign, negative in the case of the US, positive in the case of Japan.

Graph 2 : Structure of IIPs at the end of 2000
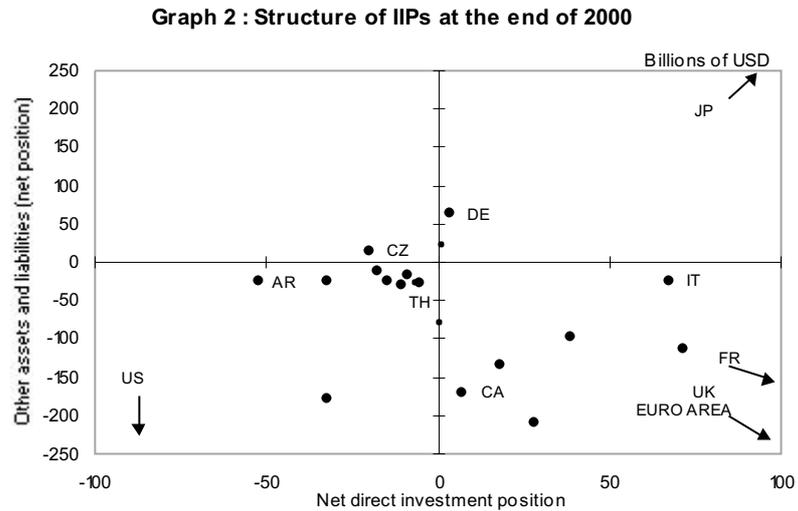
Source: IMF, International Financial Statistics

Regarding other countries, direct investment liabilities are offset by net other assets in the Czech Republic, whereas in Argentina and in Thailand, direct investment and other net liabilities both contribute to financing the domestic economy.

It is also interesting to compare gross external debt to available external assets. The usual assessment of the risk of a liquidity crunch, partly formalized by the IMF (2000), consists in comparing short-term debt and borrowing requirements corresponding to forecasts of the current account balance with available foreign reserve assets.

Finally, the analysis of debt sustainability through the IIP can be supplemented by the assessment of the impact of flows of financial revenues on the equilibrium of the BOP current account. External debt is traditionally considered as sustainable when the ratio debt /GDP has a finite limit. On an intertemporal basis, the steady-state trade balance can then be expressed with the following equation (Lane and Milesi-Ferretti, 2001):

$$tb = r' \times b$$

where *tb* is the trade balance to GDP ratio, *r'* the rate of return on external assets and liabilities and *b* the net stock of the IIP as a ratio to GDP. This means that a country can run a steady-state trade deficit equal to the income flow on its net foreign asset position or, conversely, that a country with net external liabilities must run a trade surplus equal to the net income flow paid up to the rest of the world in order to stabilize its external debt broadly assessed through the net IIP.[2]

A prospective analysis is however very difficult to implement. Calculating the income flows implies assessing future rates of return for the different categories of assets and liabilities. In the case of direct and portfolio investments in equities, the rates of return will depend essentially on the GDP growth rate which is hard to predict on a medium to long term basis.

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1   *To be rigorous, inter-company transactions such as loans and deposits should be excluded from direct investment so that only equity capital and reinvested earnings are taken into account. This distinction is available in the Balance of Payments Statistics Yearbook published by the IMF.*

2   *To makes things simpler, we overlook other components of the current and capital accounts, like the compensation of employees and current transfers.*

The case of the United States is interesting, since it still records net positive income flows, whereas its net IIP has been increasingly negative since 1989. This reflects an average return on external assets in the US IIP substantially higher than the average cost of external liabilities. A simple calculation based on data for 2000 shows that the average return on US external assets is one percentage point higher than the return on external liabilities. [1]Thus, the imbalance in the US IIP has had so far no direct impact on the US current account and hence no effect on the dollar exchange rate.

This last point directly raises the issue of the link between the IIP and variables of interest for monetary policy, starting with the exchange rate.

Graph 3 : United States
Net IIP - Net Investment Income Flows
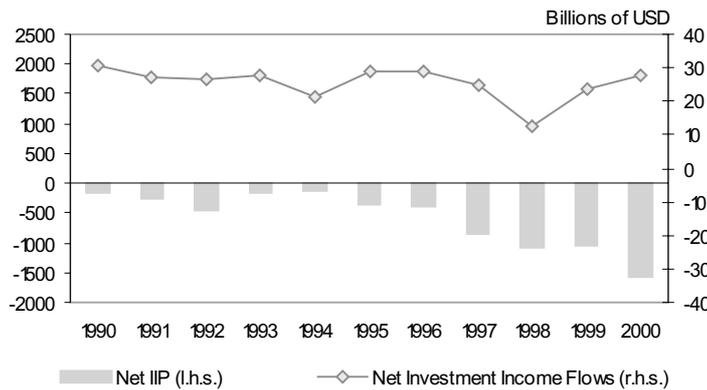
Source: IMF, International Financial Statistics

3.2. The IIP and monetary policy

The financial openness observed via the IIP largely affects the conduct of the monetary policy in its domestic framework. In practice, there is a bijective relationship between monetary policy which exerts an impact on the IIP via inferred changes in the value of external claims and liabilities, and the IIP which may influence key indicators, such as monetary aggregates and the exchange rate via *inter alia* the impact on net income earned from abroad (or paid to the rest of the world) by resident economic agents.

The strength of these relationships progressively increases as financial openness rates rise as a result of the explosion of direct and portfolio investment flows. This phenomenon must be assessed by taking into account the size of the respective net positions of the various sectors (i.e. monetary authorities and banks, general government, and other sectors). The behavior of economic agents and the wealth effects inferred by a change in their external financial assets may indeed prove to be very different.

Central banks are almost unaffected by a capital loss on reserve assets, inasmuch as, theoretically, they are not managed for profits. Similarly, commercial banks usually hedge part of the risks on external claims and liabilities. Not only do they not take foreign exchange positions, but, in general, they also limit their interest rate risks on portfolio debt securities. Besides, they make little investment in equities and their share in total direct investment flows is usually relatively small. Thus, wealth effects are concentrated on the non-banking sector, whose external assets or liabilities are generally not hedged. Therefore, we should assess the net composition, broken down by sectors, as an analysis of the overall stocks may be over-simplistic.

The usefulness of a sectoral breakdown can be illustrated by the Japanese IIP which at the end of 2000 showed a significant positive net balance of USD 1157.9 billion, or 25 % of GDP. The breakdown by major sectors was as follows :

Central bank (reserve assets) :	USD 361.0 bn
Banking sector :	USD 637.2 bn
Others :	USD 159.7 bn

On the whole, non-banks only hold 14 % of the Japanese IIP surplus. Indeed, though Japanese households have a particularly high saving rate, they mainly invest on their domestic market in spite of the weak return on yen denominated securities or deposits. Consequently, the external sur-

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1   *The main explanation lies in the weak return on inward direct investment stocks.*

plus of Japan is invested abroad via the banking system and the central bank. Wealth effects may then be more limited than could have been thought by looking only at aggregated figures.

A currency breakdown of external claims and liabilities, or at least a distinction between local and foreign currencies, is essential for an in-depth analysis of investors' behavior, as well as in assessing the vulnerability of an economy to foreign exchange variations. Though the provision of this component is encouraged by the IMF, national publications rarely give this information. Only partial information can be obtained, through the BIS statistics regarding the external position of reporting countries' banking sectors. [1]

One easy way to analyze the links between the IIP and monetary policy is to refer to monetary policy transmission channels. Economic theory usually distinguishes four channels:
- exchange rates ;
- interest rates ;
- the credit channel through banks' reactions to liquidity injections or interest rates variations, or in a broader sense, the impact of monetary policy measures on the net worth of borrowers ;
- wealth effects relating to asset price variations.

Figure 3 – Stylized representation of the interactions between monetary policy and the IIP
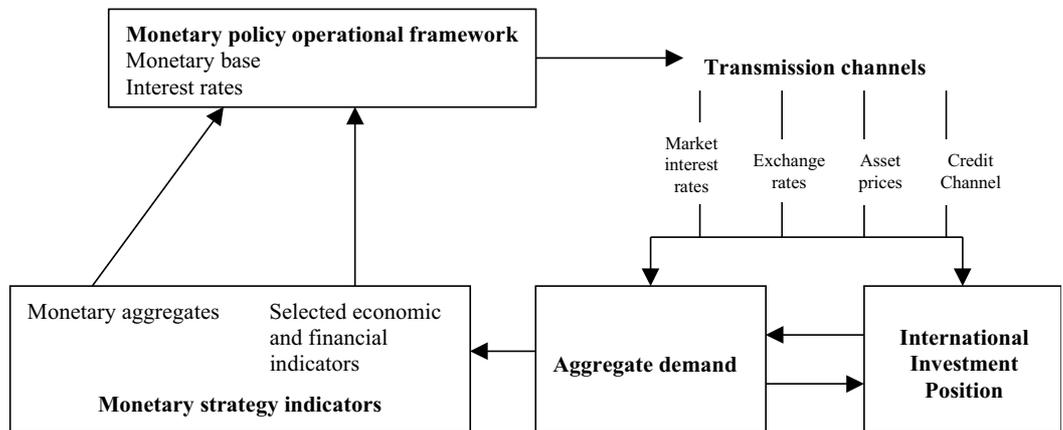
3.2.1. The exchange rate channel

The impact of a country's net foreign asset position (its IIP) and its exchange rate has been covered through extended economic research. Lane and Milesi-Ferretti (2002) show that net foreign asset positions influence long-term real exchange rates, defined in terms of consumer prices, through their impact on current accounts. Larger liabilities lead indeed to higher net payments – interests or dividends – to the rest of the world, which must be financed by a trade surplus in equilibrium. This normally requires a lower currency valuation. Hence a negative long-run relation between the trade balance and the real exchange rate when controlling for other determinants.

Conversely, the exchange rate has also an impact on the net IIP. Indeed, other things being equal, any depreciation of the national currency will increase the share of external assets and liabilities denominated in foreign currencies compared to national wealth (immediate impact). This change in the value of external assets and liabilities may then induce changes in the behavior of economic agents, which in turn affect the IIP (delayed impact). Expectations of local currency depreciation may for instance, encourage economic agents to raise the share of their assets denominated in foreign currency and vice-versa.

Estimates made on the French IIP make it possible to assess the size of the immediate impact. Thanks to the positive position in direct investment and portfolio investment stocks, the French IIP is long in foreign currency and short in euro assets. This implies that any depreciation of the euro

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1 *This breakdown is sent by the BIS to the reporting central banks only.*

would tend to boost the net external position. That is what occurred in 1999 et 2000 with the fall of the euro against the dollar. All other things being equal, the French net asset position would indeed have improved by 59% between 1999 and 2000, while the euro was loosing 7.3 % against the US dollar.

It is necessary to have a detailed currency breakdown of assets and liabilities forming the IIP (at least a split between foreign and domestic currency denominated stocks) to estimate the delayed impact of the exchange rate channel. Moreover, it is important to assess the volume of hedging operations on foreign exchange positions vis-à-vis other countries initiated by local agents (either via spot transactions or via derivatives). While hedging can considerably affect the extent of the wealth effect related to an exchange rate variation, a study of the IIP alone gives only an approximate idea of the extent of this impact. However, it can be assumed that the hedging of foreign positions is primarily performed by banks.

Another difficulty lies in assessing the impact of foreign exchange fluctuations on the different types of underlying instruments. The wealth effect generated for economic agents will depend on the investment outlook. It can therefore be posited that the more short-term the investment, the greater the impact of a foreign exchange loss. Conversely, direct investment will remain largely unaffected by short-term variations of the exchange rate.

3.2.2. The interest rate channel

The net IIP can also influence interest rates. This is mainly the case in emerging countries or in any fixed exchange rate system. A country recording large net liabilities and a current account deficit may indeed need to increase the yield on inward investments by raising its interest rates in order to attract foreign financing and avoid a liquidity crisis. While entailing an immediate increase in the deficit on income,[1] this rise in interest rates should ultimately lead to a contraction of domestic demand that reduces the trade deficit and eventually tends to restore the current account equilibrium.

In turn, like exchange rates, interest rates have both an immediate and a delayed impact on the IIP. Monetary policy may be more concerned by the impact of short-term rates over which central banks theoretically have absolute control. Besides, the effects are much less predictable on long-term maturities, as economic agents' expectations, depending on the credibility of the central bank and on fiscal policy, may impede the stance of monetary policy.

As regards the immediate impact, the market value of investments in quoted debt securities is affected in a very classical way by changes in interest rates. An increase in interest rates is expected to lead to a reduction in the market value of both equity securities (by lowering the present value of discounted future corporate profits) and bonds (following the traditional reverse relationship between bonds' prices and interest rates).

Indirectly, portfolio investments in debt securities could also be affected by arbitrage between equities and fixed-income securities following changes in stock market indices.

Effects may stem from either a change in domestic rates, or an adjustment of foreign interest rates. This brings us back to the problem of the currency breakdown of claims and liabilities included in the IIP. Hedging of interest rate positions can also change the analysis. However just as for the exchange rate channel these transactions mainly involve banks.

3.2.3. The credit channel effect

As regards the credit channel, it is useful to analyze the impact of monetary policy on the IIP for the banking sector, above and beyond effects strictly related to exchange or interest rate variations. Indeed, changes in monetary conditions applied to their domestic market will have an influence on domestic banks' activities abroad. Thus, a slowdown in credit demand from residents may encourage banks to increase the granting of loans to non-residents and vice-versa.

Above all, the extent of these reactions depends on local banks' ability to expand their operations abroad. They may be discouraged from doing so by internal problems relating to the weakness of their capital structure (Japanese banks provide today a clear example of such a phenomenon) or their risk aversion. Finally, as banks are more and more multinational, they tend to expand their activity vis-à-vis non-residents via subsidiaries and branches abroad without any flow being recorded in the BOP (and following without any stock in the IIP), except for possible cross-border inter-company transactions.

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1 *The impact mainly concerns index linked securities (bonds or credits) and short-term investments whenever they are rolled over.*

3.2.4. Wealth effects linked to asset prices variations

The last channel usually identified in economic theory is that of wealth effects linked to asset price variations, be they securities or real estate. These effects are not easy to analyze as they may lead to opposite behaviors. Negative wealth effects may for instance encourage economic agents, either to take their loss and carry out disinvestments, or to make new purchases (in order to keep the same balance in the composition of portfolios, or because of expectations of an imminent market recovery, etc).

As pointed out before, other sectors – households and companies – are first concerned by wealth effects. Faced with a loss in the value of their investment abroad, companies may thus limit their future investment because of a decrease in their borrowing capacity, while households may either increase their saving rate to rebuild their wealth or, on the contrary, reduce their savings to maintain their consumption.

These mechanisms are identical to those observed for domestic assets and liabilities, except that foreign assets and liabilities can create more violent wealth effects, given the impact of exchange rates in the short run and increasingly of "herd behavior". Thus, the greater the volume of external assets and liabilities compared to the overall financial assets of non-banks, the more significant the reactions will be. Obviously, such a reaction only applies to few companies and households, even in the most open economies. This is particularly the case for multinational companies because of their direct investment abroad, or for households with a large part of their savings invested in foreign shares. But the extent of the spill-over caused by these economic agents to the whole domestic economy would then remain to be determined.

To conclude on the links between the IIP and monetary policy transmission channels, we can refer to the structure of the IIP as analyzed in sub-section 3.1. According to graph 2, four main types of external position can be identified, each raising very different problems for central banks.

Japan typifies the first case. The net IIP is positive thanks both to direct investment and other external stocks. In such a context, risks arise primarily from an appreciation of the yen, which would reduce the value of foreign currency denominated assets, and in addition from a cut in foreign interest rates or a fall in foreign stock market indices. This may be one of the justifications of the interventions of the Bank of Japan to avoid any overvaluation of the yen.

The US is an example of the opposite case, with a negative position due both to direct investment and other financial stocks. In theory, major risks here would come from a depreciation of the dollar and a rise in foreign interest rates. However, this should be viewed against the fact that, thanks to the dollar's status as the main international reserve currency, a large part of the US external debt is denominated in dollars. Moreover, while a decline in the dollar exchange rate has a negative impact on the net IIP, it subsequently results in a reduction in the US borrowing requirement vis-à-vis the rest of the world, via the improvement of the current account balance.

The third case applies to the euro area, where the overall balanced IIP reflects direct investment abroad financed by foreign currency denominated loans recorded in other liabilities. The main risks are twofold : a fall in foreign stock market indices leading to a decline in the value of external assets and a rise in interest rates abroad, which would result in higher borrowing costs.

Apart from the Czech Republic, there is currently no clear illustration of the last case : an overall balanced IIP position reflecting inward direct investment, offset by net other external assets. In this case, risks vary according to the currency of denomination of these net external assets. If they are denominated in foreign currencies, the country faces a foreign exchange risk. If they are denominated in the domestic currency, the risk relates to possible diverging developments in the value of assets on the one hand and liabilities on the other hand, should the yield on inward direct investment rise faster than the yield on net external assets.

3.3. The French IIP

The Bank of France has published an IIP on a yearly basis since 1989. Data for direct investment stocks have been available at book value from this date and at market value since 1994 (the latter information is released in the *IFS review*). The creation of this aggregate, prior to the *Fifth Manual* of the IMF, coincided with the complete dismantling of capital controls in France enforced by the decree dated December 29, 1989 which anticipated the complete liberalization of capital flows within the European Union by July 1, 1990.

During the 1990s, France registered the fastest growth rate among the G5 countries of stocks of external assets and liabilities. It now has the second highest financial openness ratio after the

United Kingdom (graph 1). This trend is mainly due to the sharp increase in direct investment stocks (both assets and liabilities).

Developments in the French net IIP during the 1990s have been largely disconnected from those of the balance of payments current account. Despite a current account surplus from 1992, the French net IIP was constantly negative up to 1996. After turning positive during a single year in 1997, it became negative again from 1998 onwards. Preliminary figures for 2001 show a close-to-zero net position. Revaluation effects thus played a great role in these variations.

Graph 4 : French Net International Investment Position

(direct investment stocks at book value)
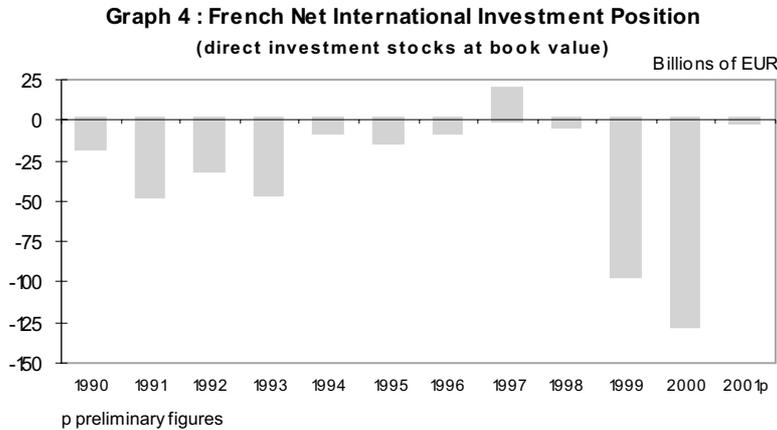
Source: Banque de France

This overall trend shows a constantly positive position for net direct investment stocks, which sharply increased over the recent years.

The share of long-term assets and liabilities continuously increased throughout the period. Direct investment stocks (at book value) which accounted for just 15 % of the total outstanding amount of external claims in 1990, reached 25 % in 2001 ; likewise, it rose from 11 % to 15 % of liabilities. As far as portfolio investment is concerned, its share rose from 11% to 34 % of claims and from 28% to 46 % of liabilities for the same period.

Graph 5 : French IIP - Assets

□ Reserve assets
□ Other investment
□ Portfolio investment + Financial derivatives
■ Direct investment abroad

Graph 6 : French IIP - Liabilities

□ Other investment
■ Portfolio investment + Financial derivatives
■ Direct investment in reporting economy
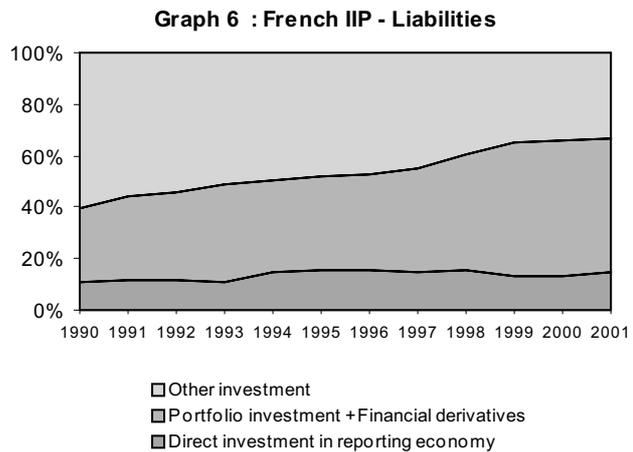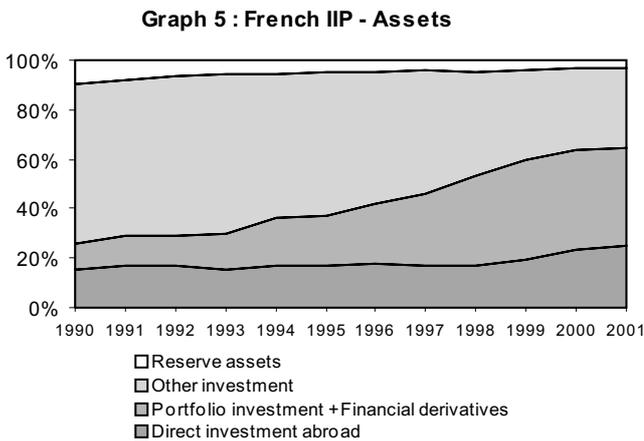
Source: Banque de France

The spectacular expansion in the French stock of direct investment abroad and foreign stock of direct investment in France is mainly the result of flows reported in the balance of payments, which dramatically increased following the internationalization process of French companies. However, valuation effects are particularly large as French and foreign stock indices rocketed until 2000. Indeed, the difference between estimates of direct investment stocks at their book value and at their market value shows that more than half of the rise in stocks that has occurred since 1990, for both claims and liabilities, is related to valuation effects.

Graph 7 : French stocks of direct investment abroad

Billions of EUR

── Book value ── Market value
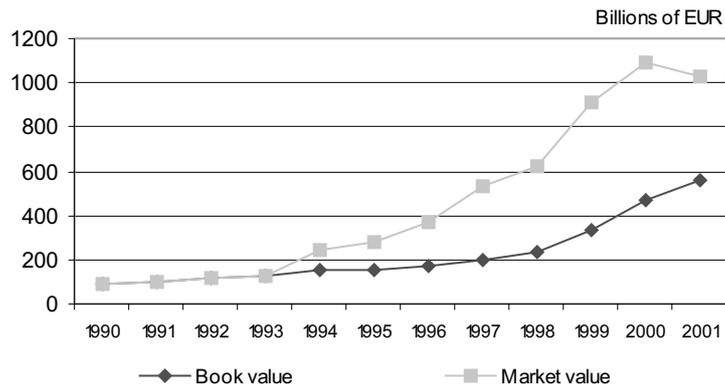
Graph 8 : French stocks of direct investment in France

Billions of EUR

── Book value ── Market value
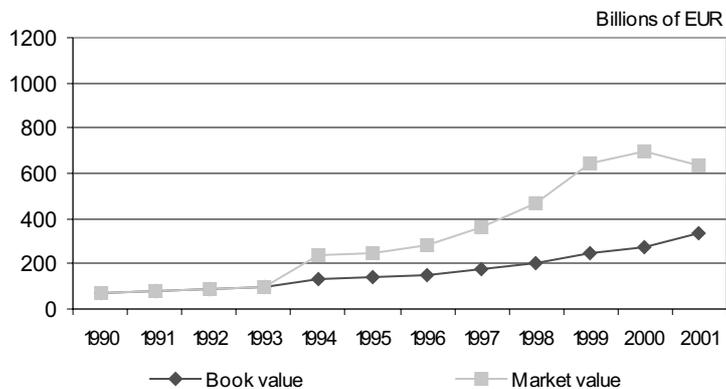
The same causes have the same effects on portfolio investment ; stocks of portfolio investment benefited from both the growth of flows and revaluation effects due to the rise in stock indices and declining interest rates in the 1990's. Besides, the structure of portfolio investment shows a clear distinction between equities and debt securities on the assets side and on the liabilities side. French investors favor debt securities, which accounted for 76 % of their portfolio at the end of 2001 (compared to 50 % in 1990). Non-resident investors hold a somewhat larger share of equities, representing 43 % of their portfolio of French securities at the end of 2001, compared to 25 % in 1990.

The difference in types of investors may explain this distinction. As far as French residents are concerned, banks are the main investors and they favor debt securities transactions, which entail a much less significant risk of capital loss. As far as non-residents are concerned, the share of non-bank investors is much higher, especially American or British pension funds in search of profitable long-term investments, which favor equities.

Looking at the impact of the speculative attacks against the French franc in the early 1990s on the IIP shows both the usefulness and the limits of the IIP as an analysis tool for central banks.

It can be seen that speculative assaults were not caused by the state of the French IIP, as it showed a slightly negative balance which could not have raised anticipations of a possible debt crisis. This was emphasized by monetary authorities in their communications vis-à-vis financial markets during the crisis.

The external liabilities were a major factor in the French monetary authorities' decision to maintain the franc's external value. A devaluation would have caused a loss of confidence among non-residents who would then have asked for an additional premium for any new investment denominated in francs. Gains obtained through an easing of monetary policy would have been probably offset by a rise in long-term rates and a decline in French equity prices.

However, the 1992 and 1993 IIPs only reflect to a limited extent the speculative crises that affected the French franc during both years. It is true that, at the end of each of these years, the situa-

tion was nearly back to normal, as foreign exchange reserves had been rebuilt to a level close to that prior to the crisis. Due to the very short period of crisis (a few weeks at most), it is almost impossible for the IIP to reflect, even retrospectively, the extent of the tensions, as far as the closing date does not fall in the period of speculative assaults.[1]

The form of speculative attacks observed during this period presents an additional problem. Besides using usual mechanisms (i.e. term loan and spot sale of the currency expected to depreciate), speculators partly resorted to derivative instruments offering a leverage effect. In the case of France, a significant part of the speculative positions in 1992 and 1993 took the form of purchases of 3-month PIBOR contracts. Speculators expected a rise in the price of the contract following a fall of short-term rates which would have been coupled with the devaluation of the franc $(P_t = 100 - i_t)$, where P_t is the price at time t and i_t is the 3-months interest rate at time t).[2] This type of transactions initiated by non-residents only appears in the IIP for guarantee deposits made on the purchase of the contract. However these deposits only represent a minor part of the total amount of the position.

Crises experienced by the French franc during this period nevertheless had a delayed impact on the composition of France's IIP via the outstanding amounts of debt securities held by non-residents.

Reforms in the functioning of the public debt market in the mid 1980's were accompanied by growing investment in French government securities (bonds, bills and notes) by non-residents. Thus, the holding ratio of the French marketable government debt by non residents increased from 3 % at the end of 1987 to over 35 % at the end of 1992 (Patat, 1994). In addition to making easier the financing of France's public deficit, which strongly increased during this period, this process contributed to enhancing the international use of the French currency.

Graph 9 : Holding ratio of French tradable government debt by non-residents
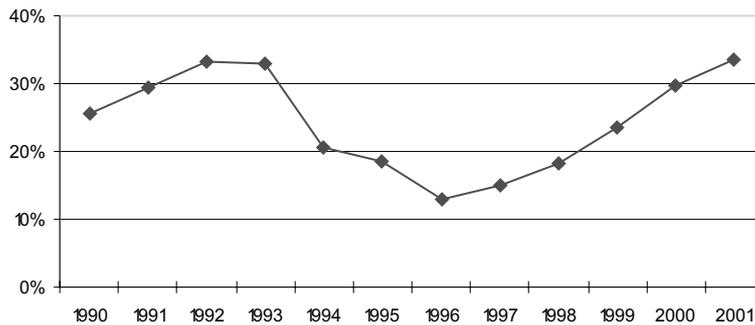
After stabilizing at that level in 1992 and 1993, a downward trend began in 1994, as the holding ratio fell to 14 % at the end of 1996. This turnaround can partly be attributed to the failure of speculative assaults affecting the French franc in 1992 and 1993.[3] Until that time, non-resident investors had registered significant capital gains due to the constant reduction of spreads between French franc and Deutsche mark interest rates. A number of these investors following short-term strategies had expected additional gains on their portfolios of fixed-rate securities due to a further decline in French interest rates after a devaluation, which would have reduced them below the level of German interest rates. Therefore the holding of the Franc parity led non resident investors to reduce their French debt security positions. In principle, such a phenomenon did not have any impact on the French net IIP because the French franc denominated loans granted to the non-residents for financing the purchase of French debt securities were simultaneously paid back. Only its composition was affected. From 1997 onwards, the holding ratio of French marketable government debt instruments by non residents has been rising again with the prospect of Monetary Union and declining European interest rates, which has definitively restored investors' confidence.

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1 *Because of the fixed exchange rate policy implemented within the EMS, it was nevertheless necessary for the French monetary authorities to have at their disposal an instrument for monitoring speculative positions within very short delays. As the IIP does not obviously present this feature, the external monetary position of resident banks was used. It covered the whole external assets and liabilities in loans and deposits of French resident banks, broken down into francs and foreign currencies, as well as into short and long term.*

2 *Such a strategy was pursued not only for speculative purposes but also for hedging portfolios of French franc fixed-income securities.*

3 *The 1994 bond crisis that affected all major industrialized countries also probably played a role.*

In recent years, the global balance of the French IIP showed diverging trends between the net direct investment stocks and the net position for the other assets and liabilities. While the figures for the net direct investment stocks were increasingly positive because of the growing number of transactions by French companies, the net position for the other assets and liabilities became increasingly negative. These two phenomena can be partly related. The outflows of direct investment have been financed by a growing debt in foreign currency, either in the form of securities issued by investors, or via the resident banks borrowing from their non-resident correspondents.

Graph 10: French International Investment Position
Net Direct Investment Stocks and Net Other Assets
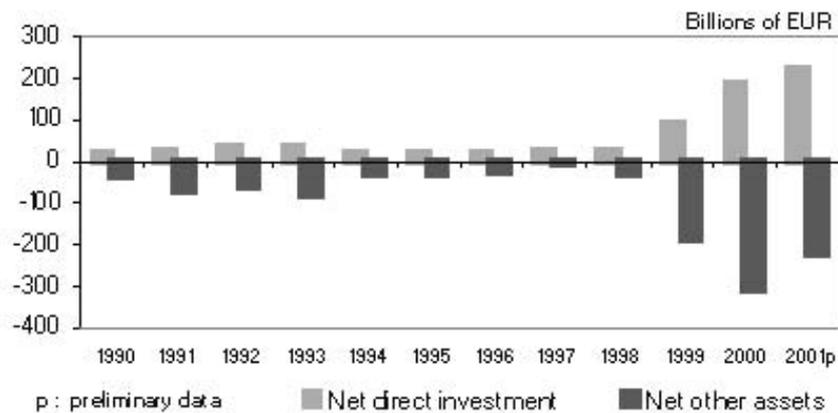
Source: Banque de France

Thus, the composition of the French IIP illustrates the classical maturity mismatch risk borne by French resident companies, like many other large Western companies, pursuing leverage strategies aimed at increasing the return on equity, with direct investment financed by short-term loans.

4. Conclusion: the need to improve the availability and quality of the IIP

The theoretical value of the IIP lies in the complexity of international financial relations. However, the numerous practical difficulties in compiling it, and to some extent, the lack of detail (e.g. currency breakdown) explains why it is so hard to use the IIP for analytical purposes.

Analyzing the IIP makes it possible to better understand *ex post* the origins and development of financial crises, caused by insufficient monitoring of financial openness, or unsustainable debt levels. The question remains open whether this aggregate can be used *ex ante* as an indicator for the implementation of corrective measures.

Practical experience suggests that the IIP is more useful for backward-looking analysis to better understand past events, than for making forecasts or for the implementation of economic and monetary decisions. While this is the case for most statistical aggregates, it is even more so for the IIP because of particularly long computation lags and low data frequency. Indeed, contrary to the balance of payments, the IIP has not been included in the panel of indicators monitored by the Eurosystem for the conduct of its monetary policy.

It is clear that expected or effective actions by monetary authorities do have an effect on external investment behavior of economic agents, as well as on the value of their net external assets. However these effects on the IIP are all the harder to estimate as a large number of parameters need to be taken into account.

- The impact of monetary policy measures will concern gross stocks of claims and liabilities which most of the time are far more substantial than the net balance of the IIP. Therefore it is particularly difficult to foresee the trend on the net IIP.
- Moreover, the impact has to be differentiated according to the maturity and liquidity of the investments concerned. Indeed, short-term deposits abroad can rapidly be shifted in reaction to monetary policy decisions while this is almost impossible in the case of direct investment in equity capital.

- Finally, impacts will be differently felt according to the type of economic agent. Normally, monetary authorities and general government are largely unaffected by wealth effects. As far as banks are concerned, they often have the means to hedge against risks related to their investments or their external debt. Impact is concentrated on other sectors comprising households and companies.
- If the objective were to set the IIP among operational indicators followed by monetary authorities, a large number of conditions would have to be met.
- Time and periodicity requirements should be dealt with first. The publishing of a quarterly IIP - an aim encouraged by the IMF - would be highly desirable. Besides, it is essential to reduce publishing lags to less than a quarter after the end of the reference period, as is planned today for external debt aggregates in the SDDS.
- The comparability between aggregates provided by the different countries needs to be enhanced. Statistics on the IIP published by the IMF in its *International Financial Statistics review* cover important methodological gaps which greatly limit their possible use.
- In particular, if some countries are able to report their investment stocks at market value, a majority of them continue to report them at book value. In general, reporting countries should give more information about the valuation indices used for direct and portfolio investments (the so-called "metadata").
- Currency breakdowns, rarely available, are essential for estimating wealth effects. Geographical breakdowns, at least for main counterpart countries, would also be of great analytical interest. Moreover it seems highly desirable that IIP data be supplemented by information concerning positions on derivatives as recommended for the elaboration of external debt aggregates.

It must be emphasized that the various statistics on external stocks compiled by international organizations (e.g. BIS international banking statistics on a locational basis, or results of the *coordinated portfolio investment survey* conducted under the aegis of the IMF, to the extent that a majority of countries will participate) can be very helpful in the elaboration of national IIPs or for cross-checking purposes.

Hence the need for continuing efforts of harmonization. The international statistical community which has made substantial efforts to improve external debt aggregates over the past years, could make the IIP its new target for transparency in financial statistics by promoting the effective and consistent implementation of internationally agreed standards.

Abstract

The international investment position (IIP) is the balance sheet of a country's external assets and liabilities. It can be used to measure the degree of financial openness of a country and to provide indications on the sustainability of its external debt. As such, it is a helpful tool for monitoring financial stability. Although studies of the IIP are fairly new, we shall review some mechanisms through which this aggregate can impact on variables relating to monetary policy, such as interest rates and exchange rates for a medium to long-term horizon. These variables may in turn explain shifts in the external balance sheet, due in particular to revaluation changes, that may lead to wealth effects at a macroeconomic level. As an illustration we shall briefly analyze developments in the French IIP during the 1990s. We shall conclude by suggesting ways of improving the compilation of external balance sheet statistics.

Keywords: International investment position, balance of payments, external debt, monetary policy

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Euroconversion
in international databanks

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1. Introduction

The replacement of twelve different national currencies by a common currency, the Euro, poses special demands to statistics and its compilers. Statisticians have to face the challenge of introducing a new unit of account, while preserving the comparability of data over time and between countries. They must preserve users from the pitfalls related to the euroconversion, i.e. the transition to the Euro as a unit of account. In this paper, I give an overview of some aspects of the euroconversion that are overlooked too easily. In addition, I give a critical judgement of the way official international databanks (Eurostat, ECB, BIS and IMF) have dealt with the euroconversion.

The transition to a new currency by a country is not a unique event. Countries struggling with hyperinflation in particular have introduced a new currency from time to time. Examples may be found in Latin America (Argentina and Peru, among others) and - more recently – among the former soviet republics and the countries in Eastern Europe (Russia and Bulgaria, among others). Often, the new currency is a thousandth or ten thousandth part of the old currency ("deleting zeros"). Statisticians are able to compile consistent time series by using the new currency as a unit of account for the past as well.

For many years, the IMF applies two methods presenting time series in its publication *International Financial Statistics* (*IFS*). They imply very different solutions to the presentation of time series that are influenced by a currency reform. The first method is presenting data in the original currency. With respect to the influence of currency reform on time series this comes down to doing nothing. A drawback of this method is that a time series may contain several breaks. *IFS* does clearly indicate the unit of account in each time period. Nonetheless, users of data who want to convert them to a single unit of account in order to obtain consistent time series face a cumbrous task, because the conversion rates have to be derived from other information (for example exchange rates with the SDR). The IMF uses this method for monetary variables, banks' balance sheets and National accounts.

The second method is using an external currency, the US dollar, as a unit of account. This method fosters the international comparability of data between countries. In addition, this is a method that improves the comparability over time for countries with an unstable or strongly depreciating currency. The IMF uses this method for the balance of payments and international liquidities. The use of the dollar as unit of account means that in this case a correction is made to the break in time series due to currency reform.

2. Statistical aspects of euroconversion

In many respects, the introduction of the Euro is from an arithmetical point of view not different from the examples of currency reform mentioned above. In the eleven founding members of the EMU the national currency was replaced by a new currency on January 1, 1999. As opposed to the cases of currency reform mentioned above, the ratio between the new and the old currency was not a round figure, but was determined by the exchange rates between the currencies and the ECU on December 31, 1998. Owing to the introduction of the Euro at a rate of Euro 1 = ECU 1, official conversion rates resulted that can only be expressed in many decimals (see table 1). Greece followed as the twelfth eurocountry on January 1, 2001.

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Table 1. Irrevocable conversion rates for the Euro
(Quantity per Euro)

Belgian/Luxembourg franc	40,3399
German mark	1,95583
Greek drachma	340,750
Spanish peseta	166,386
French franc	6,55957
Irish pound	0,787564
Italian lira	1.936,27
Dutch guilder	2,20371
Austrian schilling	13,7603
Portuguese escudo	200,482
Finnish mark	5,94573

The transition to a new currency, and at the same time to a new unit of account, would lead to a break in national time series that complicates comparability over time, unless action is taken. I call this the *time* aspect of euroconversion. Statisticians in the eurocountries have chosen to compile consistent time series for their countries by dividing data for 1998 and previous years by the official (irrevocable) conversion rate. With respect to National accounts this means that both data in current prices and data in constant prices are divided by the same number. Consequently, the development of these data over time remains the same: index numbers and percentage growth rates are unchanged. Implicit deflators, ratios between the same data in current and constant prices, do not change either. So, the euroconversion by use of official conversion rates offers a solution to the *time* aspect of national time series. From a national point of view, this is a completely satisfactory solution.

One of the pitfalls related to the euroconversion is that contrary to the currency reforms previously mentioned, which related to single countries only, the Euro became the common currency of 12 different countries. National data that are converted into Euro are not comparable across countries right away. I call the comparability between countries the *geographical* aspect of the euroconversion. The official conversion rates reflect the central rates within the EMS that were in force on December 31, 1998. In fact, exchange rates between the currencies of the eurocountries fluctuated strongly in the past. This means that historical data for countries with a depreciating currency are converted at an exchange rate that is too low and, therefore, they are undervalued. Likewise, historical data for countries with an appreciating currency are converted at an exchange rate that is too high and, therefore, they are overvalued. As a matter of fact, the national data have not been converted into a common unit of account, but they have only been rescaled. The euroconversion by means of official conversion rates offers no solution for the *geographical* aspect of time series. Users of the data should not be misled by the common label "Euro" carried by the time series. Statisticians have a duty to preserve users from this pitfall.

It is not possible to solve the *time* aspect and the *geographical* aspect concurrently. We can make time series comparable between countries by converting them into the same currency, as a common unit of account, using historical exchange rates. But at the same time, we affect the consistency over time, because exchange rates have not been constant in the past. As a consequence annual growth rates of, for example, National accounts data are determined not only by the movements of the original time series, but also by changes in the exchange rate between the original currency and the common unit of account. It can be easily seen that the results are also influenced by the choice of the unit of account. The exchange rate development between the guilder and the D-mark has been different from the one between the guilder and the Italian lira.

We can make a further step and calculate historical time series in Euro as a unit of account. We can do so by first converting data from the original national currency into one of the eurocurrencies, which functions as a pivot currency, and consequently convert them into Euro by use of the official conversion rate of the pivot currency. As explained in the previous paragraph, the development over time of these "Euro"series depends on the choice of the pivot currency.

The points made above are illustrated in Graph 1 "GDP and euroconversion". With respect to GDP in current prices, it shows the difference between a time series calculated through direct con-

version from lira into Euro (using the official conversion rate) and a time series calculated through indirect conversion using the Dutch guilder as a pivot currency. First, it appears that the former lies below the latter, reflecting the history of the lira as a depreciating currency compared to the guilder. Use of the official conversion rate, determined on December 31, 1998 leads to GDP figures that are undervalued. Second, the two time series show different movements over time. This reflects the exchange rate fluctuations between the lira and the guilder. Of course, the two time series overlap in 1999 and following years after the introduction of the Euro. With respect to GDP in constant prices the graph shows that the time series calculated through indirect conversion lies consistently below the time series calculated through direct conversion. This is due to the use of the 1995 exchange rate between guilder and lira for the conversion over the whole period. The lira happened to be at a low point in international currency markets in that year.

Graph 1 – GDP and euroconversion
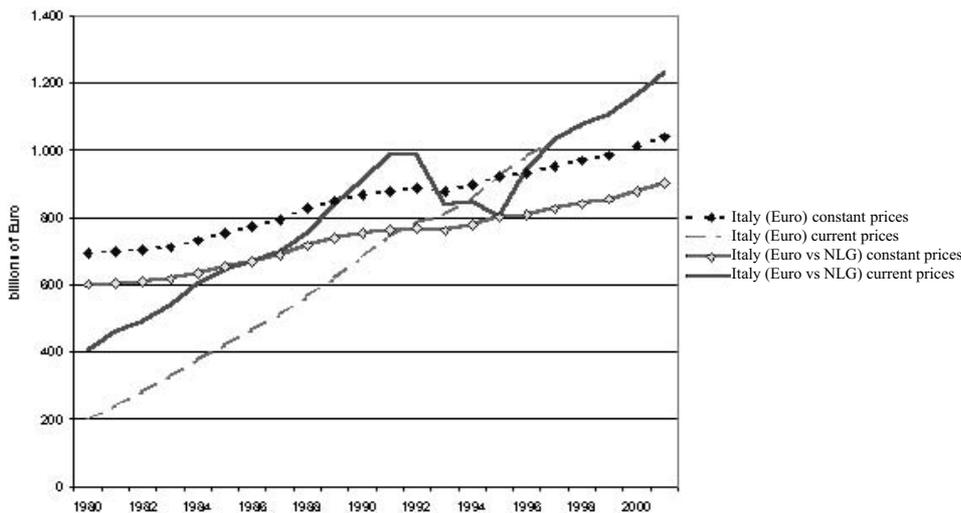
Initially, the ECB tried to find a solution for the problem of cross-country comparability by constructing a fictitious Euro for 1998 and previous years. With the fictitious Euro the ECB tried to construct a unit of account that more or less minimised the errors due to the adverse effect on the comparability over time. By doing so, the ECB was striving for an unattainable goal. The fictitious Euro had several drawbacks.
1   The calculation method - a weighted average of exchange rates, with weights being based upon GDP and population size - had only a weak theoretical foundation.
2   The calculation was performed for the 11 countries that were the original members of EMU. Given the basic assumptions, the fictitious Euro would have to be recalculated every time new countries joined. As a consequence, all "Euro" amounts would change.
3   It meant the introduction of a new basket of currencies, next to the ECU. This can only create confusion.

The most remarkable fact is that the fictitious Euro has never been used despite all the energy spent on its calculation. Yet, the ECB had a number of opportunities to use the fictitious Euro. In the first place, the calculation of historical monetary data. The ECB, however, opted for country data that had been calculated by use of the official conversion rates and for the calculation of aggregates for the Euro area by simply adding those data, even though this is strictly speaking not correct. In the second place, the calculation of effective exchange rates. The ECB, however, preferred to derive a different set of fictitious Euro exchange rates on the basis of trade weights. In the third place, National accounts. However, the ECB uses the data provided by Eurostat. Eurostat calculates historical time series with the ECU as unit of account and never considered use of the fictitious Euro.

3. Aggregates for the Euro area

The *geographical* aspect does not only relate to the comparability of data between countries, but also to the calculation of aggregates for the Euro area. At the same time the *time* aspect gets involved. This means that whatever solution is chosen by statisticians for the calculation of Euro aggregates, it may have properties not suspected by users and for which they have to be warned. In general, every user of Euro area aggregates has to ascertain which properties the time series he uses possess. The choice of a particular time series depends on the kind of analysis he wants to perform.

This may most clearly be illustrated by way of the calculation of GDP for the Euro area. A time series of GDP in current prices denominated in Euro can be calculated by first converting the national data into a pivot currency and next converting these into Euro by use of the official conversion rate. The resulting time series reflects both the value developments of the national data as the movements in the exchange rates. The outcome also depends on the choice of the pivot currency. This means that every calculation method is arbitrary to a certain degree, but this does not need to be an important drawback for GDP in current prices.

This is different for a time series of GDP for the Euro area in constant prices. If this were calculated by use of current exchange rates, then this would mean that exchange rate changes influence the outcome. A price effect creeps into the volume development. Moreover, the size of this price effect depends on the choice of the pivot currency. This is clearly an undesirable result. The solution is to calculate GDP in constant prices for the Euro area by use of fixed exchange rates. However, this also influences the way we look at GDP in current prices. If we calculate an implicit deflator of GDP, then use of a GDP in constant prices calculated on the basis of fixed exchange rates and a GDP in current prices calculated on the basis of current exchange rate would lead to an outcome that also reflects changes in exchange rates. The interpretation of this variable is rather difficult. The solution is to derive the GDP deflator from a GDP in current prices that has also been calculated on the basis of fixed weights, thereby excluding the influence of exchange rate fluctuations.

4. Euroconversion in international databanks

In this paragraph, I offer a critical review of the way official international databanks deal with the euroconversion. I confine myself to data on GDP, both in current prices and constant prices. When applicable, I also consider the implicit deflator of GDP. In my view, users of data are best served if they find consistent time series for individual countries in a database. In the case of the eurocountries this should be supplemented with a warning against the use of these data for geographical comparison. In addition, users should receive advice on how to deal with aggregates for the Euro area.

The main conclusion is that there are quite a few differences between international databanks. Users are confronted with a labyrinth in which it is not easy to find their way. The biggest obstacle they meet is that not all databanks provide consistent time series (IMF, BIS). Moreover, some databanks contain errors demonstrating the complexity of the euroconversion.

- Eurostat Eurostat is responsible for the compilation of GDP of the European Union and the Euro area. In addition, it stores GDP data of all EU member countries in its databank NewCronos. NewCronos offers two data sets on GDP *in current prices* of the eurocountries and the Euro area:
    1   The first data set comprises time series denominated in national currency, i.e. the Euro. The data for the period before 1999 have been calculated by conversion with the fixed conversion rate.
    2   The second data set comprises time series denominated in ECU for the period before 1999 and denominated in Euro for the period starting with that year.

The time series in the first data set offer a solution for the *time* aspect with respect to the individual eurocountries. The second data set offers a solution for the problem of cross-country comparability. In both data sets the time series for the Euro area are identical. This means that Eurostat considers the ECU the national currency for the Euro area in the period before 1999. As a consequence, annual GDP growth rates of the Euro area are influenced by exchange rate fluctuations between the eurocurrencies and the ECU during that period.

NewCronos also contains two data sets on GDP *in constant prices* of the eurocountries:

1   The first data set comprises time series in 1995 prices, based on the Euro-value of GDP in that year;

2   The second data set comprises time series in 1995 prices, based on the ECU-value of GDP in that year.

The time series based on the ECU show larger values than the same time series based on the Euro, because in 1995 the ECU had reached a low point against the eurocurrencies. Italy is an exception, because the lira had even more depreciated in the aftermath of the currency crises within the EMS in 1992 and 1993.

NewCronos also contains GDP price indices of the eurocountries and the Euro area with base year 1995. In the calculation of the price index of the Euro area Eurostat makes a methodological error. It calculates the index by dividing GDP in current prices by GDP in constant prices of 1995. In this way, Eurostat does not calculate a "pure" deflator, but a deflator that also includes the effects of exchange rate changes. The price index calculated by Eurostat is a weighted index of national price levels corrected for the exchange rate difference between the national currencies and the ECU. For the sake of the calculation of a "pure" deflator, Eurostat should have used a differently calculated time series for GDP, i.e. one based on the data denominated in national currency, weighted with 1995 GDP values (see also paragraph 3).

Graph 2 – GDP Deflators
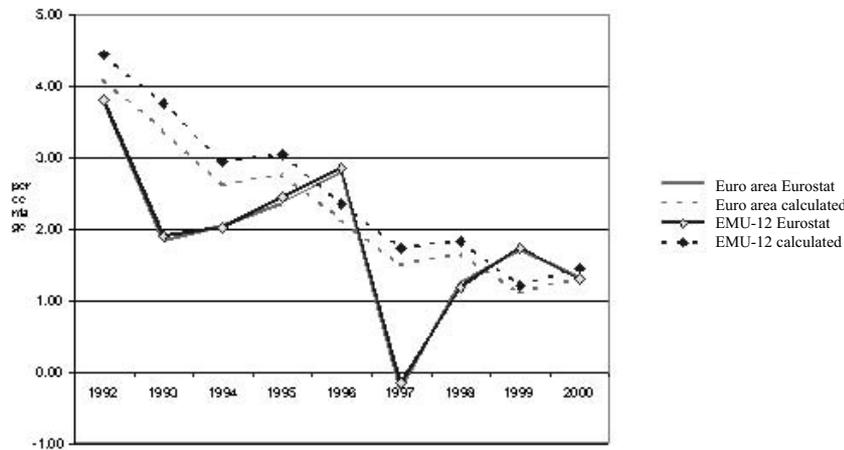
Graph 2 "GDP deflators" shows the somewhat bizarre results of the deflator calculated by Eurostat: price deflation in 1997 and strongly fluctuation inflation levels over the last ten years. As a matter of fact, the outcomes are distorted by exchange rate movements between the eurocurrencies and the ECU.

When it comes to judging Eurostat's performance in the euroconversion, I notice as strong points that Eurostat presents two sets of time series for the eurocountries, thereby providing solutions for both the *time* aspect and the *geographical* aspect. In addition, it provides advice on the use of these data. However, it is to be regretted that these notes are posted on the home page of NewCronos. Users looking for data on National accounts may be inclined to skip this information. It would be better, if they receive a warning about the use of these data once they make a selection of Nationals accounts data. A weak point is the way Eurostat deals with the calculation of aggregates for the Euro area. It does not give any explanation of the way Euro area aggregates are compiled. Moreover, it makes an error in the compilation of deflators. This is to be regretted because Eurostat is the compiler of these data and also the source for other databanks.

• ECB The ECB derives its data from Eurostat. The time series mentioned above are also contained in the ECB databank. The ECB also discovered the shortcomings in the calculation of the GDP price index of the Euro area. It publishes deflators based on its own calculations in the *Monthly Bulletin*. This price index has been calculated as a weighted average of national price

indices with constant weights. The ECB data bank is not accessible to the public. Therefore, advice on the use if these data is less necessary.

- BIS The BIS receives country data from the individual countries. Data on the Euro area are provided by Eurostat. The BIS data bank has a completely different way of storing data. With respect to the eurocountries, the BIS stores data from the period up to and including 1998 in the original national currencies (in BIS jargon: they are *discontinued time series*). Data for 1999 and later years are stored in Euro. For Greece, the break lies between 2000 and 2001. This method has important drawbacks:

    1 The BIS does not offer consistent long time series for the countries concerned;
    2 Users who need long time series are forced to make an extra effort and must calculate these themselves. I admit that this method also has an advantage: users are forced to deal thoughtfully with the data and to think about the type of euroconversion that they want to apply. However, it seems to me that the latter is not a function of an international databank.
    3 The separate storage of historical data in *discontinued time series* also bears the risk that data are not properly updated when revisions are made. Staff at central banks who transmit National accounts data to the BIS are confronted with a complicated procedure. Historical data covering the period before 1999 that are published in Euro by statistical institutes who apply the rules of euroconversion have to be converted back into the original national currency.

The BIS databank is not accessible to the public. So, there is less need for an explanation on the use of data denominated in Euro.

- IMF The IMF receives country data from the individual countries. Data on the Euro area are provided by Eurostat. In its monthly *IFS* and in the *IFS* Yearbook, the IMF publishes GDP data of the eurocountries with a break in the time series: in the original national currency up to and including 1998 and in Euro afterwards. The IMF's choice for publication of the data in the original currency is to be regretted, even though it is a consistent way of dealing with the break in time series. In the cases of currency reform mentioned previously, the IMF did not make corrections for a break in time series either. By doing so, the IMF takes a different road from the one followed by the eurocountries and Eurostat, who make an effort to publish data with a solution for the *time* aspect. Users of *IFS*, on the contrary, do not find consistent time series for individual countries and are forced to make calculations themselves. The fixed conversion rates they need can be found with a little effort in the country notes.

Time series on GDP for the Euro area start in 1998 only. With respect to data for 1997 and before, the reader is referred to Eurostat. The notes state: "Data for 1997 and earlier can be obtained from Eurostat". Possibly, there are shortcomings in de data exchange between Eurostat and the IMF. For users, however, this is rather annoying. Finally, a mistake: the break in time series in GDP of the Euro area caused by the membership of Greece is mentioned correctly in the text of the notes, but in the table it is indicated in the wrong place: between 1998 and 1999 (in *IFS* of May 2002).

- **Datastream** Datastream is not an official, but a commercial databank. It shows, however, how managers of databanks struggle with the euroconversion. Datastream offers National accounts data of the eurocountries in Euro. It has calculated historical data (before the introduction of the Euro) by use of the fixed conversion rates. With respect to the countries that joined EMU on January 1, 1999 the results are correct. However, the calculations for Greece contain an error. Table 2 shows that GDP-data in Euro have not been calculated with the fixed conversion rates, but with variable rates. This produces wrong results with most serious consequences for GDP in constant prices. According to the Euro denominated time series volume growth of GDP in 2000 amounted to 0.6%, whereas the original drachma denominated time series showed a growth rate of 4.3%.

Table 2. Greece: Gross Domestic Product
(in millions of Euro/drachma)

	GDP in current prices			GDP in constant prices		
	Euro	Drachma	implicit conversion rate	Euro	Drachma	implicit conversion rate
1995	82,820	27,235,200	328.8	82,820	27,235,200	328.8
1996	91,030	29,935,088	328..8	84,773	27,877,488	328.8
1997	100,666	33,103,792	328.8	87,753	28,857,488	328.8
1998	109,085	35,872,496	328.8	90,431	29,738,192	328.8
1999	117,462	38,147,152	324.8	94,646	30,737,296	324.8
2000	122,113	41,135,536	336.9	95,210	32,072,592	336.9
2001	130,181	44,359,296	340.8	98,406	33,531,936	340.8

Ssource: Datastream (14-06-02)

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Discussion comments

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A theme common to all nine papers presented this afternoon is that the data requirements faced by central bank statistical compilers are growing, and, in fact, growing rather rapidly. In some cases, the growth in requirements is a direct result of changes in the financial markets. In other cases, the additional requirements are due to the adoption of new monetary stabilization policies. Currency changes, including the introduction of the Euro, have imposed new burdens on statistical compilers. Further, even without changes to the financial markets, the needs of internal data users has been growing as the world has become increasingly reliant upon timely, sophisticated information. Through increased international standards, external data users have also been able to apply pressure for additional economic data. Clearly, like it or not, we are in a "growth industry."

Samuel Alfaro in his paper "Banco de Mexico's experience in measuring the risk position in Mexican pesos of foreign investors and its relevance for monetary policy" discusses the difficulty of collecting data on foreign currency risk positions in a free market/flexible exchange rate regime. Mr. Alfaro does an excellent job of explaining the need for, and the difficulties of, monitoring these positions under free market conditions, particularly given the recent growth in sophisticated financial instruments. The paper presents a useful indicator of these positions and shows its performance during the recent past. A similar monitoring of the cross-currency positions of local businesses and investors might also be useful, as local businesses grow in size and sophistication. During the most recent financial crises in Asia and Latin America, there is some evidence that local asset holders were more aggressive than foreign holders in shifting the currency composition of their assets.

Francesco Columba in his paper "Transaction technology innovation and overnight deposits demand in Italy" shows that technological changes in the provision of retail banking services shifts the demand curve for monetary aggregates. As a result, the meaning and implications of changes in key monetary aggregates is altered. This excellent paper demonstrates the importance of a comprehensive monitoring of the economy. Monitoring monetary aggregates alone during periods of rapid technological change can not provide clear direction for monetary policies. An extension of this paper might address the extent to which there are long-run changes in the demand function for components of the money supply due to the technological changes.

Two of the papers, those of *Peter Vojtisek* "Statistical implications of the chosen monetary policy strategy: the Czech case" and *Adrian Armas* "Gathering predictive information for implementing inflation targeting: the case of Peru" note that countries which adopt inflation targeting strategies find that, as a result, their policymakers have greatly increased data needs. In addition to all of the normal macroeconomic variables, a greater effort must be made to decompose the real and price components accurately and to obtain a measure of "core inflation." Further, under a regime of inflation targeting, it is important to be able to track recent changes in the markets for labor, goods, and services. These papers are very important, as the increased data requirements of new policies are not always considered until the new policies are adopted.

In addition, inflation targeting requires a measure of inflationary expectations. However, measuring inflationary expectations is very difficult. Both countries have used surveys to create an index of inflationary expectations. The United States does not measure inflationary expectations through surveys, but does use surveys to measure consumer expectations. The general finding is that these surveys primarily provide "backward-looking" information, with very little new information content. By contrast, the United States does issue "inflation protection" bonds, which, despite a relatively illiquid market, have anticipated recent declines in inflation. As capital markets in these countries develop, the development of market-driven measures, perhaps even inflation-indexed derivatives, should be explored as a way of providing more useful information about inflationary expectations than surveys.

Laurent Paul and Frederic Lambert in their paper "International Investment Positions: Measurement aspects; usefulness for monetary policy and financial stability issues" discuss the importance of the establishment of the creation of international investment position (IIP) data which can help

to track key indicators such as the wealth effects of revaluation changes at the macroeconomic level. Their excellent paper discusses compilation problems and prospects for improvement. Valuation problems are particularly important and difficult components of the construction of IIP accounts. Paul and Lambert conclude that the value of these accounts is sufficiently great that further efforts to improve their timeliness, productivity, and quality need to be taken.

Henk Lub in his paper on "Euro-conversion in international data banks" and *Amelia Pinto* in her paper "Challenges for the Central Bank of Ecuador under dollarisation" both discuss the difficulties of creating historical data series when a country changes the currency in which historical data are to be presented. Lub explains that the conversion of historical time series of multiple countries to the Euro without changing historical rates of growth caused bilateral inconsistencies to develop. In fact, the actual problem is even more severe. If national accounts are to be presented in the new currency, statisticians must present data that make it appear that history is being rewritten! For example, GDP growth even in nominal terms, in the new currency of denomination can not be the same as growth in the former currency of denomination. As Ms. Pinto describes, creating a set of accounts in the new currency of denomination is extremely difficult both conceptually and practically. One option might be to create an estimate of value-added by industry, based upon the new currency of denomination and then to create an index of GDP by summing these value-added measures. (For the Euro, obviously this would have to be based upon synthetic data, based upon an average of at least the major currencies that were merged together.)

As *Reimund Mink* describes in his paper "Financial Accounts for the Euro Area" a tremendous amount of progress is being made in creating quarterly financial accounts for the Euro area, which cover both transactions and positions. The creation of the Euro area makes it imperative that a set of economic data be presented for the residents of that area as a whole, a major undertaking. A question which Euro area statistical compilers may face in the future is the extent to which resources should be devoted to collecting supra-national data, as opposed to the aggregation of national data. Statistical programs that try to create data for large regions as well as sub-regions, with similar quality and timeliness, often face inherent difficulties. For example, local area data for multiple areas requires far larger samples than would a single supra-national estimate, making the process very expensive. Similarly, the need to estimate, and difficulty of estimating, missing data accurately is far greater with smaller-area data than supra-national data. The problem is even more severe when compilation is occurring at multiple sites under multiple authorities. In some cases, local area data and national area data have inherent inconsistencies, which must be reconciled. For example, there is a very different definition of "foreign resident." Thus, the collection of consistent national and supra-national data can result in larger costs and reporting burdens.

Grazia Marchese's paper "The value of discrepancies" provides some very important contributions. Although her comments relate directly to the financial accounts, I can testify from my experience as a national accountant that published statistical discrepancies are very useful in the evaluation of economic activity. Even if the published statistical discrepancies are "managed" to some extent, the public release of these discrepancies remains quite useful for several reasons. First, discrepancies provide a clear indication of the differing trends and positions shown by the underlying data. This, in itself, is very useful information. Second, if one assumes that statistical authorities are managing the discrepancies, one can discern additional information from the direction of large discrepancies. Third, the publication of discrepancies puts pressure on the statistical compilers to make the conceptual and practical changes needed to improve the accounts. For example, large published discrepancies cause compilers to re-examine vigorously, the assumptions in their estimating methodologies. Fourth, the publication of discrepancies may also cause statistical compilers to re-question, and perhaps even to override, preliminary data from weak data sources. Thus, weak preliminary data sources are given less weight than strong sources.

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Rudi Acx (National Bank of Belgium)

The paper by *Mr. Alfaro* and the one by *Mr. Columba* deal basically with the need for continuous adaptations in the way economic reality must be measured, given the changes in economic behaviour, structure, economic regulations and innovations in products as well as in the infrastructure.

The papers differ however in their statistical and analytical approach. The use, in the Mexican case, of the definition of the Uncovered Net Position in Government Securities, replaced later by the Net Position in Pesos of the Foreign Sector, follows a macro-economic approach. The specification of demand for overnight deposits in Mr. Columba's paper is based on more disaggregated data, which goes into the direction of a micro-data approach, an approach which has become predominant in economic analyses in recent years. The Mexican approach is oriented towards more global information or policy information, while the demand for overnight deposits seeks details on different behaviour over time and by location.

The choice of approach must be seen in the light of the purpose of the information. For monetary policy decisions, indicators must be readily available and they must be chosen in coherence with and in function of the policy aims. The cost involved also plays an important role. These arguments favour probably the selection of a global indicator like the Net Position in Pesos of the Foreign Sector. Even if the indicator is not exact for the full 100 per cent, this approach may be preferred in as far as the user is aware of the limitations of the indicator, as it is suggested in the paper by Mr. Alfaro. Furthermore, information for decision support must be flexible, especially in a changing economic environment and one must take into account the burden put on the reporting agents. If data collection is very heavy in terms of costs, one will loose the flexibility to change the data collection system even if economic developments impose a quick rethinking of the information required by policy makers.

One can raise the question if a global indicator alone is sufficient as the main indicator for the conduct of monetary policy. Therefore, it is interesting to know to what extent the Net Position in Pesos by the Foreign Sector is supported by other statistical information and what is the mutual relationship between the main indicator and other information.

The Alfaro paper points indirectly to another very important point. Data collection must not only be flexible to cope with innovation, but the data itself must be of high quality so that policy makers can rely on them. For that reason instructions to reporting agents must be very strict and clear to achieve that the information content is in conformity with the user's understanding of it. This is not only true for domestic reasons but also in domains where international comparisons are made or, even more, where international aggregates are made, e.g. in the case of economic unions or monetary unions.

Indicators for monetary policy must be replaced/adapted from time to time, and this holds also for the money demand function or components of the money demand, as is clearly demonstrated by Mr. Columba. The Cagan-like demand function has been completed for transaction technology. The empirical evidence from the paper, confirmed by results obtained by other authors, shows clearly their impact. As it is always the case in empirical research, the specifications may be influencing the outcome. Central questions here are:
- Is the right information used for the selected variables?
- Are all relevant phenomena taken into account?

Dealing with the *first item*, the number of ATM/POS could be replaced by the number of transactions via ATM/POS or the amounts of money involved with ATM/POS transactions. Is the interest on large balance sight deposits (over 10.000 euro) the correct reference for the calculation of the opportunity cost in money demand functions which deal mainly with effects in the retail segment?

On the *second item*, the pricing policy of financial institutions and operators of the electronic network for payment services should be considered. One should also take into account the effect of prepaid cards, which in my opinion might further increase the share of sight deposits at the expense of cash holdings. Furthermore, home banking facilities, which recently are gaining in importance, will also exert an impact on the relative part of the sight deposits. Home banking, including electronic banking for enterprises, provides an instrument for swift portfolio reallocations, which can have a negative impact on the outstanding balances of sight deposits or at least make the estimated function less stable.

Such more elaborated specifications may affect the relationships on which reaction functions are based.

To complete information on missing issues, survey results could be used as is demonstrated in the paper on the need for data in case of inflation targeting. This brings me to the papers of *Mrs. Pinto*, *Mr. Armas* and *Mr. Vojtisek*.

Here too, the papers describe the need for new statistical information, but now due to the shift of monetary policy to a regime of inflation targeting, as in the case of the Czech Republic and Peru, or to opting for dollarization of the economy, as is it the case of Ecuador. Both in the Czech Republic and in Peru, policy makers rely on an extensive set of economic indicators. In the new environment, inflation forecasting on different components takes a predominant position, as well as the measurement of inflation expectations. Differentiating inflation by components creates a better picture for the understanding of the inflation process and contributes to the understanding of the transmission of price and cost effects.

Information on inflation expectations of market participants is in both countries based on surveys. But approaches differ in terms of the surveyed populations. Up until very recently Peru limited the survey to analysts of the private sector and to treasurers of financial institutions, while the Czech Republic includes also managers of non-financial corporations and households. This gives rise to some questions:

- Do inflation expectations in the Czech Republic differ among the sub-populations? Although inflation targeting is not relevant to the Belgian case, Belgium has since a couple of years indications on the inflation expectations by households. The available data are not yet very conclusive but it seems that inflation expectations by households are not indifferent to current inflation rates.
- Do the expectations coincide with observed price evolutions of financial products and with observed price evolutions in futures markets, or what additional information is obtained from the surveys?
- What value is attributed to the survey results on inflation expectations (in general and by sub-population) for monetary policy purposes, or in what sense do they influence the monetary policy ?

The four papers in the second part of the session deal, on the one hand, with the quality of data provided to the users and, on the other hand, with new statistical products which can, or according to the authors should, complete the existing set of information to policy makers.

The quality aspect is touched upon in the paper of *Mr. Lub* dealing with the problem of currency conversion after the introduction of a new common currency. In the case of the European Union, long and intense discussions took place within the European Central Bank and the Committee for Monetary, Financial and Balance of Payments Statistics, which resulted in the outcome as described in the paper. The problem to safeguard the internal dynamics, or the time aspect as it is called in the paper, and the problem related to international comparisons, or the geographical aspect, cannot be solved through the creation of one single conversion method: for the analysis of each of the two aspects, meaningful series would be lost.

The author proposes to publish consistent time series with annotated explanations. This brings us to the metadata on statistics, which gain in importance as statistics are becoming more and more complicated in nature and construction. In order for these annotations to become effective, the users should take the attitude to consider carefully any footnotes and methodological annexes in the publication. As we all know, this is not always the case and therefore user-friendly techniques and presentations must be implemented. The risks to which users are exposed is clearly demonstrated by Mr. Lub's example of the erroneous GDP deflator for the Euro-area.

The discrepancies between the balance of the capital account and the balance of the financial account by sector, as analysed in the paper of *Mrs. Marchese* treats a delicate and fundamental issue for both statisticians and users. As the sources for the two types of accounts are different, full coherence is not attainable without intervention of the statisticians. The question comes up to what extent the statistician may adapt the value of figures resulting from two distinct statistical processes. On the other side of the spectrum there are the users, which prefer data fully in line with the theoretical concepts. A modus vivendi must be found.

To put this problem in perspective, one should be aware that the construction of national accounts, incl. the financial accounts, is a complex statistical process, of which estimates and "arbitrage" form an integral part. Arbitrages are carried out by specialists, who act to the best of their knowledge and in an non-biases manner, depending on the relative reliability of the data involved. So, even before comparing the balances of the two accounts involved, statisticians have already improved and interpreted the data, which constitutes in fact part of their value added. The next step

for a full integrated set of accounts would be to apply some arbitrage between the balances of the capital account and the financial account, which may exert effects in the upward and downward accounts and balances of the SNA93/ESA95-system.

The position defended by Mrs. Marchese, namely to explain any arbitrage effectuated to reduce or to eliminate the discrepancy between the balances of both accounts, should therefore also become more common for similar actions in estimating accounts of the integrated system of national accounts other than the financial and the capital accounts. This transparency in the statistical process should contribute to a more correct assessment of the data quality. Concealing these interventions of "accommodating arbitrage" can be misleading for the users and would moreover contribute to false quality reports as mentioned in the paper. However, even in using a forced balance not disclosed to the user, a further detailed comparison among different variables in the national accounts can reveal the existence of that kind of actions. But this is "playing games" with the user, which does not contribute to the image of reliable statistics.

The attempt for reducing discrepancies between the accounts implies in most countries a close co-operation between the national statistical offices and the central banks.

The relevance of the empirical part of the study on the discrepancies is of course the challenge for the countries to provide explanations and solutions for improvement. As far as Belgium is concerned, a large part of the discrepancies observed are due to working hypotheses in the financial accounts, where some balances are forced. The statistical difference which is caused by these hypotheses must be reallocated to other sectors (mainly the households and the non-financial corporations), which in the end generates the discrepancies with the capital account. In most, if not all, countries analysed in the paper, it can be observed that the discrepancies in the general government sector are minor. This, of course, is a positive effect of the large investments made by most of the countries within the framework of the Excessive Deficit Procedure for the European Commission.

The paper of *Mr. Mink* points to the importance of the financial account for monetary policy. The external component of the financial account in stocks forms the statistics on the International Investment Position (IIP), which is strongly promoted in the paper by *Messrs. Lambert and Paul*. Detailed financial accounts and IIP do indeed provide structural information to the policy makers. In as much as this information becomes available within short delays, which is unfortunately not yet the case in many countries, this will contribute to a better understanding of the potential effects of policy decisions, for which in the best case we currently have only general indications at our disposal while for many other interesting and maybe crucial information we are confronted with a black box. From both papers, and especially from the project description with the ESCB, it is clear that the statisticians still face a lot of work before reaching the ultimate goal. Both elaborated statistical products will provide information which fit into the existing economic theories.

Stock data are important to get an idea on the potential wealth and substitution effects, but the calculation of stocks still poses a lot of problems, which makes them less useful for analysis and hence for policy purposes.

As the work is far from finished, it is advisable that the users – the policy makers – are consulted in defining priorities on required breakdowns and on the frequency at which these details should be made available.

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SESSION 2

Central bank statistics and financial stability

Chair: Paul Tucker, *Executive Director, Markets, and member of the Monetary Policy Committee, Bank of England*

Secretary: Blaise Gadanecz, *BIS*

Papers: First Part

"The use of macro prudential indicators The case of Costa Rica"
William Villegas Calvo, *Central Bank of Costa Rica*

"The use of Central Registers for statistical activities in the light of Financial Stability: The experience of the Portuguese central bank"
Orlando Caliço, *Bank of Portugal*

"Early warning indicators for emerging economies"
John Hawkins and Marc Klau, *BIS*

Second Part

"The statistical challenges in monitoring Financial Stability"
Celeste Wood, *Central Bank of Barbados*

"The use of supervisory or other micro-prudential information"
Rangachary Ravikumar, *Reserve Bank of India*

"UK Bank exposures: data sources and financial stability analysis"
Andrew Gracie and Andrew Logan, *Bank of England*

"Role of financial soundness indicators in surveillance: data sources, uses and limitations"
Sean Craig, *IMF*

"Macro-prudential indicators: A pilot compilation exercise for the Netherlands"
Kees Elfferich and Arjo de Jong, *Netherlands Bank*

"Are data sources adequate for the Federal Reserve?"
Richard D. Porter, *Board of Governors of the Federal Reserve System*

Discussants: Ivan Alves, *ECB*
Sean Craig, *IMF*
Richard D. Porter, *Board of Governors of the Federal Reserve System*

Session 2:
Central bank statistics
and financial stability

Issues paper

Paul Tucker (Bank of England)

Central bank statistics for financial stability analysis

During the five years since the Asian crisis, the range and depth of financial stability analysis has increased substantially. Those involved include central banks, regulators, international agencies and academics, as well as market participants, in both developed and developing countries. Much of the early work, both initially and since, involved wrestling with some of the conceptual issues involved: e.g. what do we mean by "financial stability"; can we measure it; what, in principle, do "early warning" indicators look like? More recently the emphasis has shifted to the more practical problem of identifying appropriate data sources.

At first glance, this may not seem especially challenging, given the plethora of financial information available at both the national and international level. But closer examination shows that the available data have been generally (if not universally) designed and collected to meet specific purposes that do not map precisely to the needs of financial stability analysis. As a result the challenge – and one of the main themes of this session – has been to develop ways to adapt or cannibalise existing data sources.

One of the main sources of financial data in most countries is the monetary dataset, designed explicitly to meet monetary requirements. Often this is also used to produce banking sector inputs to the national accounts. These data do provide useful information for financial stability analysis, but there are gaps. Most obviously, monetary data by definition focus on the (domestic currency) activities of the resident offices of credit institutions whereas financial stability analysis casts its net much wider as the global activities of a bank could cause losses.

Another potentially rich source of information comes from regulatory return, which constitute specific datasets designed to permit analysis of individual financial institutions groups. To the extent that these data were designed for micro-regulation (i.e. to assess individual firms' vulnerabilities) it might appear to be a relatively simple next step to aggregate these data to produce outputs that would contribute to macroprudential analysis. But in many countries the data were not designed to be aggregated, and there can be inherent features (i.e. the nature of the data requested or the collection methodology) that make aggregation difficult; for example, the use of exception reporting (where certain ratios are exceeded) or different levels of consolidation.

Both sets of data have value for financial stability analysis provided users interpret the results carefully. Even so, they are not bespoke datasets so one question is whether they can satisfactorily meet the financial stability needs.

We have a number of papers that address topics that are directly relevant to this debate, and the speakers have been asked to bring out in their presentations the specific issues outlined above (full papers will be available to participants to download before the conference from the e.bis site). There are two papers examining the compilation of macroprudential indicators (from Barbados and Costa Rica), two papers exploring the use of supervisory and monetary datasets for financial stability analysis (from India and the UK) and a paper discussing the Portuguese experience of using Central Credit Registers.

As demonstrated by the range of papers, these questions are being widely addressed at the individual central bank level in a number of countries. In addition, international bodies such as the IMF, the ECB and of course the BIS are looking at the second-stage, but no less important, issue of comparability between different national datasets to facilitate cross-country analysis. Accordingly, we have papers from the IMF and the BIS that explain aspects of their work in this area. And

we have a discussant from the ECB who will be able to draw on the experiences of the WGMA in trying to construct EU indicators from national data.

I expect our speakers will provide enough material to stimulate an interesting discussion in the second half of the session. But, among the questions that I believe we should attempt to address, are:

- Does the lack of purpose-built datasets matter? What are the major gaps? Is timeliness an issue for some data?
- Indeed, given systematic work on financial stability is relatively new, can we yet know how much it matters? Can anyone point to specific examples where research into financial stability issues has been materially impeded or prevented by lack of suitable data?
- How prepared are central banks, or other data compilers, to adapt forms for a new purpose? Can anyone offer specific examples from their own countries?
- Is there a case for introducing – or planning to introduce – new returns specifically to capture data for financial stability purposes? Any examples? How would we explain the reasons for such returns to the banking community?
- Should we collect data from non-bank sector? The focus above has implicitly been on the banking sector, both because they still remain the main transmission mechanism for financial imbalances, within and between countries, and because there is already a much more comprehensive range of available data. But what about securities dealers, which in many markets act as quasi banks? And insurance companies, which are increasingly active in credit risk transfer markets?

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The use of macro prudential indicators
The case of Costa Rica

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I. Introduction

It is very common now to hear about financial crises in different regions of the world and especially in developing countries. From 1980 to 1996 nearly 120 member countries of the International Monetary Fund (IMF) faced banking problems of different magnitude. The subject of banking crises is very complex by the diversity of forms and operational schemes of the financial systems in different countries and by the variety of measures that different countries have taken during the crises.

The reasons why the banking problems require special attention are their domestic consequences on the economies and their effects on other countries in view of the high integration of the international financial markets.

In general, the causes of the banking crises can be divided in macroeconomic and microeconomic causes. In the former we can find: shocks affecting assets quality, funding, credit dynamics, excessive expansion of the monetary aggregates and the effect of the public's expectations and the external and internal volatility. With regard to the microeconomics causes: a weak banking supervision and regulation, quick financial liberalization, inadequate account frameworks, increases in non-performing loans and narrowing bank interest margins, the share of the state in banks property, loans to related groups and asymmetric information problems.

The international financial disturbance occurred in the second half of the 90s has raised many reflections about how the world financial system can be strengthened.

Different studies have measured the huge fiscal and quasi-fiscal costs (rescue loans from central banks) that the crises have caused, which have amounted to almost 33% of the Gross Domestic Product (Chilean case).

Also, different studies have shown that in the majority of cases countries experienced lower average rates of growth in the five years after the crises than in the five years before these. Another important feature is the high interrelation between the international financial markets, which has led to contagion situations, inclusive between countries seemingly different and far away like Mexico, Brazil, Russia and Turkey.

To strengthen the supervision over the financial sector, we need adequate indicators of the strength and stability of the financial system. These macro-prudential indicators (MPI) are very important for several reasons. First, they enable to make evaluations based on objective measures of the financial strength. If the indicators are disclosed, the supply of financial information to the markets is improved. Also, it is only possible to compare indicators between countries, if these countries adopt international prudential, account and statistical standards that facilitate supervision on a domestic and international base.

MPI include both aggregate micro-prudential indicators about the solvency of the financial institutions and macroeconomic variables related to the strength of the financial system. Financial crises occur when both types of indicators mark vulnerability, when the financial institutions are weak and suffer macroeconomic disturbances.

To wait for a crisis, with the purpose to explain it afterwards, is not a satisfactory strategy. There is an urgent necessity for finding indicators which can measure the probability of a bank bankruptcy and, in general terms, to measure the development of a banking crisis before it occurs.

Macroprudential analysis closely complements and reinforces early warning systems and other analytical tools to monitor vulnerabilities in the external position, using macroeconomic indicators as key explanatory variables. Macroprudential analysis and the associated stress testing focus on vulnerabilities of the domestic financial sector to macroeconomic, external and capital account developments. While MPI and these analyses primarily aim on predicting banking crises, they also provide an important input to more general vulnerability analyses and early warning systems. Their usefulness for these purposes will depend on the solution of measurement and /or availability problems, which have so far made it difficult to incorporate them systematically in vulnerability analyses.

II. The case of Costa Rica.

Before the 80s the Costa Rican banking industry was dominated by four state banks; private banking was practically nonexistent.

The most important implication of that situation was the nonexistent competency within the banking sector, which was reflected by the degree of efficiency (high spreads) and innovation, as well as by a clear lack of client service. In 1980 the state banks had nearly 99% of the banking sector's total assets and 99% of total credit; both indicators show the high concentration in this period.

During the first years of the 80 decade, there was an increase in the number of private banks in the country. These banks appear with a clear orientation toward the services, specially those related to international trade and lending to some activities like trade, services and consumption, activities which the state banks consider unimportant.

The sharp increase in the private banks' share is evident from the number of banks in operation: in 1980 there were only five private banks and in 2002 there are sixteen. These banks now have 40% of total assets and 50% of total credit.

The financial system of Costa Rica is composed of five groups of entities: 1) state banks, including three state-owned commercial banks and three banks created by special laws; a second tier entity that finances housing projects, a worker's bank and a saving system for teachers; 2) sixteen private banks, seven of which are foreign owned (branches of foreign banks are not permitted); 3) sixteen non-financial institutions, which engage in most banking transactions except for taking demand deposits and participating in international trade finance; 4) a Saving Credit Cooperative; and 5) three mortgage banks.

Following a rapid liberalization of the capital account in 1992, Costa Rica has conducted a process of financial sector reform in the context of a gradual exchange-rate based stabilization. These reforms have involved some reductions in the preferences enjoyed by the state-owned banks, operational strengthening of the state banks, improvement in the organization framework for supervision of financial institutions and markets, and strengthening of prudential regulations and supervisory procedures. Reforms have also been implemented in the area of public debt management, with the introduction of an auction for central government bonds in 1996 and efforts to seek greater standardization of such bonds to improve their liquidity and enhance their marketability. The public debt auction (expanded to include central bank bills) and subsequent moves toward greater uniformity and a lower level of reserve requirements have represented important moves toward more market-based indirect instruments of monetary policy.

Notwithstanding progress in financial reforms, the financial system in Costa Rica continues to be characterized by significant distortions caused by heavy taxes specific to the banking system, a requirement for the private banks to maintain a 17% reserve of demand deposits at below market rates with state-owned banks, unless certain other costly conditions are met. In addition, a number of legal, regulatory and institutional factors have impeded the development of an efficient and integrated money and interbank market.

These characteristics of the Costa Rican financial system have contributed to the heavy concentration of resources in an inefficient state-owned banking system, a high level of disintermediation reflected in large off-balance sheet and unsupervised "off shore" operations of banks and shallow and segmented liquidity markets. Together with relatively limited development of modern risk management systems and practices in the banking system, volatility of short term interest rates, and intermingling of transactions of various types of trust and investment funds with the operations of the banks that manage them, these aspects of the financial system raise concern about vulnerability to significant shocks. These vulnerabilities are exacerbated by questionable accounting practices and limited information on the large parallel operations of the banking system, which create serious problems of transparency (and thus the measurement and monitoring of risks).

About 40 per cent of credit granted by the banking system is denominated in foreign currency. Loans to borrowers that do no generate foreign currency earnings could thus involve a dimension of credit risk (indirectly related to foreign exchange risk incurred by the borrower) in the event of a large depreciation of the colon. In addition, banks that depend upon dollar-denominated liabilities for funding their operations, particularly when such liabilities are due to nonresidents, are subject to liquidity and interest rate risks that differ substantially from liquidity and interest rate risk related to colon-denominated liabilities. It is not clear that this extra dimension of risk in foreign currency operations is explicitly taken into account in existing prudential regulations and supervisory oversight. More fundamentally, the weak and primitive internal risk control systems and policies of commercial banks in Costa Rica combined with questionable accounting practices lead to inadequate incorporation of risk in the pricing of portfolios.

III. Macroprudential indicators in Costa Rica.

1. Microeconomic indicators.

Costa Rica has three supervision agencies; a) Superintendency for Banks and Financial Institutions (SUGEF), which supervises the financial system; b) Superintendency for Securities Market (SUGEVAL), which supervises the stock market and the stock exchange; c) Superintendency for the Pension System. All of these agencies are conducted by a Board named the Financial System's National Supervisory Board.

The SUGEF supervises the financial system through the CAMELS methodology, which consist of microeconomic indicators in six different areas of banking performance: Capital, Assets, Management, Earnings, Liquidity and Sensitivity to Market Risk.

The SUGEF, with the purpose to evaluate the economic and financial situation of the supervised institutions, defines the following risks;
- *Solvency risk:* It is present when the level of the capital is not sufficient to cover the losses except those covered by the reserves. The estimated losses are based on the quality and structure of the financial institutions' assets. Then the solvency risk includes the asset risk.
- *Liquidity risk:* This risk originates when the financial entity doesn't have the liquidity resources to attend their liabilities in the short term.
- *Interest rate risk:* It is the exposure to losses for fluctuations in the interest rates when there is a mismatch in the terms of assets and liabilities.
- *Exchange rate risk:* A entity face this risk when the value of his assets and liabilities in foreign currency are affected by exchange rate fluctuations and the amounts are undermining.
- *Credit risk:* This reflects the possibility of non payment.
- *Operational risk:* It is when the management information systems are unsuitable or when internal control is weak.

The CAMEL methodology was adopted by the SUGEF from January,1999, with necessary modifications to adapt it to the Costa Rican financial market. Currently, this methodology is established in "Rules to evaluate the economic and financial situation of the supervised entities". The global rating is compounded by a quantitative and qualitative rating. The former is CAMEL, and the SUGEF adds an area to analyze the sensibility to market risk, hence the name CAMELS.

For each of the six areas, the SUGEF set one or more indicators. For each indicator there are ranges depending on the size of the risk that the financial institution assumes. For example: normal level, level 1, level 2 and level 3. The major is the riskiest.

The sum of the qualifications of the elements of the six areas result in qualitative rating.

Following, we present a short description of the indicators used by SUGEF.

1. The evaluation of the Capital focuses on the adequacy of capital resources. In the case of Costa Rica the minimum capital ratio requirement is 10%. This 10% minimum is weighted for the different type of risk.

Indicator	Normal level	Level 1	Level 2	Level 3
Capital Adequacy	≤ 5%	≤ 20% but > 5%	≤ 35% but > 20%	> 35%

2. The quality of the Assets is analyzed with the relation between the non-performing loans with a maturity of more than 30 days and the total of credit. Also the level of waiting losses resulting from delay loans is calculated.

Indicator	Normal level	Level 1	Level 2	Level 3
Overdue Loan more 90 days / Direct portfolio	≤ 3%	≤ 10% but > 3%	≤ 20% but > 10%	> 20%
Wait losses in loans / total portfolio	≤ 1.7%	≤ 3.7% but > 1.7%	≤ 8.6% but > 3.7%	> 8.6%

3. The Management evaluation is made with some indexes about resources allocation, about ample overdue loans and about the relation between administrative expenditures and the gross operational utility.

Indicator	Normal level	Level 1	Level 2	Level 3
Productive asset / Liability with cost	$\geq$ 1 time	$\geq$ 0.9 times but < 1 time	$\geq$ 0.8 times but < 0.9 times	< 0.8 times
Ample overdue	$\leq$ 5%	> 5% but $\leq$ 12%	> 12% but $\leq$ 22%	> 22%

Indicator	Normal level	Level 1	Level 2	Level 3
Administrative expenditures / gross utility	$\leq$ 5% / $(P_{/8} + 5\%)$	> 5% / $(P_{/8} + 5\%)$ but $\leq$ 10%	> 10% but $\leq$ 15% / $(-P_{/8}+15\%)$	> 15% / $(-P_{/8} + 15\%)$

4. The Earnings evaluation is made by means of the following relations: utility to productive asset and utility to accounting patrimony.

Indicator	Normal level	Level 1	Level 2	Level 3
Final Utility / Productive Assets	$\geq P_{/8}$	$< P_{/8}$ but $\geq$ 0%	< 0% but $\geq -P_{/8}$	$< - P_{/8}$

Note: P is the interannual rate of inflation measured by the Consumer Price Index. The number 8 is a factor that relates productive assets to total assets.

5. The Liquidity indicator is measured by the match between assets and liabilities at one and three months. Both indices are adjusted for the volatility of current account and savings deposits.

Indicator	Normal level	Level 1	Level 2	Level 3
Match A and L at 1 month	> 1.00 T	< T but $\geq$ 0.83 T	< 0.83 T but $\geq$ 0.65 T	< 0.65 T
Match A and L at 3 months	> 0.85 T	< 0.85 T but $\geq$ 0.70 T	< 0.70 T but $\geq$ 0.50 T	< 0.50 T

A = Assets
L = Liabilities

6. Finally, the Sensitivity to Market Risk is evaluated with the index of the interest rate and the exchange rate indicator.

Indicator	Normal level	Level 1	Level 2	Level 3
Interest rate risk	$\leq$ 5%	> 5% but $\leq$ 20%	> 20% but $\leq$ 35%	> 35%
Exchange rate risk	$\leq$ 5%	> 5% but $\leq$ 20%	> 20% but $\leq$ 35%	> 35%

The Qualitative Rating is another element of evaluation. This qualification is issue by SUGEF as result of an evaluation "in situ". The main aspects included in this qualification are (the weight is in parenthesis): Planning (15%), Policies (15%), Human Resources Administration (10%), Control Systems (35%) and Management Information System (25%).

Indicator	Normal level	Level 1	Level 2	Level 3
Planning	≥ 80%	≥ 50% but < 80%	≥ 30% but < 50%	< 30%
Politics	≥ 80%	≥ 50% but < 80%	≥ 30% but < 50%	< 30%
Personal Administration	≥ 80%	≥ 50% but < 80%	≥ 30% but < 50%	< 30%
Control Systems	≥ 80%	≥ 50% but < 80%	≥ 30% but < 50%	< 30%
Manager Information System	≥ 80%	≥ 50% but < 80%	≥ 30% but < 50%	< 30%

2. Macroeconomic indicators.

With respect to macroeconomic indicators, there is broad consensus to include variables like economic growth, the balance of payments, the level and stability of inflation, interest rates, exchange rates, credit growth, share prices and real estate prices, the terms of trade, etc. Also, we need indicators which show the correlation between financial markets and the contagion through trade and investment.

The level and trend of these variables can have a direct or indirect influence on banking performance by bringing it to serious solvency problems and general crises.

In some cases, the influence of these variables is reflected on the client´s payment capacity, for instance, reductions in economic activity or in some productive sectors like coffee or bananas affect significantly the overdue loan indicator of the banks and, consequently, their solvency. A fall in the terms of trade can have similar effects on the export sector.

Credit booms and rises in share prices and real estate prices without real fundamentals (bubbles) could be observed in a lot of well-known financial crises.

In the end, drastic and unexpected changes in interest rates and exchange rates can cause important decreases or losses in the bank's financial income and in the client's payment capacity.

The Economic Division of the Central Bank of Costa Rica has been charged to produce and monitor a macroprudential indicator system for the country.

This system covers twelve early warning indicators relative to the performance of the Costa Rican economy:
- Aggregate growth rates.
- Sectorial growth rates.
- Balance of payments current account.
- International reserves.
- Terms of trade.
- Capital flows.
- Inflation volatility.
- Volatility of interest rate and exchange rate.
- Real interest rate.
- Real effective exchange Rate.
- Credit.
- Fiscal deficit.

IV. Recent economic trends

In this part of the paper, we will analyze the behavior during the last three years of some of the variables mentioned above. The aim of the analysis is to ascertain if the macroprundential indicators can predict or not a banking crisis in our country or have an explanation why a crisis has not occurred.

1. Production

As mentioned before, a production fall can be reflected in credit portfolio quality. It is clear that debtors whose activity is depressed have a high probability to fail paying back the loans.

During the last three years, the Costa Rican production, without the High Technology Industry, has presented a poor performance and we don't expect relevant positive changes in the short or me-

**National Product**

(Yearly change in per cent)
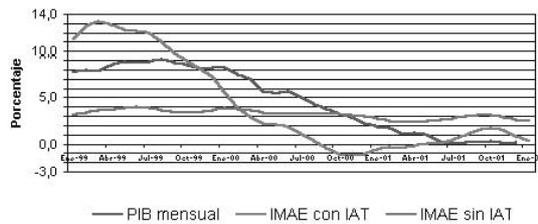
dium term. In these three years, the average production has grown by 3.1%, in contrast with a 5.4% average in the seven years before.

The modest growth of the agricultural sector has been a good example of developments that have ill effects on performance of banks.

2. Exports

A bad performance of the export sector could cause an increase in overdue loans of this sector and also reduce financial service income of the banking sector.

Gross Exports
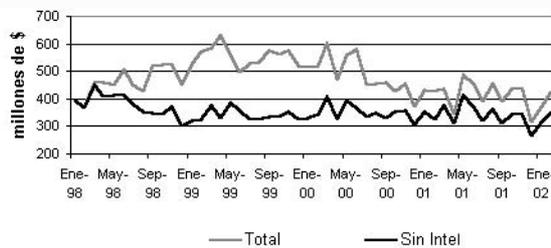
Like total production, Costa Rican exports have shown a negative trend in the last three years (with some decreases), mainly in the High Tech Industry. After elimination of the effect of HTI, this variable shows a much more stable trend, but likewise with decreases in two of the last three years. It is important to mention the effect of coffee and bananas on the total export performance.

3. Credit

Some banking crises were preceded by credit booms, which reflected high economic activity and an undue flexibilization of loans requirements.

**Credit to the Private Sector**
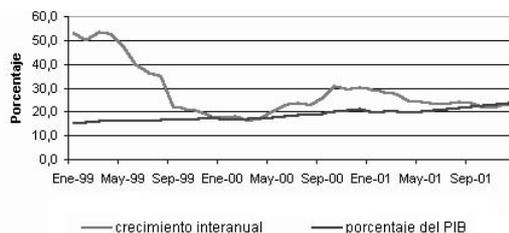
In 1998 Costa Rica experienced a credit boom. Credit to the private sector grew by nearly 50% in that year. And in the next years credit grew by 23% on average, this is about a real growth of 12%. The credits to the private sector were used for consumption and housing.

It is important to point out that in the last few years the dollarization of credit has become important because of the differential between the loan's interest rate in foreign currency and in domestic currency. The majority of credits in foreign currency were supplied to sectors which don't have any earnings in that currency. This trend is serious because it burdens the banking sector with a high exchange rate risk and, in some circumstances, it presents a constrain on the exchange rate policy of the Central Bank.

Dollar Credits
*(in % of total credits)*
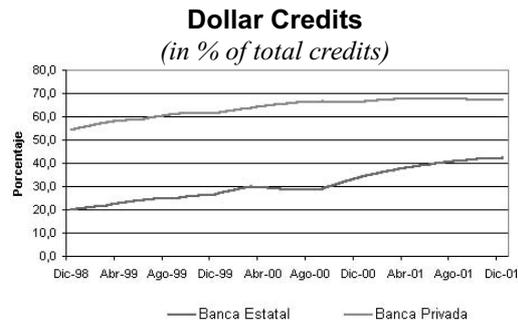
4. Inflation

The level and volatility of inflation are two factors which affect the financial agent's decisions, provoke distortions on other macroeconomic variables, like interest rates, and may impel the financial system to growth appropriately.

Consumer Price Index
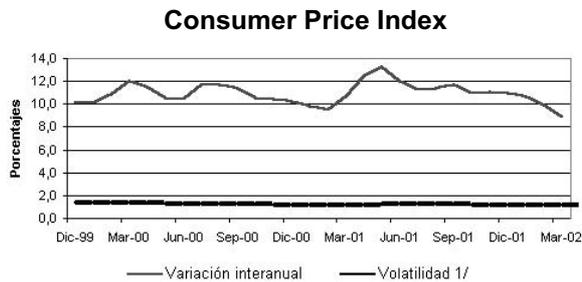
The Costa Rican inflation from 1996 to 2001 was smaller than six years before. For example, from 1990 to 1995 the average inflation was 20%, while in the last six year it was 11.5%. Notwithstanding that decrease, the changes in the price level have been relatively high compared with other countries in the region. Nevertheless, the volatility has been low, which is a positive aspect for the banking sector. We don't expect important changes that can modify the economy's price performance in the short term.

5. Interest rates

Interest rates are a key element in banking performance. The interest rate risk is a relevant factor in the analysis of a financial entity's solvency, not only for the institution itself but also for the supervisory agency.

Real Interest Rate [1]
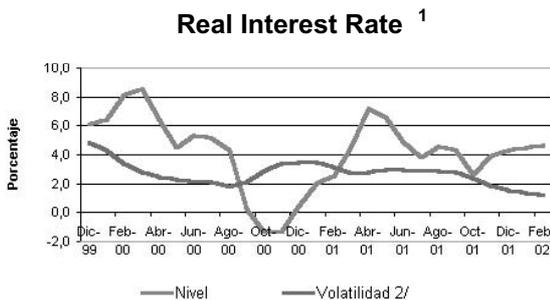
Depending of the sensibility of the banks' assets and liabilities structure to the interest rates, increases or decreases in interest rates may affect the net financial income of these institutions significantly. In the Costa Rican case the commercial banks, state bank specially, present a negative structure (more liabilities than assets sensitive to the interest rate) in domestic currency. Therefore, an increase in domestic currency interest rates can affect their financial result.

From another point of view, the level and volatility of the interest rate can affect the payment capacity of the borrowers increasing the banks' non-performing loans.

The interest rates in Costa Rica, mainly in domestic currency, have showed high levels recently (but no more than in other periods). Their volatility has been high, which may affect the confidence in the financial system and its soundness.

6. Terms of trade

A sustained deterioration in terms of trade is prejudicial for the economy in general and could, specifically, indicate problems in the export sector if the deterioration is on the side of the export prices. This situation can negatively affect the performance of banks which have important relations with the economic sector concerned.

Terms of Trade

In the last few years Costa Rica has suffered an important deterioration in terms of trade caused by a significant fall in the coffee price and an increase in the oil price. This situation has affected some coffee producers and subsequently state banks which had lent to that sector. We don't see a more positive development in the future because of the conflicts in Asia and the overproduction of coffee in the world.

7. Real effective exchange rate

In some financial crises, problems were related to the exchange rate policy, mainly by a failure to adjust the exchange rate appropriately.
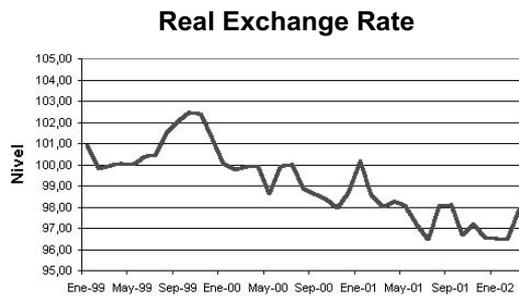
Real Exchange Rate

In Costa Rica the real effective exchange rate (REER) has shown a small overvaluation of the colon compared with the US dollar from 2000 until now. Since December the Central Bank of Costa Rica has accelerated the rhythm of devaluation to adjust the REER.

That increase in the exchange rate has represented a devaluation of more than 3% and, consequently, has pushed up the effective interest rate in foreign currency. That action could have effects on the dollar debts and increase non-performing loans in that currency, specially for borrowers who lack dollar earnings.

8. Fiscal deficit

Fiscal deficits affect the interest rate and inflation; they produce crowding out of the private sector and burden economic performance of a country. All of that impede the development and good functioning of the financial system.

Fiscal Deficit
(in % of GDP)
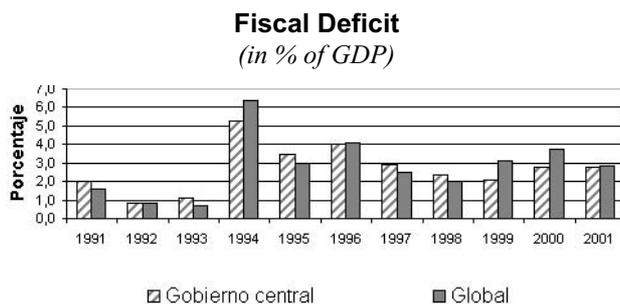
Costa Rica has faced continuous fiscal deficits through several years. This is the main problem that the country's economy currently faces.

9. Current account deficit

Another element that has proven to be relevant to explain some financial crises is the permanent and unsustainable deficit in the balance of payment's current account. Such a deficit can provoke international reserves losses and pressure on the exchange rate. In Costa Rica the current account deficit has been nearly 5% of the GDP in the last five years.

Deficit on BoP Current Account
(in % of GDP)
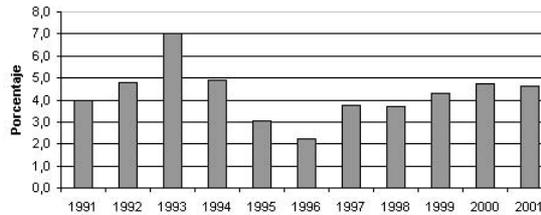
Briefly, some macroeconomic variables show levels and trends, which without be dangerous (at least to the extent as in countries that suffered financial crises), call the attention since they show a behavior that could affect the financial system's performance: high and volatile interest rates, mid-inflation rates, a poor production and export performance, terms of trade deterioration, permanent fiscal and current account deficits and a high dollarization of bank portfolios.

V. Conclusion

Costa Rica has not had an important banking crisis, though in the last fifteen years ten banks were intervened by the authorities, five of them were declared bankrupt, two were merged with others, one is still operating and the last two were closed.

Nonetheless, those bankrupt didn't provoke a systemic crisis because in the most of the cases, there were specific problems, which affected only the own entity.

When we analyze the bankruptcy causes, it is possible to identify some common elements present in those episodes: management problems, an inadequate legal and regulatory framework and weak supervision.

In the last few years Costa Rica has made progress in the legal framework, in the supervision approach of the SUGEF, in the release of information to the public and in the banking capital requirements.

Also, the Central Bank of Costa Rica calculates a group of macroprudential indicators with the purpose of analyzing the effect of macroeconomic variables on the financial system. The use of these indicators is recent.

When we look at the development in recent years of the leading indicators for banking crises, we can find some warning signals that imply the necessity to take some economic policy measures to avoid a currency or banking crisis.

In the last year the Central Bank of Costa Rica took some actions in that sense: it increased the annual devaluation percentage, reduced the reserve requirement on banking deposits in domestic currency and tightened the monetary policy to reduce credit growth and inflation.

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The use of Central Registers for statistical activities in the light of Financial Stability: The experience of the Portuguese central bank*

Orlando Caliço (Banco de Portugal)

Introduction

The "Use of Central Registers for statistical activities in the light of Financial Stability" is a part of a more generic topic, well known in the economic literature as the relevance of reliable data on the credit market in order to reduce the ever-present asymmetric information between the borrower and the lender.

For the lenders, it acts as a most valuable instrument to support sound risk management practices; for borrowers it represents a reduction on credit operations costs, due to the availability of detailed information on their loans past performances.

For National Central Banks, due to the fact that financial market surveillance and analysis are an essential part of the Banks macro prudential task, the availability of information leading to an identification of lending and borrowing behaviour of the different sectors of the economy is of the utmost relevance, minimizing large exposures and preserving financial stability.

This topic, extremely important for both lenders and borrowers, is of no less importance for national authorities in charge of supervision, which, in the case of Portugal, is the Central Bank.

It is also an interesting theme for future developments in the European Monetary Union context, since, for the creation of a truly European credit market, the existence of a process of exchanging information about borrowers' behaviour, at a wider level and reasonable costs, seems essential.

In this context, financial stability in the European Monetary Union imposes cooperation between national supervisors, in order to avoid the spill over effects of a special borrower problems in a specific country.

Credit Registers integration in the context of Central Bank activities

Integration in the Statistics Department of the Banco de Portugal

In Central Banks organization there is no common rule for the integration of the "Credit Registers Data Bank". In general, there are three situations: (i) it is part of the Market Operations Department – that was the situation in Portugal until the middle of 1999; (ii) it is part of the Supervision Department, and (iii) it is part of the Statistics Department – which is the present situation in Portugal.

The option for the integration of the "Credit Registers Data Bank" in the Statistics Department was recommended by a Committee of Bank directors (Market Operations; Payments System; Research; Statistics; Information Systems and Organization; Human Resources) based particularly on the fact that the Statistics Department was better placed to provide information for internal and external users, observing, at the same time, the usual restrictions on banking secrecy and statistical confidentiality that are absolutely crucial in the management of this data bank.

After the integration of the "Credit Registers Data Bank" in the Statistics Department, we became aware that the general knowledge about "Credit Registers", not only by the general public, but also by the financial community and by the Government Departments, was very scarce.

In order to fill this gap, the Board of the Banco de Portugal decided to create a permanent advisory Group ("Group for Monitoring the Credit Registers Data Bank"), in charge of following its functioning and making proposals for a better adequacy to the needs of the different users. The Group meets every four months and it is composed by representatives of:

i.   Financial institutions;
ii. Government Ministries;
iii. Banco de Portugal.

General characterization of the Portuguese Credit Registers

The first historical reference to Central Credit Registers (CCR) in Portuguese law dates from 1957, when a Decree Law established the bases of the credit system and banking structure reorganization. However, only in 1968 did a contract between Banco de Portugal and the Government define the specification of the service.

After some preliminary work done by the Banco de Portugal, the rules laid down in Decree Law No. 47909, of 7 September 1967, signalled that the foundations could be laid for a centralisation of information, on a monthly basis, concerning risks with credit operations, in order to enable credit institutions and financial companies to evaluate the risks attached to these operations. In fact this was only implemented in 1978. There were only a number of financial institutions as participants, and only liabilities from enterprises and entrepreneurs were communicated. Since then a computerised system was developed and conditions were created to receive information from the whole financial system and also to include liabilities on credits to individuals (this occurred in 1993).

In 1996, Decree Law No 29 of 11th April revised the rules laid down in the previous Decree Law and gave Banco de Portugal the rights to make use of information for three different purposes: credit risk centralisation, prudential supervision and statistical production and especially the capacity to exchange information with the central credit registers of other countries.

Today, the Credit Registers managed by Banco de Portugal covers credit activities of the whole financial system. All credits with a minimum threshold of 50 Euros have to be communicated, the only exception being credits between monetary institutions.

Since last year, some adjustments have been made in order to follow market evolutions. One example is the need to receive information on securitisation. These operations have growing importance in the Portuguese financial system and correspond to a credit portfolio sale. However, these securitised credits shall continue to be reported to the Credit Registers because they are relevant for an individual risk evaluation.

Credit institutions engaged in credit functions or credit-related activities, contribute to the centralisation of liabilities by supplying information on end-of-month balances of loans carried out with resident and non-resident enterprises and individuals. This information is centralised and distributed by Banco de Portugal, as shown in the next figure.

Figure 1 – CRC activity
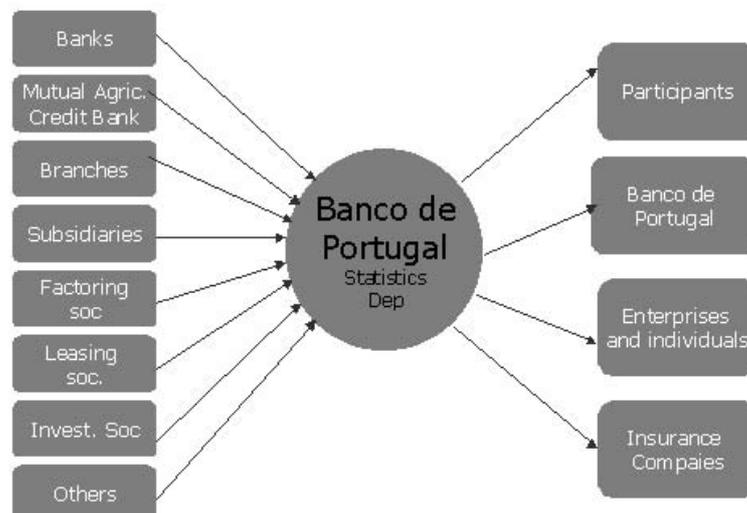
Banco de Portugal sends monthly a list to the participating institutions containing the total liabilities for each of their credit clients. The liabilities (received and sent) are aggregated in 10 different types and 12 categories, as follows:

By Types:

Types 1 to 5	Liabilities in regular situation (includes commercial liabilities, liabilities from discount operations and short, medium and long-term financing operations)
Type 6	Off-Balance Sheet Liabilities
Types 7 to 8	Default Credit
Type 9	Write-Offs
Type 10	Default credit re-negotiated.

By Categories:

Category 1	Individual Accounts
Category 2	Joint Accounts – First borrower
Category 3	Joint Accounts – Other borrowers
Category 1.4, 2.4, 3.4	Liabilities used in credit securitisation
Other	Liabilities related to emigrants savings accounts

The amount of information centralised in the Credit Registers is very high. In fact, considering the number of participants (around 260) and the operations covered (with a very low exemption threshold), the number of individuals and corporate bodies included in the database is significant, around 5 millions, and is growing (it represents more or less the double, comparing with 1998 data)[1], as shown in the next picture.

**Figure 2 – Evaluation on credit beneficiaries**
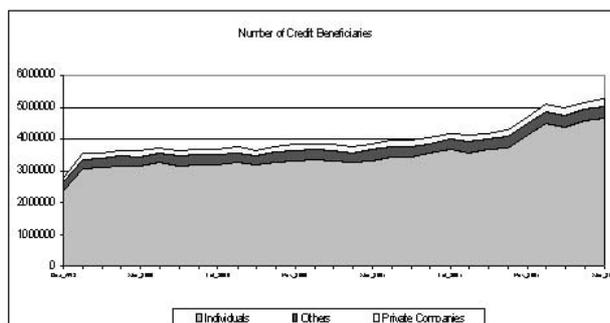
The participating institutions can contact Banco de Portugal to obtain information on the liabilities related to existing credit beneficiaries or to those who requested the credit and authorised the scrutiny. Liabilities can also be analysed by economic activity or other types of aggregation.

   This information is also important for insurance companies authorised to operate with credit insurance, and also for individuals and enterprises. In fact, credit beneficiaries, in compliance with constitutional and legal provisions intended to protect citizens, are entitled to obtain the information on their own situation from the Central Credit Registers of the Banco de Portugal[2]. In fact the number of inquirers is increasing, as shown in the next figure, not only because more credit incidents exist but also because this service is becoming more widely known.

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1   *We are aware that this number is greater than the reality once there are some problems with identification, which causes some duplication. This problem may be solved in short term with some important changes in the process of certification.*

2   *This information will only be provided to the person himself/herself or to his/her legal representative, in accordance with the banking secrecy rules in force in Portugal. To obtain information on the credit risks data base, the identity card and taxpayer card are needed (corporate entity card in the case of independent professionals and enterprises).*

Figure 3 – Number of inquirers
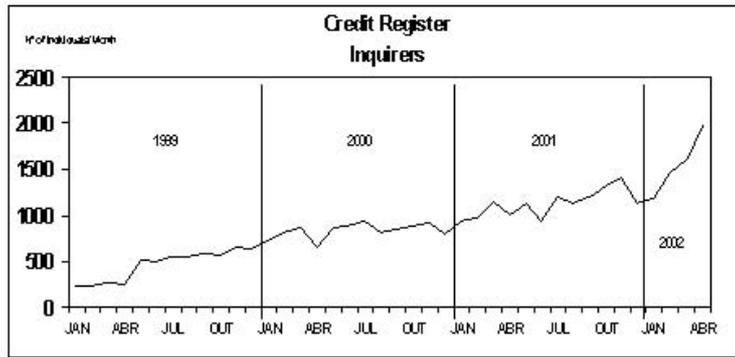
Another important Credit Registers service is to provide statements on construction enterprises involved in public works, a service attributed to Banco de Portugal by Decree Law No 59/99 of 2nd March. The control of credit granted under the emigrants savings regime also falls under the aegis of Banco de Portugal as laid down by Decree Law No 323/95.

Banco de Portugal is aware of the importance of this kind of information to financial institutions and has taken advantage of new technologies to invest in the CCR system. Nowadays individual banks and financial institutions can have on-line access to the database, which provides a big contribution to a faster decision process on a credit demand, without the risks associated to lack of information.

Also, with the liberalisation of capital movements and the possibility of freely granting credit in every country of the EU, the risk associated is even bigger. It is therefore very important for the regulator and for the financial participants to have a record of total indebtedness of the borrower. As an answer to this request, Banco de Portugal is preparing a regular exchange of information with the central credit registers[1] in the Central Banks of other EU countries, thus providing details on the common borrowers of each country.

The experience of the Statistics Department using Credit Registers Data Bank

In Portugal, as was shown in the previous section, the Central Bank experience working with the Central Registers Data Bank is very long. The main areas for which the Credit Registers Data Bank has been used are the following:
• Statistics
• Supervision
• Economic analysis
• Information for Government agencies dealing with public works
• Information for the financial sector community and market operations
• Information for individuals and enterprises

Statistics

The aggregation of data on an individual basis gives better statistical information in areas such as:
i.   The breakdown of credit by economic activity;
ii. The breakdown of default credit by geographic area and economic activity;
iii. The availability of a database on individuals loans allows the construction of sampling exercises. One of this exercises was made recently, in co-operation with our Research Department, selecting a representative sample of total credit for individuals. Based on this sample we launched a questionnaire addressed to commercial banks with about fifty questions on credit behaviour, in order to get a clearer view of credit policy. Some examples of the results obtained are:
   • Different credit policies pursued by different banks, in terms of interest rates, credit to income ratio, monthly payment to monthly income ratio, etc.

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1   *The following countries make up the working group on Credit Registers: Austria, Belgium, Deutschland, France, Italy, Portugal and Spain.*

- Social and economic characterisation of the population with access to credit for housing acquisition and durable goods acquisition.
- Social and economic characterisation of default credit population.

These results, without specification of each reporting bank, will be sent to participating institutions for their own analysis.

Supervision

For supervision authorities, the availability of detailed information is an essential tool. The possibility of accessing individual data allows a thorough analysis – specifically sensibility analysis – of the implications on the balance sheet of financial institutions and consequently for their financial stability resulting from:
- Total indebtedness of "economic groups", with a great number of enterprises working in several sectors of activity and subject to a wide range of economic situations;
- Crises in some sectors of activity, or in some geographical areas.

Economic analysis

In addition to the characterisation of borrowers and credit policies of a variety of credit institutions, sensibility analyses of the impact of specific shocks – regional or sectoral – on banks' balance sheets are a very important and easy result, that can be achieved by particular questionnaires based on credit register data.

   This data is even more important when the structure of outstanding credit has changed significantly over time, as happened in Portugal. The chart below gives the outstanding credit amount compared with the level of GDP and reflects the importance of credit activity through the years.

Figure 4 – Measure of credit importance

The breakdown between credit to enterprises and credit to individuals gives more or less equal shares. However, the risks connected with credits to individuals are different from those resulting from loans granted to enterprises.

   In fact, in credits to individuals, the average amount of credit per borrowers is much smaller, the distribution over a large number of debtors leads to greater diversification of risk and a very large proportion of the debt is covered by mortgage guarantees. However, it must me remembered that individuals depend almost exclusively on the banks for their financing and have great difficulty in adjustments in cases of financial crises.

   If a Central Bank, as is the case in Portugal, has also a "Balance Sheet Data Bank" on non-financial enterprises, some complementary information can help analysing the indebtedness of enterprises. For example, information provided by the Portuguese Balance Sheet Data Bank shows that bank credit represents around 25% of financing sources of Portuguese enterprises, but a breakdown between the enterprises with positive results and those with losses shows that credit is even more important in less profitable enterprises. In these cases the role of "Credit Registers" information for the assessment of demand for credit by these enterprises is clearly reinforced.

**Figure 5a – Development of financing structure of profit-making
Portuguese companies**
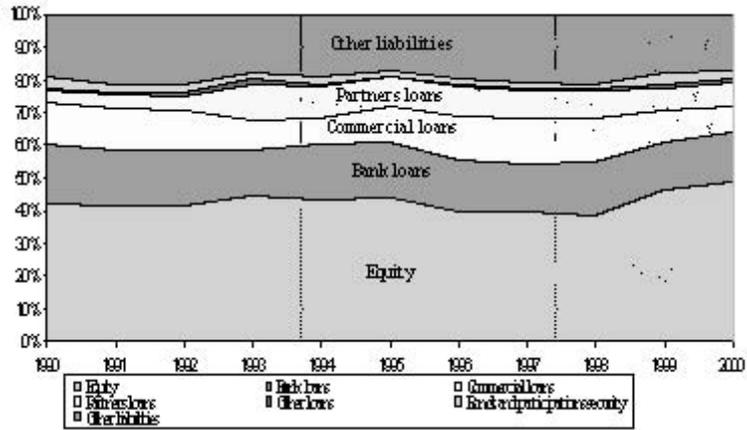
**Figure 5b – Development of financing structure of non-profit-making
Portuguese companies**
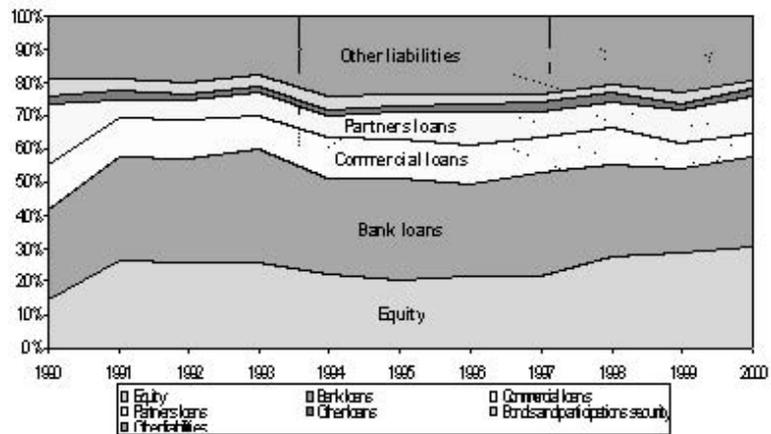
Figure 6 – Indicators of profitability of Portuguese companies
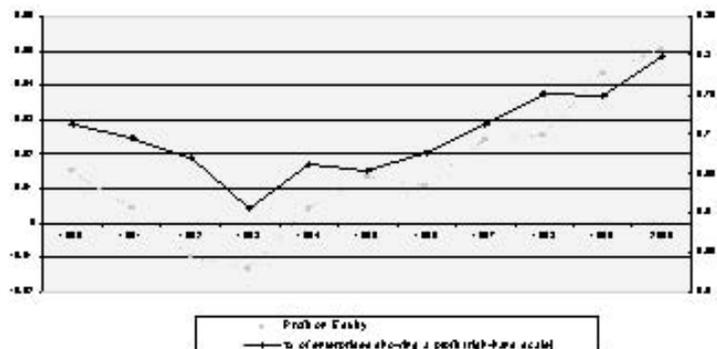
Nowadays, with the total domestic credit representing around 140% of GDP (see figure 1), which is a relatively new situation in Portugal, Banco de Portugal has been making significant improvements in the resources available for public information.

Provision of information for financial sector community and market operations

The main objective of the credit register data base is to provide information for the financial sector community, reducing the adverse effects of asymmetric information on credit decisions with positive implication on financial stability.

For this purpose, Central Banks are particularly suited for the task since they may impose the report, check the information reported with other sources (information for statistical purposes and supervision purposes) and consequently they can make use of a data base of good coverage and accuracy.

For the Central Bank this information is also relevant in order to evaluate the credit risk of collateral.

Provision of information for individuals and enterprises

In the past this objective was not considered as important as today by the Banco de Portugal, since individuals didn't owe significant amounts of credit. Indeed, up to the 1980s housing financing was not developed in Portugal. Large-scale consumer credit is even more recent.

Provider of information for Government agencies dealing with public works

The obligation imposed on every enterprise that the documentation presented for a bid in public works includes a certification issued by Banco de Portugal, based on the information available in the Credit Registers Data Bank, about total indebtedness vis-à-vis the banking system, is also an element contributing to the financial stability.

Conclusions

The concept of asymmetric information gives rise to the phenomenon of adverse selection and moral hazard. In this context, the ability to provide financial institutions and decision-makers with good information is a priority and a contributor to financial stability.

The Credit Registers Data Bank is an important tool to complement and support macro prudential analysis made by the Supervision Authorities and economic research made by Central Banks.

Central Banks, which now have a Credit Registers Data Bank, may reinforce the conditions for avoiding over-indebtedness by individuals and enterprises, if they have a more active position regarding the availability of information to the public, that is to say, a more public oriented information access policy.

It seems that there is not enough knowledge about the possibilities of using information from a Credit Registers Data Bank in economic research and in supervision, even inside Central Banks, which makes a strong point for improving cooperation between departments in charge of the management of the Credit Registers Data Bank and, at least, Research and Supervision Departments.

A Credit Registers Data Bank with a high coverage can be an important source of information for quality control of statistics reported by financial institutions and may also be used to reduce the charge for Banks reporters and so reducing the cost without losses in statistical quality.

There is also a need for improving cooperation between Central Banks of EMU countries with a Credit Registers Data Bank, which points to an acceleration of the legal basis for exchanging information and sharing experiences on the use of a Credit Registers Data Bank for economic analysis and supervision purposes.

Abstract

The National Central Bank's role in financial stability is usually seen as essentially focused on the macroeconomic determinants underlying the stability of the banking system. However, the increased changes in the financial environment, with a significant enlargement of the credit markets and the strong developments in information technologies, have given a new role to "Credit Registers". This paper is a contribution, based on the Portuguese experience, on how, and through what channels, credit registers can contribute to financial stability. The paper is presented in three main sections. The first section introduces the subject in appreciation. The second section covers the

Credit Registers integration in the core activities of a Central Bank, with a special emphasis on the potentialities resulting from its integration in the Statistics Department. In the third section some conclusions and implications for the future are presented, regarding an increase of the use of Credit Registers in the framework of financial stability.

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Early warning indicators for emerging economies

John Hawkins and Marc Klau[1] (BIS)

This paper summarises work on early warning indicators for emerging economies. It describes in particular the use within the BIS of relatively simple indices summarising information about emerging economies currently under pressure in financial markets and those vulnerable to such pressure in the future. The survey of the literature suggests financial crises are typically preceded by overvalued exchange rates, inadequate international reserves, large foreign debt, recessions and excessive credit growth. These indicators are included in the summary indices of vulnerability. The vulnerability indices have modest predictive power for the pressure index but like other early warning signals are best regarded as an aid to analysis rather than a definitive predictive tool.

1. Introduction

The global economy has been shaken by a series of financial crises since the mid-1990s. While the epicentres of these shocks were in Mexico, East Asia, Russia, Turkey and Latin America respectively, they were felt more globally. One financial "tsunami" swept across the Pacific from Mexico in 1995 affecting Asian (and other) financial markets, and another travelled in the opposite direction in 1997. In September 1998 the Russian financial crisis caused a worldwide retreat from risk and reduced liquidity globally. Subsequent crises in Argentina, Brazil and Turkey also caused tremors, but these were largely confined to neighbouring countries.

These events led to extensive research into what variables can serve best as measures of pressures facing emerging economies and those making them vulnerable to pressure in the future. This burgeoning literature on "early warning indicators" is surveyed in Section 2. Some simple indices used within the BIS are described in Section 3 and the Annex. Section 4 gives a tentative evaluation of early warning systems.

2. The "early warning indicators" literature

The increasing incidence of financial "crises" – disturbances in financial markets of sufficient size to cause significant disruption to the real economy – has led to increasing work in this area. The use of aggregate indices of country risk has been widespread in the private and public sectors for some time. The banks evaluate country risk as part of their credit assessment and monitoring, although they usually do not make such ratings public. Their supervisors sometimes calculate country risk weights for domestic banks to apply to their lending abroad. The IMF has developed early warning indicators – see IMF (2002), as well as their related work on "macroprudential" (also known as "financial soundness") indicators: see Craig (2002) and Sundararajan et al (2002). Rating agencies produce sovereign risk ratings. Export credit/insurance agencies calculate country-specific risk premia.

Some of these institutions use statistical studies to help in selecting the variables to include in these indices. Three different approaches have in general been followed:
- *Qualitative comparisons*, graphically comparing economic fundamentals immediately preceding a financial crisis with those in normal times or in a "control" group of countries which did not suffer a crisis.
- *Econometric modelling,* either using regressions to explain some measure of exchange rate pressure or *logit* or *probit* models to test whether indicators are associated with a higher probability of a financial crisis.

- *Non-parametric estimation*, evaluating the usefulness of a number of different variables in signalling a pending or potential crisis. Threshold values are chosen for each indicator so as to strike a balance between the risk of many false signals and the risk of missing the crisis altogether.

A good summary of this literature, as it stood prior to the Asian crisis, is in Kaminsky, Lizondo and Reinhart (1998). They reviewed 28 studies of currency crises, which between them tested 105 possible indicators, of which 43 are significant in at least one study. The first column of Table 1 summarises the results of their survey and the second column summarises a subsequent survey by Hawkins and Klau (2000). The other columns show results from some more recent papers.

Table 1 – Indicators of financial crisis

	Pre-97	1998-2000	B&P	IMF DCSD	IMF Signals	B&L	JPM	DNB	Mulder
GDP, output gap	6	16	5				v		
Budget balance	3	6					v		
Real exchange rate	12	22	1	v	v	v		v	v
Current account	4	10		v	v		v		v
Exports	2	9		v	v	v			
Terms of trade	2	6	2						
Capital account	3	1							
External debt		4	1	v			v		v
Debt to international banks		4							
International reserves	11	18	3	v	v	v	v	v	
Money supply	2	16	3		v		v		
Credit	5	10	4		v		v		v
Real interest rate	1	8	4		v				
Equity prices	1	8	1						
Inflation	5	8	4				v	v	
Contagion	1	5							
Political/legal	3	3	1						v

Pre-97: number of times indicator is statistically significant in 28 studies surveyed by Kaminsky, Lizondo and Reinhart (1998).
1998-2000: number of times indicator is statistically significant in 21 studies surveyed by Hawkins and Klau (2000).
B&P: number of times indicator is significant in 5 studies of financial (particularly banking) crises surveyed by Bell and Pain (2000).
IMF DCSD: indicators currently included in IMF's Developing Countries Studies Division early warning system; see IMF (2001).
IMF Signals: indicators currently included in IMF's Crisis Signals early warning system; see IMF (2001).
B&L: indicators found to have good predictive power by Brüggemann and Linne (2002).
JPM: indicators included in JPMorgan's assessment of country risk, described in Hargreaves (2001).
DNB: indicators significant at 5% or better level in De Nederlandsche Bank (2000).
Mulder: indicators found to have significant explanatory power by Mulder, Perrelli and Roche (2002).

The most important indicators appear to be international reserves, the real exchange rate, credit growth, and real GDP (either growth or relative to trend). The evidence is mixed on the importance of current account deficits. In theoretical models and informal discussions of countries thought to be at risk, this tends to be one of the most frequently mentioned indicators. In the empirical studies it is one of the most commonly tested variables but is often statistically insignificant. This may reflect that the impact of a large current account deficit depends on the sources of the imbalance (eg it is more damaging if due to excessive levels of consumption rather than high levels of productive investment) and its funding (direct investment leaves an economy less exposed than short-term portfolio flows) as much as its absolute size.

There have been some changes in emphasis over time. The size and composition of external debt was rarely found to be a useful indicator in early studies but has been given more attention since the Asian crisis.

3. An approach used within the BIS

Some economists in the BIS have for some time been constructing early warning indices. The goal is deliberately modest; to suggest which of two dozen emerging economies are deserving of more attention in meetings of central bankers to discuss developments in the global economy and financial system. This closer study involves not just examining a wider array of economic data but an assessment of non-quantitative and non-economic factors as well.

It is conceptually useful to think of a crisis as excessive *pressure* in financial markets, which has been *triggered* by various developments in a *vulnerable* economy.[1] Financial market pressures may be triggered by political events, natural disasters or contagion, all of which are largely unpredictable. But often a crisis will occur after a gradual deterioration in various aspects of the real economy and/or the financial sector rendering the economy more susceptible to shocks. Such increases in *vulnerability* can usefully be summarised in indices.

The BIS approach therefore involves constructing three indices, each encompassing indicators weighted and scaled so that the maximum (worse) score is 10.[2] The first is a monthly index of pressures manifest in financial markets. Continuing the earthquake analogy with which the paper opened, it is the equivalent of a Richter scale. The next two look for stresses in the tectonic plates as signalled by indices of vulnerabilities in the external and banking sectors, respectively.

The indicators were chosen and the weights applied judgementally, but after consultation with experts and after reviewing the available literature. For simplicity, the same weights were applied to every economy, rather than, for example, distinguishing between different exchange rate regimes and degree of openness in choosing the weight to assign the exchange rate. On the face of it, this approach may be regarded as "arbitrary". But while econometrics could be used to select the indicators and weights, Table 1 shows that different econometric exercises give different conclusions. Judgementally choosing just one study as definitive would be just as arbitrary as choosing the indicators themselves. Furthermore, indicators found most useful in econometric studies of past crises are not necessarily the best ones for constructing indices of present dangers. Indices of vulnerability need to contain timely data. This is why, for example, the BIS international banking data are used in this work whereas an econometric study of past crises might use a broader measure of international debt which becomes available much later. Finally, using relatively simple, transparent techniques makes it clear what is driving the results, rather than facing a complex "black box".

The three indices

The financial pressure index

The most obvious sign that an economy is under pressure, that may be the first stage of a financial crisis, is a large depreciation of its exchange rate. However, the authorities may be able to deflect the impact on the exchange rate, at least for a time, by some combination of raising interest rates and running down international reserves. For this reason, following Eichengreen, Rose and Wyplosz (1995), the index of pressure encompasses three elements; the exchange rate, interest rates and international reserves.

The interest rate used is based on the *real* rate of interest. This created an anomaly in the case of China, where real rates are high because of declining prices and not because nominal rates have been raised to defend the exchange rate. However, experiments with the obvious alternative – nominal interest rates – produced rather more apparent anomalies. The highest risk weight is given when real interest rates exceed the world rate by over 5%.

The exchange rate enters the index twice, once as a change over three months and once as a change over one year. The reasons for this approach are: (i) to give greater weight to more recent exchange rate movements but (ii) to discount a reversal of a sharp exchange rate movement a year earlier.

The data on reserves are admittedly imperfect and, during the run-up to the Asian crisis, the published data were actually misleading; in some cases, they omitted off-balance-sheet transactions that had reduced the amount of reserves available for the defence of a besieged currency.[3]

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1 *In terms of the theoretical literature, "first generation" models initiated by Krugman (1979) emphasise the role of fundamentals, especially fiscal laxity, in bringing about a crisis. The "second generation" models, surveyed by Flood and Marion (1998), allow for multiple equilibria and "self-fulfilling crises", and show that a crisis is not inevitable in a vulnerable economy. The latter are consistent with the approach used.*

2 *They are presented in summary tables whose format is shown in Annex A of Hawkins and Klau (2000).*

This should not be a problem in future. The prescriptions for international reserves data in the IMF's Special Data Dissemination Standard were significantly strengthened in March 1999 to follow a template developed in conjunction with the Committee on the Global Financial System: see CGFS (1998).

The external vulnerability index

The first two measures of underlying external disequilibria included are the real effective exchange rate and current account deficit, while the third is based on recent export growth, as a slowdown in exports has frequently preceded crises. For the exchange rate and export growth, the indicators are expressed relative to a base period. The choice of the base period is inevitably somewhat arbitrary. There is a trade-off between choosing a single recent year, which may be unrepresentative, or a longer-term average that might not reflect longer-term structural changes. One possibility is to choose a period regarded as "normal" or an "equilibrium". This is very difficult, especially without the benefit of hindsight. Also, a normal period for one region may be abnormal in another; yet using different time periods as bases for different countries would involve adding more complexity.

The final three indicators cover external debt. BIS data on liabilities to international banks and on international bonds outstanding are available more frequently, are more timely, and are more internationally comparable than data on other forms of external debt. Moreover, such flows tend to dominate year-to-year movements in the capital account – in the Asian crisis they displayed large movements in and out. In the calculation of debt/GDP ratios, GDP is converted into US dollars at a "smoothed" exchange rate.

The banking system vulnerability index

Unfortunately, this is an area where reliable data are hard to find. In principle, it would be desirable to have indicators such as the quality of the supervisory system, the level of banks' non-performing loans, capital ratios, sectoral credit concentration and banks' exposure to foreign exchange or interest rate risk. In practice, however, such data are either not widely available or are systematically distorted (eg low reported NPLs often reflect negligent supervision). It was therefore decided to use five proxies for banking system vulnerability:
- the first is simply based on the rate of growth of domestic bank credit: very rapid growth has often gone hand in hand with declining loan standards/greater risk and the emergence of speculative bubbles – see Borio and Lowe (2002);[1]
- the second is the growth of borrowing from international banks, which typically reflects increased foreign currency borrowing by domestic residents (sometimes, as in many Asian economies, through local banks);
- a third, related, indicator measures the external borrowing by banks as a percentage to domestic credit. This is a proxy (admittedly a highly imperfect one) for the extent to which local bank lending is denominated in foreign currency: such lending leaves borrowers and their banks exposed to significant exchange rate risks;
- the fourth indicator is the level of real interest rates; very high real rates mean banks will struggle to have loans repaid while very negative rates mean they will struggle to attract deposits.
- the fifth indicator is domestic interest rates relative to US rates. A highly positive interest rate differential provides an incentive for domestic corporations and banks to borrow abroad while highly negative differential indicates that domestic credit is getting too cheap.

Evolution of the indices

The indices of pressure and vulnerability have been modified over time in the light of experience. For example, reserves and borrowing from foreign banks were both initially included as percentage changes. However, this meant that marginal increments to very low reserves were being un-

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3 *The Working Group on Transparency and Accountability (1998, pp 15-6), comment that "following the flotation of its exchange rate on 2 July 1997, Thailand revealed that although the central bank held gross reserves of US$ 32 billion at the end of June, outstanding forward and swap liabilities totalled US$ 29 billion. In Korea, the central bank reported that gross reserves totalled US$ 24 billion at the end of November, but almost two-thirds of this amount was not readily available to the Korean authorities because it had been deposited with overseas branches of Korean banks to assist the banks in meeting their external obligations."*

1 *A possible amendment would be also to penalise credit contraction, beyond some point, although this is sometimes a positive indication that banks are sorting out problems in their loan portfolios.*

duly rewarded and higher international borrowing off a low base was being unduly penalised. The absolute increases are now expressed relative to the size of trade and GDP respectively.

Setting thresholds in the scoring process

A continuous, but complex, scoring system could be employed to combine the values of the individual indicators into summary indices. However, the current arrangement of mapping values into five bands (see the Annex), given the values –2, –1, 0, 1 and 2 respectively, has the virtue of simplicity and makes it easier to see which indicators are leading to a deterioration in an index for a country. However, realising the limitations of such an approach, undue emphasis is not placed on single-point changes in index scores which may be the result of very small changes in indicators that cross the threshold from one band to another.

Weighting

As mentioned above, each index is a weighted sum of the scores of individual indicators. To give each index a maximum value of ten, the weights depend on the number of indicators used. The indicators are generally equally weighted, although where certain key indicators reach extreme values they are given increased weight (see Annex). An alternative of weighting indicators in inverse proportion to their volatility, although less arbitrary, was rejected because of the additional complexity introduced.

4. Evaluating early warning systems

General

How well do these early warning systems work? There have been a few assessments. Berg and Pattillo (1999) look at whether some models would have predicted the Asian crisis. They conclude "the results are mixed. Two of the models fail to provide useful forecasts. One model provides forecasts that are somewhat informative although still not reliable." A comparable study by Furman and Stiglitz (1998) and informal surveys by *The Economist* (1998) and Starrels (2001) reach similar conclusions. An analysis of their own early warning systems cited in IMF (2002) concludes they are significant predictors of actual crises but they still generate a substantial number of false alarms and missed crises. In reflecting on their own work on early warning signals for emerging economy crises, Goldstein, Kaminsky and Reinhart (2000) say "while we would not place much confidence in the precise estimated ordering of vulnerability across countries, we think the signals approach looks promising for making distinctions between the vulnerability of countries near the top of the list and those near the bottom – that is, it may be useful as a 'first screen' which can then be followed by more in-depth country analysis".

Part of the reason for the modest performance is that the indicators that seem most relevant in explaining one crisis are often not germane to the next crisis. Crises in the more open Asian economies are more likely to result from competitiveness problems while in Latin America internal monetary problems or commodity prices are a more likely cause. Mexico's was a crisis of government finance, while east Asia's was one of private sector finance.

The BIS indices

The behaviour of the BIS indices is shown in Graph 1. Those countries affected by the Asian crisis show large rises in the pressure index at this time, and would have stood out as vulnerable on the external front well before this. In mid-1996, Thailand and Korea were at the top of the list of emerging economies with high scores. However, the index did not highlight Russia because its troubles did not primarily stem from current account imbalances. The external vulnerability of Latin America rose steadily from mid-1996 to end-1998.

Reflecting the data problems mentioned above, the results for the banking system vulnerability index are less impressive, but the index was warning of weaknesses in the Asian economies before they experienced the 1997 crisis.

Hawkins and Klau (2000) report an exercise to assess whether economies scored as "vulnerable" have come under pressure later on. A simple econometric approach was employed where the

exchange market pressure index is regressed on its own lagged value as well as on the indices of external vulnerability and banking sector vulnerability using pooled quarterly data for the 24 emerging markets over the period 1993–98, allowing for lags of up to eight quarters and fixed effects. While admittedly not a rigorous test[1], it finds the risk assessment provided by the two vulnerability indices seems to have some "predictive" power for the pressure index over and above the influence of the (always highly significant) lagged pressure index. The results are therefore consistent with the notion that prolonged fundamental disequilibria can trigger exchange rate pressure. In other words, crises are not just random accidents.

Graph 1

Summary indices

A: Exchange market pressure
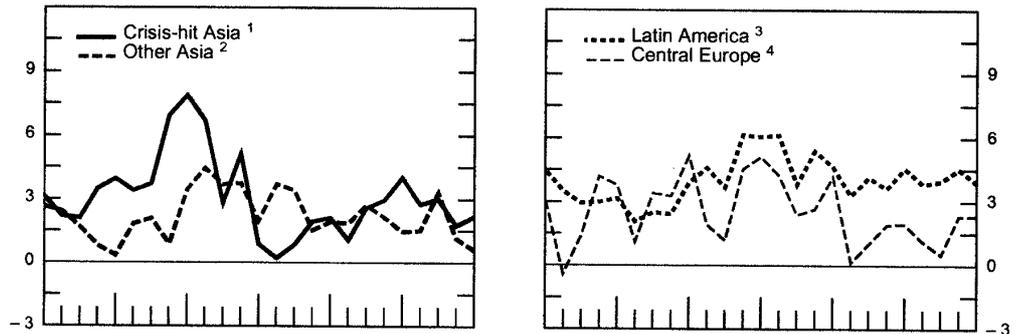
B: External sector vulnerability
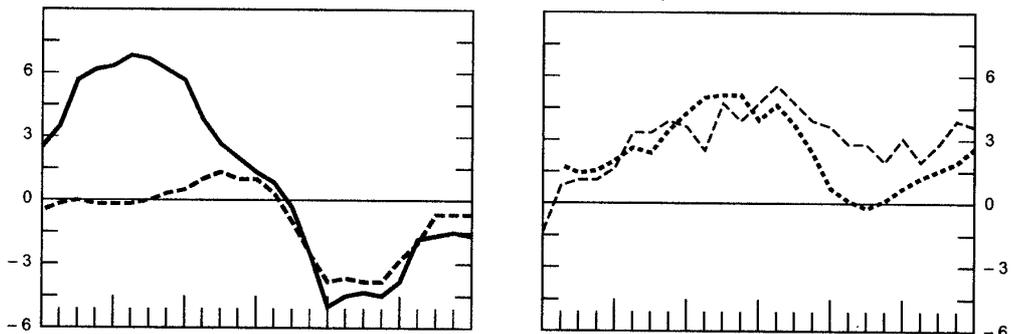
C: Banking sector vulnerability
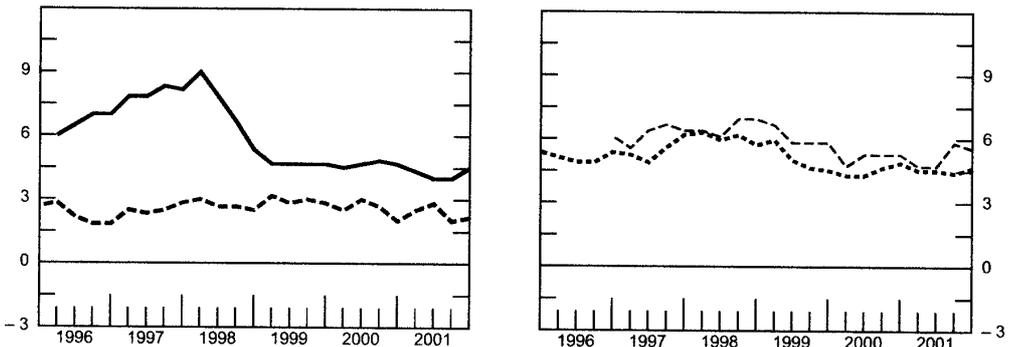
Note: Increases in the index (expressed as a simple average of the economies in each group) imply an increase in risk.
[1] Indonesia, Korea, Malaysia, the Philippines and Thailand.   [2] China, Hong Kong, India, Singapore and Taiwan.   [3] Argentina, Brazil, Chile, Colombia, Mexico, Peru and Venezuela.   [4] Czech Republic, Hungary and Poland.

As well as the total vulnerability indices, regressions were run for individual variables. The real effective exchange rate had the most explanatory and leading power for the index of external sustainability and the real interest rate for the index of banking vulnerability. These results are fully

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1   *For instance, it is recognised that the causal link between currency pressure on the one hand and banking- and external-sector vulnerability on the other is not unidirectional. The collapse of a currency could indeed deepen a banking crisis, thus activating a vicious spiral. Nor are the two explanatory variables totally independent; eg a consumption binge is likely to lead to both a deterioration in the current account and excessive credit growth. Both the exchange market pressure index and the banking sector vulnerability index include the real interest rate.*

in line with other studies on early-warning indicators. In addition, countries with high ratios of external debt to GDP appear more prone to crises. As in many of the studies surveyed in Table 1, the coefficient on the current account balance turned out to be statistically insignificant.

The way forward

Econometric exercises can still be further refined, both by better procedures and by gathering more and better data. No doubt researchers are currently adding the current Latin American crises to their data sets and finding new indicators to predict them. Possible directions for future research would include making more use of the international banking statistics compiled by the BIS, including to capture common lender effects.[1] Increasingly deep markets for financial derivatives offer potentially useful information. Mulder, Perrelli and Rocha (2002) report some success with incorporating data on the balance sheet health of corporations. Also, some approximate quantification could be attempted for relevant influences such as central bank independence, legal systems and political stability. Some would argue for greater attention to political variables, on the grounds that market sentiment can be greatly influenced by them.[2] Some of the ongoing work on macro-prudential indicators – see Craig (2002) – may enable improvements to indices of banking vulnerability. Structural variables such as the degree of foreign and state ownership and assessments of the quality of legal enforcement, and the independence and quality of bank supervision, could be considered. Proxies for the quality of the loan book such as the proportion of loans to property developers, or to state-owned enterprises, could be added. If information about the activities of large investors could be compiled, this would make a further useful addition to the list of indicators. Large shipments of currency to emerging economies may be another warning sign. The role of contagion could be investigated further; see IMF (2002).

But it seems judging by published studies that the econometric search for early warning models has been like the search for the philosopher's stone. There seems to be a growing realisation that the timing of crises is probably inherently unpredictable. This argues for greater use of relatively simple guides to *vulnerability* and also the *resilience* of economies; their ability to withstand external shocks.

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1 *See Hawkins (1999) on how the Asian crisis would have been less of a surprise if more attention had been paid to these data. Common lender effects are discussed by Van Rijckeghem and Weder (1999).*

2 *The Economist Intelligence Unit accords political factors a 40% weighting in its credit rating processes. The IMF (1999, p 149) comments that rating agencies' "emphasis on political factors as much as economic ones seems appropriate". On the other hand, political factors were argued to add little information in tests by Haque et al (1998).*

Annex: Indicator definitions and the scoring system

Exchange market pressure index

The *indicators* used are:

xrm	Percentage appreciation of the domestic currency against the US dollar over three months (against the euro for Central Europe)
xra	Percentage appreciation of the domestic currency against the US dollar over twelve months (against the euro for Central Europe)
r	Three-month money-market interest rate <u>minus</u> the annualised percentage change in consumer prices over the previous six months
res	Change in reserves over three months (in US dollars) as a percentage of a twelve-month moving average of imports (in US dollars)

The *ranges and scores* used were:

Indicator		-2	-1	0	1	2
Code	Weight					
xrm	W_1	$10<x$	$2<x\leq10$	$2\geq x>-3$	$-3\geq x>-8$	$x\leq-8$
xra	W_2	$20<x$	$5<x\leq20$	$5\geq x>-5$	$-5\geq x>-20$	$x\leq-20$
r	W_3			$x\leq2+r_{ww}$ [10]	$2+r_{ww}<x\leq5+r_{ww}$	$x>5+r_{ww}$
res	W_4	$8<x$	$4<x\leq8$	$4\geq x>-4$	$-4\geq x>-8$	$x\leq-8$

The *weighting system* follows the algorithm:[1]

- $W_1 = W_2 = W_3 = W_4 = 1.25$
- If the interest rate variable $\geq 8+r_{ww}$, then $W_3 = 2.5$; $W_1 = W_2 = 0.625$; and $W_4 = 1.25$.[2] The reason for doing this is that a country with such high real rates (relative to historical experience) is in trouble even if the exchange rate is fixed.

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1 *r_{ww} is the world real interest rate, measured as an unweighted average of a real three-month US interest rate and a real three-month Euro-area rate.*

2 *For $5+r_{ww}<r<8+r_{ww}$, W_3 increases proportionally, and the other weights are correspondingly reduced, so that the sum of the weights remains constant.*

External vulnerability index

The *indicators* used are:

reer	Real effective exchange rate, as a percentage deviation from the 1990-1999 average level
cgdp	Current account balance as a percentage of GDP
gx	Growth of exports over past four quarters (US$ value) minus average annual growth over past four years (in %)
debt	"Quick" external debt as a percentage of current-year GDP
gdebt	Growth in the "debt" variable over past eight quarters (in %)
stdebt	Short-term debt as a percentage of foreign exchange reserves
	Short-term debt defined as consolidated cross-border claims of all BIS reporting banks on countries outside the reporting area with a maturity up to and including one year plus international debt securities outstanding with a maturity up to one year

The *ranges and scores* used were:

Indicator		-2	-1	0	1	2
Code	Weight					
reer	W_1	$-15 \geq x$	$-15 < x \leq -7.5$	$-7.5 < x \leq 7.5$	$7.5 < x \leq 15$	$x > 15$
cgdp	W_2	$x > 4$	$2 < x \leq 4$	$-2 < x \leq 2$	$-4 < x \leq -2$	$-4 \geq x$
gx	W_3	$x > 10$	$10 \leq x < 5$	$0 < x \leq 5$	$-5 < x \leq 0$	$-5 \leq x$
debt	W_4		$x \leq 20$	$20 < x \leq 30$	$30 < x \leq 40$	$x > 40$
gdebt	W_5	$-10 \geq x$	$-10 < x \leq 0$	$0 < x \leq 10$	$10 < x \leq 15$	$x > 15$
stdebt	W_6		$x \leq 50$	$50 < x \leq 100$	$100 < x \leq 150$	$x > 150$

The *weighting system* follows the algorithm:

- $W_1 = W_2 = W_3 = W_4 = W_5 = W_6 = 5/6$
- If stdebt>200% then $W_6 = 10/6$; $W_1 = W_2 = W_3 = W_4 = W_5 = 2/3$

The reason for doing this is that countries are very vulnerable when short-term debt is very high even when the values of other indicators are low.

Banking system vulnerability index

The *indicators* used are:

dce	Growth of domestic credit to the private sector deflated by consumer price inflation over 4 quarters minus average real GDP growth over four quarters (in %)
bis	Increase in liabilities to BIS reporting banks over 8 quarters as a percentage of GDP
bisdc	Liabilities to BIS reporting banks (vis-à-vis the banking sector) as a percentage of domestic credit to the private sector
r	Three-month money-market interest rate <u>minus</u> the annualised percentage change in consumer prices over the previous six months
spr	Three-month domestic interest rate minus three-month US interest rate

The *ranges and scores* used were:

Indicator		-2	-1	0	1	2
Code	Weight					
dce	W_1			$x \leq 5$	$5 < x \leq 10$	$x > 10$
bis	W_2			$x \leq 5$	$5 < x \leq 8$	$x > 8$
bisdc	W_3			$x \leq 10$	$10 < x \leq 25$	$x > 25$
r	W_4			$-2 - r_{ww} < x \leq 2 + r_{ww}$	$2 + r_{ww}^{12} < x \leq 5 + r_{ww}$ $-5 - r_{ww} < x \leq -2 - r_{ww}$	$x > 5 + r_{ww}$ $x \leq -5 - r_{ww}$
spr	W_5			$x \leq 2$	$2 < x \leq 4$ $-4 < x \leq -2$	$x > 4$ $x \leq -4$

The *weighting system* follows the algorithm:

- $W_1 = W_2 = W_3 = W_4 = W_5 = 1$.

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The statistical challenges in monitoring Financial Stability

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Abstract[1]

The paper is seeking to determine the types of statistical data that would be adequate for the monitoring of financial stability in a small open economy such as Barbados. It will examine the model (for forecasting stability) being developed within the Bank to see how its performance can be enhanced by the availability of more detailed information.

The types of data currently being used will be examined and assessed on their usefulness. The main focus will be on the data collection and compilation issues. Areas such as frequency of collection, comprehensiveness of the data, methodology, accuracy, international comparability and timeliness will be examined for thoroughness and possible improvements.

The Central Bank of Barbados currently collects data to generate liquidity, capital adequacy and profitability ratios to satisfy the CAMELS framework. Data collected by other central banks in the Caribbean and international arena will be examined to see how useful they are to situations such as ours and the possibility of collection will be explored.

The paper will highlight the challenges that we face in collecting, compiling and producing comparable, accurate and timely data for assessing financial stability. These will include the accounting standards, data on impaired credit and other credit values, consolidation and off-balance sheet items.

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1 *Paper forthcoming.*

The use of supervisory or other micro-prudential information

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Background

At the time of Independence in 1947, India's economy was dependent mainly on agriculture. The policy thrust at that time was to promote industrialization and to build infrastructure. While this resulted in the creation of large infrastructure projects, the resulting development led to development imbalances between different geographical regions as well as within regions between income groups.

In 1950s and 60s banking system consisted of State Bank of India and its associate banks, the only government owned banks, and other private banks. Few foreign bank branches, particularly of those banks, which were incorporated in the United Kingdom, Europe and Australia, were also functioning. Banks concentrated mainly on high-income groups and lending was security-oriented rather than purpose-oriented, thus aggravating the already existing disparities. Banks did not sufficiently encourage the widening of entrepreneurial base thereby stifling the growth of the country. Hence, it was decided by the Government to nationalize 20 large private banks functioning in the country in two phases, once in 1969 and again in 1980, with an objective to promote broader economic objectives, a better regional balance of economic activity and the diffusion of economic power. Nationalization was also aimed at extending the reach of the banking services to all parts of the country and to bring neglected sectors of society into the mainstream.

Nationalization has achieved its objectives in as much as the number of branches increased eightfold between 1969 and 2001 from 8,262 to 65,800[2] branches. Banks were hitherto concentrating on urban and metropolitan areas only for opening their branches. Post-nationalization banks were encouraged to open branches in un-banked centres in rural and semi-urban areas where infrastructural facilities have not been developed adequately. In the process average population (in '000s) per bank branch came down significantly from 64 in 1969 to 15[3] in 2001. Statutory pre-emptions were generally very high during the period, and directed lending to neglected social sectors also was enforced.

Nationalization also resulted in the banking sector being dominated by the public sector. Even today, public sector banks hold around 80 percent of the assets of the banking system. Branch expansion during the post-nationalization period resulted in 50 percent and 22 percent of the commercial bank branches being situated in rural areas and semi-urban areas where infrastructure facilities are not up to the desired level. As the focus was on the expansion of banks, prudential income recognition and asset quality did not receive the attention they deserved.

In the light of the Balance of Payment crisis faced by the country in the year 1991, India embarked upon a sustained economic reforms program encompassing both the real and financial sectors. The banking sector, being the predominant sector in the financial system, was the focus of the financial sector reforms.[4] It would be beneficial to dwell upon the pre-reform period to understand the issues faced by the banking sector in particular and the financial system in general.

The system in the pre-reform period functioned in an environment of financial repression driven primarily by fiscal compulsions with large preemption of banks' resources (through high cash reserve and statutory liquidity ratio requirements) and a large element of directed credit at

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2 *As on June 30, 2001 there were 65,800 branches of commercial banks of which 14,456 branches were of Regional Rural Banks sponsored by these banks. (Source: Report on Trend and progress of Banking in India, 2000-01)*

3 *Central Region, Northern Region and North Eastern Region had an average population (in 000's) per bank branch of 115, 135 and 203 in the year 1969 and the average population per bank branch (in 000's) came down to 19, 19 and 21 as on 30th June 2001 ((Source: Report on Trend and progress of Banking in India, 2000-01)*

4 *Of the total financial assets of the banks and financial institutions of India, 73.8 percent were of banks in 1981, 65.5 percent in 1991 and 66 percent in 2001 (Source: Trend and Progress in Banking 2000-01, published by DESACS)*

concessional rates. Though the negative impact of financial repression was avoided largely due to reasonably low inflation and generally positive interest rates for depositors in real terms, the interest rates were tightly controlled and highly differentiated incorporating significant elements of cross subsidy. The end result was a noncompetitive system with low operational efficiency characterized by low profitability, large NPAs, a relatively low capital base, a low technology base, less than satisfactory customer service and inadequate internal controls, a manifestation of which was later the securities scam of 1992. The regulatory/supervisory framework also bordered on micro management of banks.

The approach in the concerted program on banking reforms underway since 1992 is one of gradual liberalization in tandem with phased strengthening of the regulatory/supervisory framework. The important initiatives are: introduction of Income Recognition, Asset Classification and Capital Adequacy (for Credit Risk and Market Risk) norms; stricter disclosure norms, reduction in preemption of banks' resources, setting up of a Board for Financial Supervision for strengthening the regulatory/supervisory framework; institutional strengthening for development and integration of securities, forex and money markets; increased emphasis on corporate governance and internal control systems in banks; and increased competition due to licensing of new banks in the private sector. This phase has also witnessed movement towards market-related interest rates and almost complete deregulation of interest rates with very limited controls from a situation in 1989-90 when there were 50 odd lending categories with a large number of stipulated interest rates depending on loan size, usage and type of borrowers. Interest rate deregulation, which is an important component in any reform program and which influences both the real and financial sector, is a risky proposition if the balance sheet of the financial intermediaries, particularly commercial banks, are weak due to adverse selection and moral hazard problems. Accordingly, the deregulation has been done through a gradual process consistent with the needs of monetary policy and condition of the banks. While following the reform process, prudential norms and principles adopted in developed countries were not copied, instead were introduced in a phased manner to suit the Indian environment.

One of the important functions of central banks all over the world is to regulate the financial system, ensure financial stability and thus help economic growth of the country. While in some countries, central banks directly supervise the banking system and other financial institutions, others have created separate regulatory organizations to carry out this function. Irrespective of the regulatory set-up, on-site examinations coupled with off-site surveillance and monitoring are the major tools of bank supervision. While in some countries, like New Zealand, off-site supervision is dominant, in others, including the USA, on-site inspection is an important tool for bank supervision. In India, on-site examination has traditionally been the main tool of bank supervision.

Need for Off-site data
Introduction of Off-site Surveillance and Monitoring System

Till the 1990s the only off-site data that was being collected was the published balance sheets and profit and loss accounts of commercial banks. After the involvement of banks surfaced in the aberrations in the securities markets in 1992, a need was felt to enhance the focus on bank supervision and hence a supervisory body to regulate the financial system, christened Board for Financial Supervision (BFS) was set up in the year 1994 as a committee to the central board of the Reserve Bank of India. The Governor of the Reserve Bank was designated as the chairman.

The reform agenda for the banking and financial sector has been driven mainly by the Reports of two committees set up by the Government of India, the Committee on Financial Sector (1994) and the Committee on Banking Sector (1998). The CFS and other committees, which examined the supervisory practices followed by the Reserve Bank, recommended setting up of an Off-site monitoring function to strengthen the financial sector supervision. Taking cue from these recommendations, BFS in its first meeting held on 7th December 1994 directed that an Off-site supervision system be set up in the Reserve Bank of India to collect financial information from banks on a quarterly basis so as to assess the financial health of the banks in between on-site inspections and to create a memory on the supervised institutions. This function also was expected to help improve focus of supervisory effort and to optimise resource allocation and for identification of banks showing financial deterioration and to act as an Early Warning System (EWS) and as a trigger for on-site Inspections.

Initially seven returns for Indian Banks and five returns for Foreign Banks were prescribed. These returns were designed after studying the cross-country practices followed in collecting off-site returns by various central banks including Bank of England, Monetary Authority of Singapore and Hongkong Monetary Authority and by suitably customizing them to suit our environ-

ment. Formats were circulated among banks at the time of introduction and opinion of bankers was taken into account before finalizing them, in the process introducing these concepts to banks. Even the due date[1] for submission of these returns was finalized only after discussing with the reporting banks.

Appreciating the need for monitoring the market risks faced by banks and financial institutions, the Reserve Bank issued guidelines on Asset Liability Management in the year 1999. Subsequently, a second set of returns were introduced in 1999 to capture liquidity and interest rate risk, both in the domestic currency as well as in major foreign currencies[2]. The Reserve Bank consciously chose the "Gap" method for both liquidity and interest rate risk given the then low level of computerization in banks and the given geographical spread of Indian banking industry. To begin with the market risk related returns were introduced on a quarterly basis even though banks were encouraged to prepare these returns for internal use on a fortnightly basis. As levels of computerisation improved and commercial banks started appreciating the utility of these returns, from October 2001, these returns were required to be submitted by banks on a monthly basis so as to enable close monitoring of these risks.

A fully computerised, state of the art system with a built-in data-warehouse capability has been put in place to process the off-site data and enable bank analysts to use the information. The scope and coverage of the off-site data has been enhanced over time to capture emerging concerns. The data is mainly used for generating early warning signals on the basis of select parameters, arriving at bank-specific supervisory concerns and preparing focused analysis on areas of supervisory interest.

Changes in the supervisory returns

Banking regulation and supervision is driven by market dynamics and as new concerns emerge, the data requirement and analysis thereof become necessary. The changes in the requirements are handled first through an ad-hoc statement, and then the same after successful experimentation gets integrated in to a regular supervisory return over a period of time. For instance, exposure to sensitive sector was introduced as an ad-hoc report to be submitted on a quarterly basis with effect from the quarter ended March 1999, but integrated with regular supervisory return in September 2000. Similarly data on investments, data on credit card business etc. also have been integrated in the supervisory returns.

Analysis of Data

The prudential supervisory data collected from banks is extensively used in carrying out bank-wise analysis. Reserve Bank has adopted the CAMELS (Capital, Asset Quality, Management, Earnings, Liquidity and Systems) model for supervision. Thus, while analysing the off-site data also, the same model is used for analysis so as to align the output with the on-site model.

Early Warning System Report

Immediate use of supervisory data on receipt is to generate an early warning system report. Under this report critical data pertaining to the supervised institution for four reporting periods are plotted together as a trend series. The measures used are CRAR, Owned funds to outside liabilities (to assess capital), Gross NPAs to total advances and net NPAs to net advances ratios (to assess asset quality), coverage ratio, borrowings to total liabilities and liquid assets to total assets ratio (for assessing liquidity and solvency), quarterly interest spread and operating profit to working funds ratio (to assess profitability / efficiency), change ratio (% change in total assets during the quarter) (to assess the growth trends) and share price movement (to assess the market perception).

This report is generated for all banks for all the periods to identify potential risk areas. In case of any adverse features, the off-site analysis is further focused on the identified risk areas.

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1 *21 days time from the end of the quarter for technologically advanced New Private and Foreign banks and 1-month time from the end of the quarter for Public Sector banks and Old Private banks was allowed for submission of the returns.*

2 *Market risk returns are required to be submitted in four major currencies viz. US Dollar, Pound Sterling, Euro and Japanese Yen. However, banks which are having a turnover of more than 5 percent of total turnover in any other currency are required to submit these returns in those currencies also.*

Detailed analysis of Off-site data

Analysis of data is done on CAMELS model and each parameter as represented in the off-site returns is analysed. Analysis focuses on critical levels and significant changes. Generally time series of 4/5 quarters is taken and seen so as to understand the trend in respect of various parameters. A bank's performance is compared with another bank of same size belonging to the same type of banks. A bank's performance also is compared with the performance of the peer group and the performance of the banking system as a whole.

Types of analysis

While scrutinising the supervisory returns, different types of analysis are carried out as follows:

Ratio Analysis
Analysis and interpretation of various ratios enables skilled analysts to gain better understanding of the financial condition of the supervised institution. Some examples are Liquidity ratios, Solvency ratios, Asset quality ratios, Profitability ratios, Efficiency ratios etc. Using ratios, a trend analysis is carried out by plotting ratios of a bank, bank group or industry over a period of time. Comparison with other banks, comparison with benchmarks / regulatory requirements, comparison of bank's performance with bank group and industry averages is also carried out.

Common Size Analysis
Under this analysis, both balance sheet and income account are expressed as percentage to total assets and total income respectively over a period of time. This analysis gives insight into the underlying improvement or deterioration in financial condition and performance of banks. This focuses on relative share of major components of assets and liabilities with reference to total assets and relative share of income and expenditure heads with reference to total income and hence helps in understanding the shifts in the balance sheets and profit and loss accounts over a period of time.

Index Analysis
Under this analysis, both balance sheet components and income and expenditure account components are expressed as trends over a base year. All the items of assets or liabilities are taken as 100 for the base year (or quarter) and subsequently all these items are expressed as index relative to that year (or quarter). Thus it helps to identify quickly those components which show abnormal growth or decline. Both Common size analysis and Index analysis gives us insights additional to those obtained from analysis of financial ratios.

Fund Flow Analysis
Study of net funds flow between two points in time is carried out in this analysis. The analysis is divided into four parts viz. increase in assets, decrease in liabilities and capital (both of these are considered as sources of funds), increase in liabilities and capital and decrease in assets (both of these are considered as uses of funds). This analysis gives an idea about funds raised through various sources by a bank and how they have been deployed during the period considered for analysis. This analysis helps in identifying areas to be focused in the detailed analysis.

Sensitivity Analysis
Sensitivity Analysis is carried out on the basis of external shocks applied to certain parameters so as to analyze the supervised institution's strengths to withstand such shocks. Some of the parameters used in this connection are increase in NPLs, falling interest spreads, change in provisioning norms, revision in CRAR etc. This analysis gives an idea about the weak links in the system so that necessary and timely corrective action could be taken.

Post analysis use of data

After completing the analysis for a bank, the same is seen by the General Manager responsible for the bank (a parallel can be drawn to Central Point of Contact in other supervisory regime) where the matter has to be taken up with the bank. If the concerns are very serious, at times proposals for conducting a snap scrutiny on specific areas also are considered. A mechanism has been put in place to discuss on a quarterly basis with the bank management the results of the analysis so that necessary corrective action, if required, could be initiated by the supervised institutions at the earliest.

Off-site Analysis of Systemic Trends

With the introduction of prudential supervisory returns, it became possible to consolidate the data in a meaningful manner so that inferences on the functioning of the banking system could be drawn. Thus a possibility to look at the data from the system's perspective was opened up.

Half-yearly / Annual banking sector reviews

On the direction of Board for Financial Supervision, a review of the system is placed before it every half-year. Thus, half-Yearly/ annual banking sector reviews are prepared along with important data on key financial indicators of banks. These reviews contain analysis of data from the system's perspective. Frequency distribution analysis of important ratios is made part of these reviews along with the share in the assets of the outlier banks in the banking system. This helps in identifying the weak links in the system and to optimally allocate the scarce supervisory resources.

Peer Group-wise Performance Indicators

Peer groups have been formed on the basis of asset size of banks and the ownership pattern of banks. All banks have been grouped under six peer groups. New Private banks established recently are grouped as a single peer group. Among foreign banks (foreign bank branches functioning in India are considered as individual banks and are required to maintain capital locally) small foreign banks are kept as a group and large foreign banks with significant assets and branch network are kept as another group. Other Indian banks are grouped under three groups depending on the size of the banks. The performance of banks are analysed in terms of their peer groups on a regular basis. On select parameters, individual banks are advised their position, comparative position of the peer group, comparative position of the banking system along with best performance in the peer group on a quarterly basis. This helps the banks to understand their position vis-à-vis their peer group and to take necessary steps to improve their performance.

Off-site Rating of Banks

In the on-site examination process, the banks are rated on CAMELS pattern. A composite rating is arrived at after rating individual components. As the supervisory on-site examinations are conducted once in a year, the ratings can be updated only once in a year. The rating process takes into account quantitative parameters based on the data as well as certain qualitative parameters like the effectiveness of management etc. Keeping in view the availability of supervisory data in the off-site returns, an off-site rating has been in-built in the Off-site system. While objective parameters would be computed and updated on a quarterly basis, in respect of the qualitative parameters the ratings / marks given at the time of previous on-site examination would be taken into account, thus arriving at a quarterly composite and component rating for all supervised institutions. This would help in identifying significant deterioration in the financial health of the supervised institutions in between two examination cycles.

Impact Analysis

This is typically carried out just before introducing any regulation or modifying an existing one. When off-site data was not available then estimating the impact of potential changes was a time consuming and resource-intensive exercise. With the availability of supervisory data, it has now become possible to quickly and more reliably estimate the impact of changes that are envisaged. Some examples in this connection are revision in CRAR, revision in exposure norms, capital market exposure norms etc.

Prompt Corrective Action

The issue of regulatory forbearance has been attracting lot of attention these days. Given the financial condition of the supervised institutions, an objective way of taking prompt corrective action by defining the standards and the penalty for deviation from the standards has been regarded as the need of the hour and a prompt corrective action model has been developed. Three parameters viz CRAR, Return on Assets and Net NPAs to net advances have been chosen for this model. Under CRAR three levels have been defined viz. below 3 percent, between 3 and 6 percent and between 6 and 9 percent. Under Return on Assets level below 0.25 percent per annum has been considered as critical. Under Net NPAs to net advances, level above 15 percent and level between 10 and 15 per-

cent have been defined as critical. For different combination of these values, a set of action has been suggested under the framework.

Off-site data enables the supervisors to put in place a proper Prompt Corrective Action framework at more frequent intervals.

Macro-prudential Indicators

After the crisis in certain Asian economies in the 1990s, there has been a growing realization that it would not be sufficient just to monitor the financial institutions to achieve financial stability. It was felt that at the macro level, the financial sector soundness could be assessed by aggregating micro indicators and looking at them in conjunction with macro economic indicators. In the former approach, it was felt that if every institution supervised is in good financial condition, the financial system in turn would be in good condition and followed a bottom-up approach. In view of the increasing competition and diversification of operations in the Indian banking sector as well as the increasing globalisation of the financial sector, it was deemed fit to expand the supervisory approach to include identification and monitoring of macro prudential indicators. Under the macro-prudential indicators analysis a top-down approach is followed. Aggregated micro-indicators (select indicators as outlined in the IMF's paper[1], generally) are compiled and looked at along side macro-economic indicators. Vulnerabilities to the financial system are assessed and are used to decide on the appropriate intervention as evident from the policy initiatives by our bank during last couple of years on the issues such as banks' exposure to capital markets, norms governing investments in securities, private placement of debt, etc.

Macro-prudential indicators based reviews are prepared on a half-yearly basis and placed before the Board for Financial Supervision, the apex supervisory and regulatory body in the country. Generally, sensitivity analysis or impact analysis on some parameters are also made part of these reviews. Currently it is being examined to cover the expanded encouraged set of financial soundness indicators (FSIs) discussed in the IMF paper in the ensuing macro-prudential indicators based review.

Risk based supervision

A strong off-site monitoring and surveillance system would help the bank in moving towards risk-based supervision. Under the Risk Based Supervision, it has been planned to prepare risk profiles of banks to formulate suitable supervisory strategy. It has been estimated that around 75 percent of the data would be directly picked up from the Off-site data in preparing the risk profile. As the Off-site data has the geographical reach and technical capacity, it is envisaged that the work relating to preparation of risk profiles would be greatly facilitated. With the ongoing review of financial health, it will be possible to detect when an individual institution shows first sign of weakness and assess the potential impact on the system in the event the situation becomes worse. By heeding to these "early warning signals" the concerned entity with appropriate advice from regulators can take timely action.

Data quality

In any data collection process, two important aspects would be timely receipt of data and receipt of good quality data. The introduction of prudential supervisory returns has added significantly to the ability of data collection at commercial banks. Those banks, which could build proper MIS in tune with the requirements, have succeeded in submitting the returns on time. Those banks, which are lagging in building proper MIS, have difficulty in meeting the deadlines and data quality requirements. In the early stages during 1997, the focus was therefore on improving the data quality. Several seminars were held during that time. Banks were required to submit the returns in person so that the nuances could be explained to them. Even outstation banks were called for one to one meetings. Examiners were required to assess the MIS of commercial banks and comment on the data quality aspects. When the up-gradation was carried out, all the banks were given training in using the new software at Bankers Training College, Mumbai. Later, OSMOS team visited various regional offices and invited respective area banks for a seminar so that a close interaction with bankers could take place.

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1 *IMF's Occasional paper No. 192*

Studies conducted by the division on basis of audited and un-audited data pertaining to March 2000 and March 2001 indicated that the data quality has improved vastly over a period of time.

Delays in submission of returns were noticeable in the initial years with average delay of about 45 days. Continuous pressure on the management of banks and growing awareness created among the banks has helped in reducing the average delay to around 15–20 days now. It is expected that the delays in future would come down further.

Data-warehousing

Supervisory authorities all over the world collect supervisory data in some form or the other. However, the data collected from supervised institutions are often not stored in such a manner so as to exploit the data. In India, the supervisory data collected is stored in data-warehouse which enables viewing of the data from multi-dimensions with facility to drill-down and roll-up the data from a higher level to lower level or vice versa. Under this model, the clean data is arranged in a pre-determined dimensional model so as to facilitate extensive analysis of data. For instance, bank dimension could contain bank groups, banks with CRAR below or above a particular level, banks incorporated in particular countries, banks with more than 500 employees, banks with given level of profitability, banks with very high NPA levels (above a given percentage) etc. Another possible dimension could be the borrower names reported under "Top impaired credits" or "Top large credits" etc. This facilitates in looking at the systemic exposure of individual borrowers or borrower groups quickly.

Conclusion

In order to supervise financial institutions, supervisory authorities collect enormous data from the supervised institutions. It is essential to use these data optimally to not only analyse the financial health of the supervised institutions but also to understand the financial system as a whole. Using right types of analysis would bring out the supervisory concerns both effectively and efficiently. Technology can add value to these supervisory data as it would facilitate the analysts to exploit the data efficiently.

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UK Bank exposures: data sources and financial stability analysis

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In recent years there has been an increasing effort – in the UK and elsewhere – to assess financial stability risks at the level of the system as a whole. A crucial element is the analysis of banking exposures and the robustness of banks to adverse shocks. In the UK, as in other countries, there is no single source of data explicitly designed for financial stability analysis at the level of the system. This article reviews the data sources that are available and how they are employed in the Bank's analysis to help the reader of the Financial Stability Review understand the data underlying the Bank's published assessments of the UK banking sector.

The Bank relies on three main sources of information on on-balance-sheet exposures: the money and banking statistics, the data on cross-border exposures published by the Bank for International Settlements, and regulatory data. Each can be used to explore particular aspects of UK banks' exposures and, taken together, to assess the risks facing the UK banking system. Their distinctive provenance does, however, give rise to substantial practical problems in bringing them together.

Data sources

The origins of the three main sources of balance sheet data for the UK banking sector are quite distinct:

a money and banking statistics: collected by the Bank and used to produce the monetary aggregates and to feed into UK National Accounts (for convenience, hereafter referred to as 'monetary data');

Table 1 – Relationship between sources of balance sheet data for UK banks[a][b][c]

	Reporting population (banks)	Expsoures to:		Total consolidated balance sheet
		OK residents	Non-residents	
Monetary				
UK-owned banks	98	1,262	348	–
Foreign banks	294	652	1,165	–
BIS – locational				
UK-owned banks	45	–	333	–
Foreign banks	246	–	1,157	–
Regulatory				
UK-owned banks	55	n/a[d]	n/a	2,057
Foreign banks	89	n/a[d]	n/a	332
BIS – consolidated				
UK-owned banks	21	–	791	–

Sources: Bank of England and FSA regulatory returns.

(a) Amounts are shown is £ billions at end-December 2001 (except for regulatory data at 2001 H2).
(b) Data above the dotted line show the assets of UK-resident banks on an unconsolidated basis.
(c) Data below the dotted line show the assets of UK-owned banks and the UK-incorporated subsidiaries of foreign banks on a consolidated basis.
(d) No breakdown available.

b data on international liabilities and claims: 'BIS' data collected by the Bank and published in the International Banking Statistics compiled by the Bank for International Settlements (BIS), and originally to monitor international capital flows; and

c regulatory data: collected by the Bank on behalf of the Financial Services Authority (FSA) and used by the FSA for prudential regulation and to assess the capital adequacy of individual UK banks.

The relationship between these different sources can, nevertheless, be laid out clearly (Table 1).

The most important differences are scope and consolidation. In terms of scope, only the regulatory data include the entire global balance sheet of UK-owned banks; the monetary data include only assets booked in UK offices and the BIS data capture only lending overseas. Similarly, the regulatory data are consolidated, covering not only overseas offices of the UK banks but all group companies and netting out intra-group transactions, whereas the monetary data are unconsolidated, with data reported individually for each bank within a group, including lending to other group companies[1]. The BIS data are compiled and published on both a consolidated and an unconsolidated basis (see Table 2)

Table 2 – Information available on the balance sheet assets of UK-resident banks from monetary data at end-December 2001[a]

Split by: (a) Residence (b) Sector	Monetary Data							
	UK-resident						Non-resident	
	Households	PNFCs	OFCs	Public sector	Other	MFIs	Non-resident	Total assets
UK-owned	510	170	214	10	62	295	348	1.610
	32%	11%	13%	1%	4%	18%	22%	
Foreign-owned	40	115	179	7	74	236	1.165	1.817
	2%	6%	10%	0%	4%	13%	64%	

(c) Currency	Sterling	Foreign currency	
UK-owned	1.166	444	1.610
	72%	28%	
Foreign-owned	429	1.387	1.817
	24%	76%	

(d) Instrument	Loans	Securities	Other	
UK-owned	1.321	223	66	1.610
	82%	14%	4%	
Foreign-owned	1.479	264	74	1.817
	81%	15%	4%	

Source: Bank of England.

(a) Figures show the assets of UK-resident banks' in £ billions at end-December 2001.

The monetary data measure banking activity in the UK. The breakdown of assets by National Accounts sectors can be used to trace sectoral concentrations in lending and so to assess the impact on banks of changes in the financial position of, say, the household and corporate sectors. For this purpose, the inclusion of the UK branches and subsidiaries of foreign banks is important, given the contribution they make (53%) to total UK-resident banking system assets. Foreign banks are active participants in the London interbank market, and the monetary data reveal the scale of their exposures. Because the data are unconsolidated, however, exposures are inflated by intra-group transactions. In some contexts, it is useful to see these transactions, for example, in looking at the degree to which foreign banks use the London market for funding. The regulatory data, on the other hand, provide a consolidated picture. This has clear advantages in netting off intra-group transactions and including exposures booked overseas as well as in the UK; but less detailed information is available on sectoral exposures. The regulatory balance sheet return is designed mainly

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1 *Regulatory data are also collected on an unconsolidated basis for individual banks.*

to allow the FSA to calculate the capital adequacy of individual institutions and as such the data are not always well adapted to providing information relevant to analysis of the stability of the system as a whole. The BIS data offer some information on UK banks' exposures overseas. In unconsolidated form this is consistent with the monetary data, showing lending overseas by UK-resident banks; in consolidated form it is comparable to the regulatory data but a number of issues arise in the reconciliation.

Monetary data

In order to compile the monetary data, balance sheet information is collected from all UK-resident monetary and financial institutions (MFIs), in most cases monthly but quarterly for smaller institutions (which account for 1% of total assets)[1]. Data are broken down according to the National Accounts sectors (Table 2). Thus assets and liabilities are sub-divided between UK-residents and non-residents; within UK-residents, between MFIs, public and private sectors; and within the non-bank private sector, among households, private non-financial corporations (PNFCs) and other financial corporations (OFCs). A more detailed breakdown of lending by industrial sector is provided quarterly[2]. No similar sectoral breakdowns are available for lending to non-residents given that, in the context of the National Accounts, there is no requirement for any such sub-division.

The traditional purpose of the monetary data has been the monitoring of growth in a number of monetary and credit aggregates – for example M4, which represents MFIs' sterling deposits from the UK private sector[3], and its counterparts, notably 'M4 lending' (sterling lending by MFIs to the UK private sector). M4 and M4 lending each represent, however, only about a third of MFIs' total liabilities and assets respectively (Chart 1)[4]. The difference is accounted for by foreign currency business with UK non-banks, but more importantly by inter-bank and cross-border business, all of which are included in the full MFI balance sheet[5]. While exposures within the banking sector to non-residents or in foreign currency are of less relevance for monetary policy, this version of the UK-resident banking system balance sheet, including the breakdowns by sector, currency and instrument, is the most useful for financial stability analysis.

Chart 1 – Relationship between M4 lending and the UK-resident monetary system's total assets
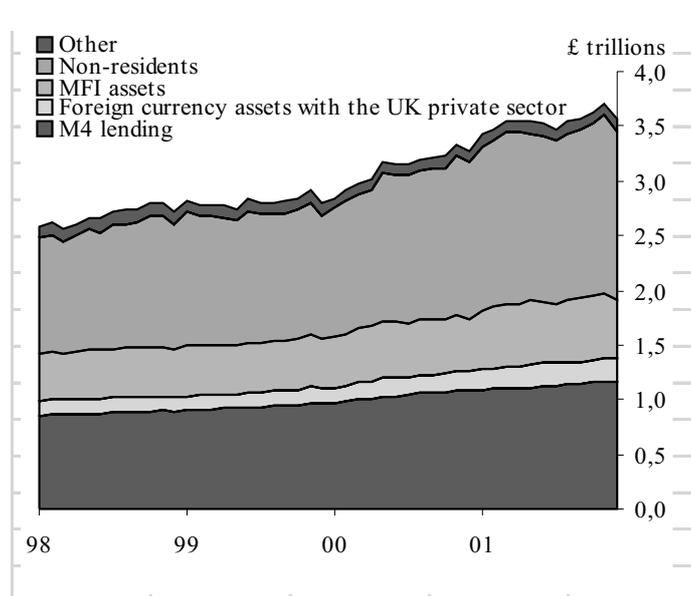
Source: Bank of England

1 *MFIs comprise the Banking Department and Issue Department of the Bank of England, all other banks resident in the UK and building societies. Monetary data for building societies are collected by the FSA and sent, in aggregate, to the Bank. The FSA also collects data from building societies for regulatory purposes, requesting a slightly different lending breakdown.*

2 *The British Bankers' Association also publish monthly data for the Major British Banking Groups (MBBG) on their balance sheets, sterling lending (including by industrial sector) and deposits, and their lending to individuals.*

3 *Bank of England (1987) introduces the monetary aggregate, M4.*

4 *See Tables A2.1 to A4.6 of Monetary and Financial Statistics.*

5 *Docker and Willoughby (1999) describe the construction of the MFI balance sheets and their relationship with M4.*

The scale of lending to non-residents and the other MFIs, and of lending in foreign currency, emphasise the importance of London as an international financial centre and the need to monitor links between the UK and overseas financial systems. UK-owned banks account for under half of UK-resident banks' total assets (47%). Foreign-owned banks – mainly those from countries which themselves have major financial centres, including Germany (13%), United States (9%), Switzerland (8%), France (4%), Japan (4%) and the Netherlands (4%) – account for the rest. Many of them are part of so-called large and complex financial institutions (LCFIs), which given the scale of their business and their involvement in a wide range of different markets, are a particular focus for system surveillance (see Section VI of the Financial Stability Conjuncture and Outlook). Most of the foreign banks' exposures (around 75%) are concentrated in wholesale markets, especially in lending to non-residents or other MFIs.

The breakdown by instrument provides another way of looking at the composition of banks' assets and liabilities, illustrating, for example, the degree to which banks lend secured via the repo market or unsecured, the degree to which banks are reliant for funding on retail or wholesale deposits or longer-term instruments, and the degree to which banks lend to companies directly or by holding securities.

Using the monetary data in aggregate will show overall lending growth and identify sectors where lending is growing particularly strongly. However, in monitoring financial stability it is often not enough to look at average or aggregate data but to look at the distribution as a whole (to identify banks that stand out from the rest of the population) or at groups of banks with common characteristics. An obvious distinction is between UK-owned and foreign banks, but beyond this it is useful to allocate banks to peer groups, foreign banks according to their country of origin and UK-owned banks according to balance sheet size and the nature of their business. The Bank's use of peer groups is described on 84 of the December 2000 Review. Peer group analysis helps not only to identify the banks underlying changes in the aggregate balance sheet but also to guard against overlooking trends among smaller institutions that would make little contribution to aggregate growth[1]. Peer groups also provide a useful tool to analyse the degree to which different groups of banks have interbank exposures.

Peer group analysis using the monetary statistics data helps to identify sectoral concentrations in lending for particular types of banks. Table 3 shows the distribution of UK-resident banks' assets by peer group and by sector and Table 4 shows each component as a percentage of the row and column totals. As Table 4 makes clear, UK banks remain dominant in lending to households (over 90% of total) and PNFCs (over 60% of total)[2], while lending to these sectors still represents a large proportion of these banks' assets. Peer group analysis can be especially useful when applied to data on the industrial breakdown of lending (showing lending to OFCs and PNFCs by sub-sector) and the breakdown of household lending between mortgages, credit cards and other unsecured lending (Table 5)[3]. The industrial sub-sectors are broadly the same as those used in the National Accounts, which means that the pattern of lending can be tracked against sectoral economic variables[4]. Analysis at this level of disaggregation is important in monitoring exposures to sectors such as commercial real estate, which have historically represented a particular risk to financial stability in the United Kingdom and elsewhere (see Section VII of the Conjuncture and Outlook).

Finally, the different breakdowns in combination allow a deeper analysis of the balance sheet data, although this falls short of providing a full multi-factor decomposition. For example, while lending to OFCs represents 11% of the balance sheet assets of UK-resident banks at end-December 2001, the industrial breakdown of lending shows that 40% of their loans to OFCs are to securities dealers (or, as Chart 2 shows, 11% of their domestic loan book). The instrument breakdown shows that most are via repo; the currency breakdown that most are in foreign currency; and the peer groups that most of the lending is through German, Swiss, US and UK commercial banks.

1   *A significant threat to UK financial stability originated within this sector on two previous occasions (the secondary banking crisis in 1973-75 and the small banks crisis of the early 1990s – see Logan (2000)).*

2   *Although in terms of assessing overall gearing in these sectors, lending by finance houses and other non-bank lenders would need to be taken into account.*

3   *See Tables A5.1 to A5.6 of Monetary and Financial Statistics.*

4   *See Table C1.2 of Monetary and Financial Statistics.*

Table 3 – UK-resident banks' assets by sector at end-December 2001[a]

Peer Group	UKPS[b]			MFI	Non-residents	Other[e]	Total	Peer Group total as a share of total assets (%)
	Households	OFCs	PNFCs					
Commercial banks	237	154	124	170	235	56	977	29
Mortgage banks	253	57	40	117	108	15	590	17
Other UK-owned banks	19	3	5	9	5	2	43	1
US	14	27	15	46	181	12	294	9
German	0	60	31	60	283	18	452	13
Swiss	0	42	7	26	204	8	288	8
Other foreign-owned banks	26	50	62	104	497	44	783	23
Total	550	393	185	532	1513	154	3427	100
Sector total as a share of total assets (%)	16	11	8	16	44	4	100	

(a) In £ billions.
(b) UK private sector.
(c) Other includes public sector and other unallocated assets (eg fixed assets).

Table 4 – Distribution of total assets by peer group and sector at end-December 2001[a][b]
Percentages

Peer Group	UKPS[c]			MFIs	Non-residents	Other[e]	
	HH[d]	OFCs	PNFCs				
Commercial banks	43	39	44	32	16	37	
	24	16	13	17	24	6	100
Mortgage banks	46	15	14	22	7	10	
	43	10	7	20	18	3	100
Other UK-owned banks	3	1	2	2	0	1	
	44	7	13	21	11	4	100
US	3	7	5	9	12	8	
	5	9	5	16	61	4	100
Germany	0	15	11	11	19	12	
	0	13	7	13	63	4	100
Swiss	0	11	2	5	13	5	
	0	15	2	9	71	3	100
Other foreign-owned banks	5	13	22	19	33	28	
	3	6	8	13	64	6	100
Total	100	100	100	100	100	100	

Source: Bank of England.

(a) Upper (left) figures in each cell: share of lending to each sector from each peer group.
(b) Lower (right) figures in each cell: share of each peer group's lending to each sector.
(c) UK private sector.
(d) Households.
(e) Other includes public sector and other unallocated assets (eg fixed assets).

Table 5 – Distribution of lending by peer group to selected sub-sectors at end-December 2001[a]

Peer Groups	Households			OFCs				PNFCs				
	Mortgage	Credit card	Other unsecured	Security dealers	ICPFS[b]	Leasing	Other	Real estate[c]	Manu-facturing	Wholesale and retail	TSC[d]	Other
Commercial banks	39	55	57	20	27	54	42	45	42	55	34	52
Mortgage banks	55	12	21	5	6	27	17	26	8	9	10	11
Other UK-owned banks	2	13	6	0	1	2	0	1	1	1	1	2
US	0	17	10	12	16	2	5	1	10	9	11	5
German	0	0	0	22	21	5	16	11	9	4	14	8
Swiss	0	0	0	21	18	0	8	1	2	1	2	1
Other overseas-owned banks	4	2	5	20	11	10	12	16	28	22	29	22
Total (£ billions)	407	36	73	125	16	36	137	85	58	36	23	57

Source: Bank of England.

(a) Percentage by peer group of total sub-sector lending. Final row shows total sub-sector lending in £ billions at end-December 2001. Definitions of sub-sectors are based on the ONS Standard Industrial Classification (SIC) of 1992 (see notes to Table C1.2 of Monetary and Financial Statistics).
*(b) Insurance companies and pension funds.*
(c) Real estate combines the commercial property and construction sub-sectors.
(d) Transport, storage and communication.

The monetary data do, however, have a number of limitations. The industrial breakdown includes only lending and not holdings of securities. While some data on undrawn commitments and facility utilisation are included, other contingent liabilities such as guarantees are not. This applies to the monetary data more generally, which include little information on off-balance-sheet instruments, for example on counterparty exposures under derivative contracts. The most significant problems with the monetary data from a financial stability point of view arise, however, from their being unconsolidated. Individual banks' assets include lending to other group companies: to other UK-resident group banks in the data for lending to banks; to branches and subsidiaries overseas in data for non-resident lending; and to related non-banks in data for lending to OFCs and PNFCs. For larger, more complex, groups and those with significant operations overseas, intra–group lending can represent a significant share of reported assets. Most fundamentally, the (unconsolidated) monetary data only include the UK-based business of UK banks. A number of UK-owned banks have a significant proportion of their operations in foreign branches or subsidiaries and are thus as much vulnerable to shocks overseas as in the United Kingdom. BIS data on external claims are particularly useful for measuring these exposures, especially the consolidated data, which in contrast to the monetary data capture all overseas claims of UK-owned banks, whether booked in the United Kingdom or in offices overseas.

Chart 2 – Sectoral breakdown of UK-resident banks' domestic lending at tend-December 2001

■ Individuals and individual trusts: lending secured on dwellings
■ Individual and individual trusts: other loans and advances
□ Securities dealers
□ Real estate(a)
□ Manufacturing
■ Other financial intermediaries
□ Finance & leasing
□ Wholesale and retail
□ Other

19%
3%
3%
5%
5%
7%
11%
10%
36%
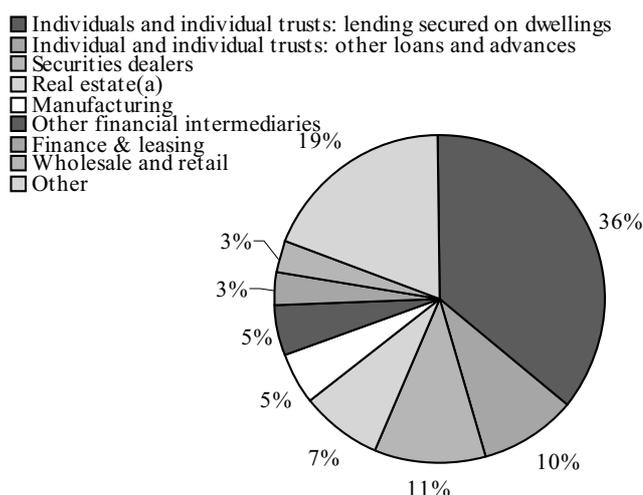
Source: Bank of England.

(a) Real estate combines the commercial property and construction sub-sectors.

BIS data

For the analysis of overseas exposures, the most useful data are probably those collected by the Bank for the BIS international banking statistics[1]. Data on overseas assets and liabilities are collected quarterly both on an unconsolidated basis from all UK-resident banks ('locational' data) and on a consolidated basis from UK-owned banks (consolidated data).

   The locational data show the cross-border assets and liabilities with non-residents booked in UK-resident bank offices (Table 6). The reporting population is therefore essentially the same as for the monetary data (although 101 banks whose non-resident assets and liabilities fall below a minimum threshold are excluded). Given the primary purpose of the locational data has been the measurement of international capital flows, the main breakdown of the data is by country of residence of the borrower or depositor. 216 countries are recognised in all plus several multilateral financial institutions[2]. In addition, the data are also split by currency and, in a limited way, by counterparty between banks and non-banks[3]. Data are separately available on the split between connected and other banks. The counterparty breakdown reveals that not only is most of the lending to banks, but that over two thirds is to connected banks. The locational data can be used to show the geographical distribution of external claims and the degree to which banks from different countries are exposed to their home banking systems (Chart 3). Almost all the lending is in foreign currency (44% in US dollars, 31% in euro), with only 11% in sterling.

The BIS publishes locational data for 30 countries besides the UK (known collectively as the BIS reporting area). Comparison with other countries shows the relative importance of London's role as an international financial centre. At end-December 2001, UK-resident banks held about 20% of total reported external claims, almost double the figure for banks resident in Japan (10%) and Germany (9%), which had the second and third largest shares. The extent of these exposures has implications for UK financial stability and partly explains the attention paid in the Bank's analysis to identifying disturbances in overseas financial systems and the routes by which they might be transmitted to the UK.

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1   *For detailed information on the construction of the BIS statistics see BIS (2000) and Committee on the Global Financial System (CGFS) (2000). Wharmby (2000) provides an overview. Box 2 in the Financial Stability Conjuncture and Outlook of the December Review and Wooldridge (2001) show how the BIS statistics can be used for financial stability analysis.*
2   *See Tables C3.1 to C3.4 of Monetary and Financial Statistics.*
3   *Claims on Central Monetary Institutions (CMIs) also identified but are not material.*

Table 6 – Information available on the external claims of UK-resident banks from BIS locational data at end-December 2001[a]

Split by: **(a) Borrower country**	BIS - locational				Total assets
	Developed	Offshore	Developing	Other	
	271	35	19	8	333
UK-owned	81%	10%	6%	2%	
	982	106	54	16	1.157
Foreign-owned	85%	9%	5%	1%	

(b) Borrower type	Banks	Non-bank	
	177	156	333
UK-owned	53%	47%	
	762	395	1.157
Foreign-owned	66%	34%	

(c) Currency	US dollar	Euro	Sterling	Yen	Other	
	164	101	38	15	15	333
UK-owned	49%	30%	12%	5%	5%	
	495	367	120	85	90	1.157
Foreign-owned	43%	32%	10%	7%	8%	

Source: Bank of England.

(a) Figures show the external claims of UK-resident banks in £ billions at end-December 2001.

**Chart 3 – External claims of UK-resident bank offices
by country of residence of borrower at end-December 2001**
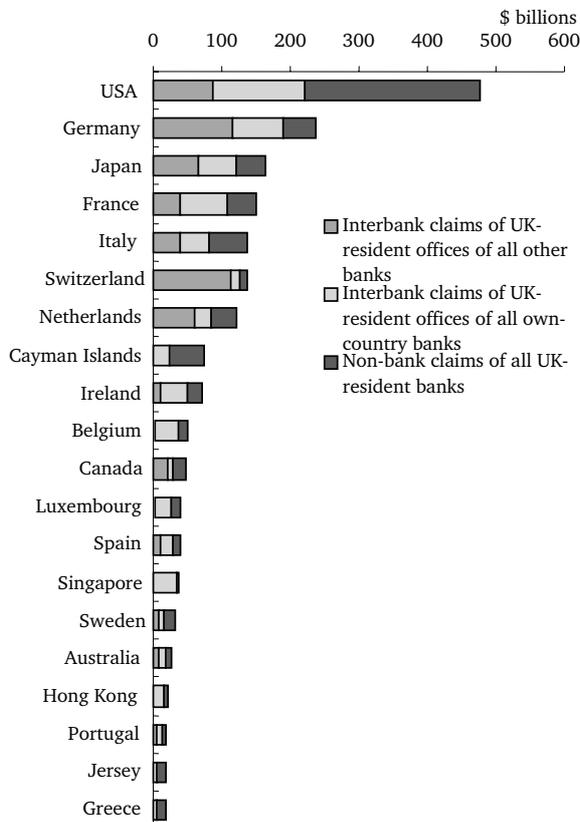
Source: Bank of England.

The BIS consolidated banking statistics are designed to measure the international liabilities and credit exposures of banks by home country of the group parent rather than location of the particular borrowing or lending entity[1]. The data therefore include not only lending by UK offices but also branches and subsidiaries overseas, consolidated to exclude intra-group transactions. Given the scale of UK-owned banks' operations overseas, the consolidated data give a better measure of the risk represented by overseas exposures.

As with the locational data, one purpose of the consolidated data is to show the distribution of exposures according to the country of the borrower. Exposures are broken down between cross-border claims including the claims of local offices in foreign currency, and claims by local offices in local currency[2]. The distinction is intended to provide some measure of the borrower's vulnerability to a capital account crisis. A further breakdown (Table 7) is available for cross-border claims by type of asset (between loans and investments), by counterparty (between banks, public sector and non-bank private sector) and by residual maturity.

Table 7 – Information available on the external claims of UK-owned bank groups from BIS consolidated data at end-December 2001[a]

BIS - consolidated				
Developed	OFCs	Developing	Other	Total assets
541	150	89	12	791
68%	19%	11%	2%	

Cross-border[b]		Local[c]		
391		400		791
49%		51%		

Loans	Portfolio
237	154
61%	39%

Banks	Public	Non-bank private sector
164	62	166
42%	16%	42%

Gross risk transfers
135

Source: Bank of England.

(a) Figures show the external claims of UK-owned bank groups in £ billions at end-December 2001.
(b) Cross-border includes local claims in foreign currency.
(c) Local shows local claims in local currency.

The BIS consolidated data also provide information on 'risk transfers' either in reallocating cross-border claims on branches from the country of location of the branch to the country of location of the parent bank, or, where claims are explicitly guaranteed, to the country of the guarantor[3]. The range of risk transfer instruments included is not, however, comprehensive and varies across the BIS reporting area. For example, in many countries, including the UK, new instruments like credit derivatives are not included.

For UK-owned banks, developed countries account for 68% of total overseas claims (at end-December 2001), with United States, Hong Kong, France and Germany representing more than 50% between them (see Box 10 in the December 2001 Review). Much of this is local-currency-denominated lending, which has expanded rapidly during the past decade, often through acquisitions, and now makes up the majority of overseas exposures (see Box 11 in the Financial Stability Conjuncture and Outlook). There is, however, wide variation from country to country: for example, local currency claims represent over 80% of UK-owned banks' exposures to Hong

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1 *See Table C4.1 of Monetary and Financial Statistics.*
2 *Data are also reported on local currency liabilities in local offices.*
3 *This applies equally to lending to the subsidiaries of banks. Unless an explicit guarantee is provided by the parent bank, exposures to subsidiaries are reported according to the country of the subsidiary, not of the parent.*

Kong, but only 16% of exposures to Germany. The financial stability implications will differ somewhat depending on whether claims are cross-border, local in foreign currency or local in local currency (see Section V of the Financial Stability Conjuncture and Outlook). For example, cross-border claims may be vulnerable to capital controls and, where they are to non-banks, are likely to be to larger corporate borrowers with access to international wholesale markets. By contrast, local assets are likely to include exposures to smaller corporate and retail customers, although no counterparty breakdown is provided for local currency lending.

The breakdown of cross-border claims shows that exposures to banks and non-banks are of a similar magnitude (42% each), the remainder being exposures to the public sector (largely holdings of government securities) (Table 7). Again proportions vary between countries. For example, while 71% of UK-owned banks' cross-border claims on Germany are exposures to banks, 56% of exposures to the United States are to non-banks.

Risk transfer can have a significant influence on the pattern of international exposures. One effect is to increase exposures to countries that have large international banks with extensive overseas branch networks (Chart 4). For example, after risk transfer, UK-owned banks' exposures to Germany rise by US$47 billions and the proportion represented by exposures to German banks increased from 71% to 82%.

Chart 4– UK-owned bank groups' cross-border claims on banks including risk transfers at end-December 2001
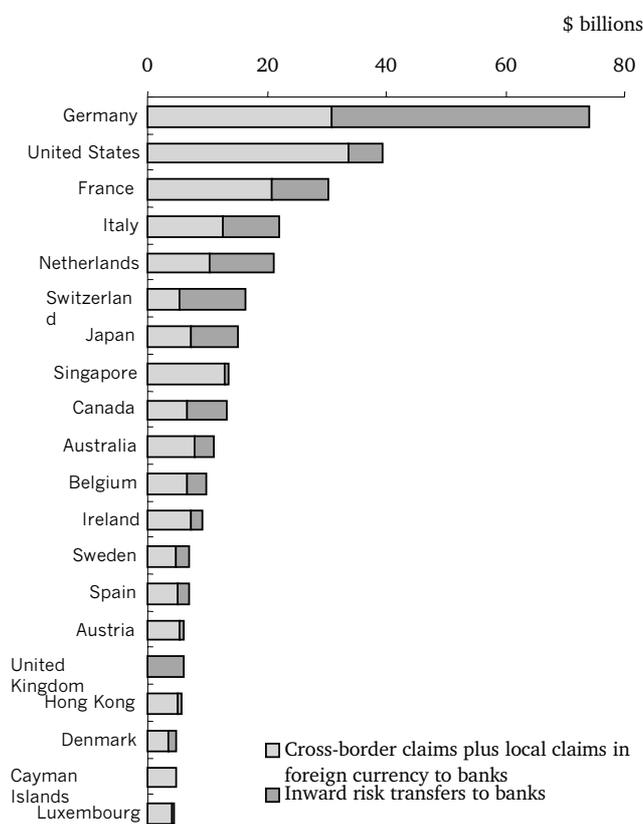
Source: Bank of England

While the BIS consolidated international banking statistics provide the best source of data on UK-owned banks' international exposures, there are nevertheless a number of drawbacks. The consolidation does not extend to non-bank subsidiaries. Overseas exposures may thus, after all, include some intra-group lending. The lack of a counterparty breakdown for local lending in local currency makes it impossible to build up a comprehensive measure of overseas exposures by counterparty. Similarly, risk transfer is only captured for cross-border and foreign-currency-denominated local lending but not local currency local lending and, as pointed out above, is in any case incomplete in terms of the instruments that are recognised. In 2004, procedures will be enhanced to address some these shortcomings, following the recommendations of a Committee on the Global Financial System working group on international banking statistics (see CGFS (2000)).

FSA regulatory returns

A third source of data is the regulatory returns collected by the Bank on behalf of the FSA. Balance sheet data to monitor capital adequacy are collected from UK-incorporated banks with deposit-taking permission under Financial Services and Markets Act 2001.

Given the primary purpose of the balance sheet return is to calculate capital ratios, the structure of the data is heavily influenced by the requirements of the 1988 Basel Accord and the 1996 Market Risk Amendment. Thus assets are broken down between the so-called 'banking book' and 'trading book' (overall 81% and 19% of assets respectively) and, within them, by broad risk-weighting categories according to the type of counterparty or obligor risk (Table 8). Similarly, on the liabilities side, the main focus is on capital-type instruments, broken down into Tier 1, 2 and 3 and their constituent parts. Assets and capital are then combined in the risk asset ratio (capital relative to risk-weighted assets). Additional information is included in appendices on provisions against bad and doubtful debts, capital requirements for market risk and for counterparty claims under derivative contracts.

Table 8 – Information available on the balance sheets of UK-owned bank groups from regulatory data at 2001 H2[a]

Split by:	Regulatory data				
(a) Instrument	Loans	Investments	Cash and transit items	Other	Total assets
UK-owned	1.355	305	40	357	2.057
	66%	15%	2%	17%	

(b) Borrower type	Residential mortgages	Public sector	Banks	Other	
UK-owned	483	132	316	1126	2.057
	23%	6%	15%	55%	

(c) Risk weight	Risk weighting categories[b]				
UK-owned	0%	10%	20%	50%	100%
	509	52	404	500	708
	23%	2%	19%	23%	68%

	Off-balance sheet					
(d) Off-balance-sheet items	Transaction-related contingents	Trade-related contingents	Commitments		Guarantees	OTC Counterparty claims
			Under 1 year	Over 1 year		
UK-owned	35	8	415	9	63	62

Source: FSA regulatory returns.
(a) Figures show UK-owned bank groups' assets in £ billions at 2001 H2.
*(b) Figures between the dashed lines are for banking book only, including off-balance sheet items.*

In contrast to the monetary and BIS locational statistics, the data cover the entire balance sheet and include assets and liabilities booked in offices both in the United Kingdom and overseas. From a financial stability perspective, this should in principle provide the best picture of aggregate balance sheet developments for UK-owned banks. Extensive information is also provided on off-balance-sheet positions, commitments and contingent liabilities. Given the focus on capital adequacy, however, only a limited breakdown of the data is provided between different instruments, counterparties and sectors (and usually only where these are subject to different risk weights), and none by country or currency. In addition, aggregation[1] of the regulatory data is often difficult, partly because they were not designed for aggregation. Individual banks have different reporting cycles and, where appropriate and bilaterally agreed with their regulator, had been given various reporting concessions prior to the FSMA 2001 that are grandfathered under that legislation. This in particular applies to the treatment of subsidiaries and other related companies in consolidated returns. While bank subsidiaries will generally be fully consolidated, the treatment of non-bank subsidiaries will depend on the nature of the subsidiary and on any regulatory capital regime to which it is subject, and may in some cases differ from the consolidation treatment for published accounts. For example, investments in insurance and non-financial subsidiaries are deducted from capital,

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1 *Data from regulatory returns have been aggregated by the Bank of England and the FSA bears no responsibility for the accuracy of the results.*

rather than being consolidated into group assets and liabilities line by line. This can be seen by comparing total assets for UK commercial banks in regulatory returns with published accounts[1] (Chart 5). Total assets based on published accounts are larger where assets for non-financial subsidiaries have been consolidated. While in aggregate the difference is small (3% in 2000 H2), the difference is larger in groups where insurance subsidiaries make up a significant part of the consolidated balance sheet.

**Chart 5 – Total assets of UK-commercial banks using published accounts, regulatory and monetary data**
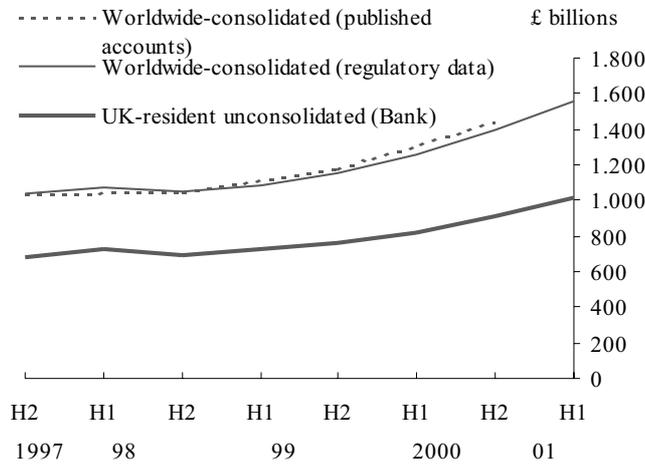
Sources: Bank of England, FSA regulatory returns and published accounts.

Reconciliation of the data sources

As this article has indicated, the individual data sources have a number of shortcomings, but these can be overcome to some extent by judicious use of the sources in combination. This is not straightforward, however, given differences in consolidation and coverage.

Easiest to combine are the regulatory and BIS consolidated data. While not identical, the consolidation is sufficiently similar to use the data to derive a split between UK and overseas exposures (Chart 6). Overseas exposures represent around 45% of UK commercial banks' total global on-balance-sheet assets, reinforcing the importance of monitoring overseas vulnerabilities in the Bank's financial stability analysis. It is also possible to analyse the geographical distribution of exposures in terms of the balance sheet as a whole. For example, exposures to emerging market economies are only 6% of the total assets of UK commercial banks (though obviously this varies widely between banks).

Chart 6 – UK commercial banks' UK and overseas assets using regulatory and BIS consolidated data
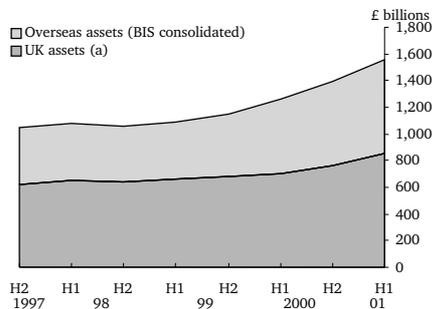
Sources: Bank of England and FSA regulatory returns.

(a) UK assets derived from difference between total assets in regulatory data and overseas assets in BIS consolidated data.

1 *Commercial banks have been used in part because they represent the greater part of total assets for UK-owned banks but also because they are responsible for most of the UK-owned banks' overseas exposure. They are thus useful in highlighting differences between data sources.*

Similar analysis is, perhaps surprisingly, more difficult for UK exposures, given that the monetary data are unconsolidated. This is more of a problem for intra-group lending to other banks, and so for interpreting interbank exposures data, than for other sectors. Intra-group transactions have no impact on household lending and minimal impact on lending to PNFCs. However the impact of intra-group transactions on lending to both OFCs (to the extent that UK commercial banks provide funding for securities, leasing and trading subsidiaries) and to banks is likely to be significant. Even including lending to OFCs and MFIs, however, and contrary to what might have been expected, total claims on UK residents from monetary data are less than total UK exposures inferred from regulatory returns and BIS consolidated returns (Table 9). The difference may relate to lending to UK-residents by UK commercial banks from offices overseas, for example from offshore centres. But further analysis is impossible from the data available.

Table 9 – Reconciliation between regulatory, monetary and BIS consolidated data at 2001 H2[a]

Split by: (a) Borrower	Regulatory						Total assets
UK Commercial banks	UK		Overseas				
			BIS-consolidated				
			Developed	Offshore	Developing	Other	
	797		441	141	85	9	1.473
	54%		30%	10%	6%	1%	

(b) Sector	Monetary					Residual	BIS consolidated				Total assets
UK Commercial banks	Households	PNFCs	OFCs	MFIs	Other		Banks	Public	Non-bank	Local	
	237	124	154	170	48	63	130	52	128	368	1.473
	16%	8%	10%	12%	3%	4%	9%	4%	9%	25%	

Sources: Bank of England and FSA regulatory returns.

(a) Figures are shown in £ billions at end- December 2001 (except fore regulatory data at 2001 H2).

Starting from the consolidated balance sheet data in regulatory returns, it is nonetheless possible to make some use of BIS and monetary data to provide a more detailed breakdown of geographical and sectoral exposures for financial stability analysis, even if the numbers do not reconcile completely. However, there are a number of caveats:

- the split of lending between UK and overseas offices can only be inferred;
- relying on monetary data to analyse the sectoral breakdown of lending within the UK can only be done on the assumption that lending from UK-resident banks' overseas operations to UK-resident borrowers is not material;
- at the same time, using unconsolidated monetary data for sectoral analysis may exaggerate exposures to particular sectors, in particular to OFCs and MFIs (though using a combination of regulatory and BIS consolidated data, UK interbank lending can be inferred);
- BIS consolidated data provide only a limited sector breakdown for cross-border lending and currently none for local lending in local currency;
  exposures to individual borrowers are not consolidated in either monetary data or BIS consolidated data; and
- beyond disclosures by individual banks in published accounts, there is no means to assess sectoral exposures in the balance sheet as a whole.

It would be difficult to address these shortcomings without the development of a new source of data for financial stability analysis that measured banks' consolidated exposures on both the lender and the borrower side. Unconsolidated data would still, however, be relevant for banks in terms of monitoring intra-group flows and the activity of UK-resident foreign banks and for borrowing companies in terms of monitoring the geographical distribution of exposures.

Conclusion

Without a data source designed specifically for financial stability analysis, there are unsurprisingly a number of questions that cannot be satisfactorily answered using the data that are available. But some reasonable approximations are possible in many cases. In assessing system resilience, the primary focus is on consolidated data that exclude intra-group transactions and allow an overall comparison of the scale and distribution of the UK banking sector's exposures against its capital. But unconsolidated data in the UK monetary sector statistics are also useful, for sectoral loan exposures, and for the analysis of foreign banks' activity in the United Kingdom and the resulting links to financial systems overseas. The Bank has therefore developed an approach that combines consolidated BIS and regulatory data with unconsolidated monetary data. The relationship between the different bodies of data is complex and, even where they can to some extent be combined, differences make detailed analysis of consolidated exposures difficult. This is a particular problem in assessing sectoral exposures where borrowers are part of international groups active in several different countries or sectors. The data available for financial stability analysis are a subject of international debate, particularly in the context of the IMF's work on Financial Soundness Indicators (FSIs)[1]. This article has indicated, that, within that debate, questions of how to combine data from existing sources, or even whether to develop new sources, might be as important as the specification of the FSIs themselves.

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1   *: FSIs are aggregate measures of financial fragility developed by the IMF. See IMF(2002).*

Role of financial soundness indicators in surveillance: data sources, uses and limitations

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I. Introduction

The growing recognition of the importance of surveillance of the financial system to their mandate has led a number of central banks and the IMF to develop Financial Soundness Indicators (FSIs). These are generally constructed by aggregating data from individual institutions to produce measure that can be used to assess the financial strength and vulnerabilities of the main sectors of the financial system, such as banking or insurance. However, FSIs cannot measure all aspects of financial system relevant to stability due, in part, to gaps in data and the qualitative nature of some information. This paper assesses from the users perspective how these data limitation can reduce the effectiveness of the surveillance of financial sector strength and vulnerabilities using FSIs. It also explores the ways in which other sources of information and surveillance tools can compensate for these limitations. It does not provide a detailed analysis of FSIs and how they are used, as this is provided elsewhere.[2] The next section of the paper defines the different FSIs and describes the specific aspects of the financial system that they monitor. It also explains the criteria used by the IMF to prioritize FSIs into a core set and less essential encouraged set (Table 1). Section III explores how FSIs are used in surveillance, partly to provide context for later sections. It briefly outlines different dimensions of financial surveillance and the role played by FSIs in them. Section IV reviews the sources of data for FSIs and their limitations, including: inconsistencies in definitions; gaps in the data covering certain sources of risk; and, the qualitative nature of some information. Section V outlines approaches that can mitigate these data limitations, such as an FSI compilation guide, under preparation by the IMF, and, reliance on other surveillance tools. The latter include stress testing, early warning indicators and the analysis of the supervisory system and financial infrastructure using the core principles and codes and standards assessments done by the IMF on FSAPs.

II. Definition and uses of Financial Soundness Indicators

FSIs generally are created by aggregating data (or indicators) for individual institutions' balance sheets and income statements to produce a measure covering the financial sector as a whole. They can also be produced for peer groups by aggregating data for a sub-set of institutions within a sector. This aggregation is a feature that differentiates FSIs from other financial indicators that can be used to monitor the financial system (e.g. asset prices). This surveillance of the financial sector as a whole—macro-prudential analysis—parallels that of individual financial institutions by supervisors—micro-prudential analysis. Macro-prudential analysis derives from the need to identify risks to the system resulting from the collective impact of the activities of many institutions that are hard to detect through the monitoring of individual institutions alone.

Table 1 – Financial Soundness Indicators

Core Set	
Deposit-taking institutions	
Capital adequacy	Regulatory capital to risk-weighted assets
	Regulatory Tier I capital to risk-weighted assets
Asset quality	Nonperforming loans to total gross loans
	Nonperforming loans net of provisions to capital
	Sectoral distribution of loans to total loans
	Large exposures to capital
Earnings and profitability	Return on assets
	Return on equity
	Interest margin to gross income
	Noninterest expenses to gross income
Liquidity	Liquid assets to total assets (liquid asset ratio)
	Liquid assets to short-term liabilities
Sensitivity to market risk	Duration of assets
	Duration of liabilities
	Net open position in foreign exchange to capital

Encouraged Set	
Deposit-taking institutions	Capital to assets
	Geographical distribution of loans to total loans
	Gross asset position in financial derivatives to capital
	Gross liability position in financial derivatives to capital
	Trading income to total income
	Personnel expenses to noninterest expenses
	Spread between reference lending and deposit rates
	Spread between highest and lowest interbank rate
	Customer deposits to total (non-interbank) loans
	Foreign currency-denominated loans to total loans
	Foreign currency-denominated liabilities to total liabilities
	Net open position in equities to capital
Market liquidity	Average bid-ask spread in the securities market 1/
	Average daily turnover ratio in the securities market 1/
Nonbank financial institutions	Assets to total financial system assets
	Assets to GDP
Corporate sector	Total debt to equity
	Return on equity
	Earnings to interest and principal expenses
	Corporate net foreign exchange exposure to equity
	Number of applications for protection from creditors
Households	Household debt to GDP
	Household debt service and principal payments to income
Real estate markets	Real estate prices
	Residential real estate loans to total loans
	Commercial real estate loans to total loans

1/ Or in other markets that are most relevant to bank liquidity, such as foreign exchange markets.

FSIs are selected for their capacity to monitor different aspects of a financial system relevant to financial stability. The specialized information provided by each FSI need to be combined to provide a comprehensive picture of the condition of the financial sector. To describe how FSIs can be used, it is helpful to present FSIs for the financial and non-financial sectors separately; and, within the former, discuss FSIs that measure financial strength separately from those used for monitoring vulnerabilities.

Financial Sector FSIs

The choice of FSIs to monitor the financial sector, and the inferences that can be drawn from them, depend to some extent on the structure of the financial system and the characteristics of the institutions making up the system. Key considerations include the extent to which the system is bank-dominated and the importance of complex groups. For example, in bank dominated systems it is usually possible to rely on the capital adequacy ratio and profitability measures for the banking system alone. In contrast, in systems where insurance companies and/or securities firms are systemically important, FSIs for these sectors also need to be monitored. In systems where complex financial groups are important, it is desirable to also monitor FSIs for the peer group of these conglomerates (where banking, insurance and securities activities are consolidated), because the scope for cross subsidization and pooling of capital within such groups can affect the risk to the system.

FSIs measuring financial strength

The financial strength of the financial sector is monitored using a range of information including FSIs that assess capital adequacy, such as the risk weighted capital ratios and the leverage ratio, and FSIs of earnings and profitability, such as Return On Equity (ROE) and Return On Assets (ROA). These FSIs indicate the capacity of the sector to absorb adverse shocks. It is also desirable to compute these (and other) FSIs for different peer groups within a sector and to look at measures of dispersion for the FSI to help determine the extent to which financial sector weakness may be concentrated in a few institutions.[1]

Each FSI measures different aspects of the financial strength of a sector. The risk weighted *capital adequacy ratio* is derived by aggregating regulatory capital ratios for individual banks collected by supervisors. Capital in this FSI is composed not only of equity but also of reserves and liabilities with equity-like properties such as subordinated debt depending on the country. The *leverage ratio* is used for non-bank sectors not subject to capital adequacy regulation and uses balance sheet data based on standard accounting concepts. It measures the size of the debt relative to the capital base supporting it and plays an analogous role to the capital adequacy ratio in the macro-prudential analysis of non-bank sectors. *ROE* and *ROA* measure the earnings or profits available to help absorb losses. Other FSIs such as the *interest margin and non-interest income relative to gross income* assess the stability of earning and therefore its availability to help absorb losses.

To properly assess financial strength, attention must be paid to the specific concepts and definitions used for the FSIs. For example, to establish the capacity of the measure of capital used in FSIs to provide protection against shocks, account needs to be taken of accounting rules. These include valuation methods for assets and liabilities and the regulatory rules on which the underlying measure of capital is based, especially the accounting treatment of provisioning and the consolidation rules.[2] Also relevant are features of the financial infrastructure, such as market liquidity, which affect the accuracy with which assets, liabilities and capital can be valued. These feature vary significantly across financial systems and so must be taken into account when international comparisons are made. Core principles and codes and standards assessments are a valuable source of information on the measurement and accounting treatment of capital that can be used, as discussed below.

FSIs of financial sector vulnerability

The role of FSIs of financial sector vulnerability is to assess a sector's vulnerability to shocks. The FSIs measure asset quality, the capacity of the banking sector to access liquidity in a crisis, sensitivity to market risk and market liquidity. FSIs of *asset quality* provide an indication of the extent to which the vulnerabilities of the financial system pose a risk to financial stability. Specifically, *NPLs relative to total loans* provide information on the quality of the loan portfolio of the financial sector. Alternatively, *NPLs net of provisions relative to capital* give an indication of the potential impact on capital of credit problems in the loan portfolio. The reliability of an assessment of vulnerabilities based on these FSIs depends on knowledge of provisioning policies and recovery rates on loans (i.e. loss-given-default). Such information can typically be provided by supervisors and may be reported in core principles assessments.

A potential limitation of FSIs that rely on NPL data is that they tend to be lagging indicators of asset quality. The reason is that NPLs are reported only when banks decide to recognize assets as

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1 *FSIs for individual institutions that are systemically significant may also be relevant and should be monitored where necessary. When weaknesses are detected at the level of the sector or peer group, it is generally necessary to then dig deeper to determine whether they can be attributed to one or a few systemically significant institutions.*

2 *An understanding of the rules for consolidating across legal entities in a complex group is necessary to identify the potential for "double gearing".*

impaired, which typically occur after a significant lag from when banks suspect they are impaired. The lag derives partly from the criteria for impairment, which is that a loan must be in arrears on interest payments for a period of time before being declared non-performing. The most common period is 90-days, but practices vary widely across countries, making cross-country comparisons problematic. Another source of reporting delay is the incentives of banks to delay reporting or to hide NPLs by, for example, evergreening loans. Nevertheless, NPLs are relied on as a measure of asset quality partly because of the lack of other satisfactory measures.[1] Partly because of these shortcomings, FSIs for the non-financial sector may be particularly helpful because they can provide an early indication of likely trends in NPL-based FSIs.

FSIs of the *sectoral distribution of loans relative to total loans and of large exposures relative to capital* also serve as indicators of asset quality. However, they monitor a slightly different source of financial sector vulnerability that arises when relatively high proportion of exposures are concentrated in particular sectors or countries. They serve primarily as indicators of the risk to the banking sector deriving from a lack of diversification in individual lending portfolios. They are intended to capture situations where the banking sector as a whole has an exposure concentration to a particular source of risk.

One sectoral-exposure measure of particular interest is the gross value of loans of the banking sector to the banking sector (which are not netted-out in aggregation). This FSI provides an indication of the relative size of interbank exposures and, thus, of the potential for contagion in a systemic banking crisis. However, at best, it can provide only a rough indication of this source of systemic risk, which depends largely on the distribution of interbank exposures within the sector. As noted below, a more accurate assessment of this risk can be derived from using stress tests as a complementary surveillance tool.

FSIs of *liquid asset to total assets and liquid assets to short-term liabilities*, measure the extent to which the banking system is vulnerable to a loss of access to liquidity. They complement other FSIs by giving an indication of the risk that an event, such as a rise in NPLs or write-off of capital (captured by the FSIs covering these indicators), could trigger a banking crisis by provoking a loss of access to funding sources or a run on deposits. These FSIs are primarily relevant to the banking sector because banks are inherently illiquid institutions due to their maturity transformation role in financial intermediation where loans are illiquid and liabilities are short-term. In contrast, securities and insurance firms typically have highly liquid asset portfolios. And, in addition, insurance companies have mostly long-term liabilities.

Another factor relevant to the liquidity of banks' balance sheets is market liquidity, which influences the size of the discount, or market loss, that could result if institutions are forced to liquidate financial asset in a crisis. This source of vulnerability is measures by two FSIs of market liquidity, *the bid-ask spread and market turnover* (gross average daily value of securities traded relative to the stock). These FSIs, however, measure liquidity under normal conditions and so may not give a particularly accurate indication of how market liquidity will hold up in a crisis. In this case, information on the robustness of market liquidity, derived from an assessment of the market infrastructure based on the core principles and codes and standards assessments, can help compensate for this limitation.

FSIs of sensitivity to market risk, the *net open FX position relative to capital, duration of assets and liabilities* and *net open position in equities to capital* measure the vulnerability of the financial sector arising from exchange rate, interest rate and equity price exposures. These FSIs do not by themselves give a direct indication of loss incurred by the financial sector that could result from exchange rate, interest rate or equity price changes. For this reason, they are often used in combination with stress testing, which does provide an estimate of loss, in the assessment of market vulnerabilities.

FSIs for the non-financial sector

The usefulness of FSIs for the non financial sector derives from their capacity to detect weaknesses in the financial sector at a relatively early stage, often before they are reflected in FSIs of the financial sector that measures them more directly (e.g. NPLs/loans). FSIs are proposed for the corporate, household and real estate sectors that are typically significant sources of credit risk through their credit linkages with the financial sector. Also, since they are constructed by aggregating data from the financial statements of individual entities, they are broad measures that capture the cumu-

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1   *Banks typically do not report their own internal rating of their loan portfolios, which is likely to be the most accurate source of data on asset quality. However, there could be progress in this area with the implementation of Pillar III of the revised Basel Accord.*

lative effect of the activities of all entities in a country.[1] This broad coverage and the relatively tight credit linkages, helps make these measures more useful indicators of vulnerabilities in the financial sector than the wide range of other potential indicators.

In using non-financial FSIs, it is desirable to establish the extent to which the risks to the financial sector that they detect pose a threat to the sector. A source of data that is useful in this regard is the relative size the financial sector's credit exposure to the different non-financial sectors using FSIs on the distribution of exposures.

There are two FSIs for the household sector: *household debt to GDP*, which serves as a measure of leverage; and, the ratio of *household debt service and principal payments to income,* which measures the burden of the debt and provides an indication of the risk of default. There are also FSIs for the real estate sector, reflecting the sectors proven importance as a source of risk to the financial sector. They include the *real estate price index* (preferably for household and corporate real estate separately) and *residential and commercial real estate loans to total loans*. The latter are closely related to the FSIs of the sectoral distribution of loans, discussed above, covering the banking sector's real estate exposure.

There is a relatively broad range of FSIs for the corporate sector reflecting, in part, the wide range of indicators used to assess the condition of individual companies that can be aggregated to construct corporate sector FSIs. The leverage ratio, defined at *corporate debt to equity*, which serves as an measure of default risk. *ROE* and *ROA* give an indication the extend to which earnings are available to cushion losses. Corporate sector *earnings relative to interest and principal payments* indicates firms' capacity to repay debt or, alternatively, the earnings left over to cover losses after debt payments. The *net FX open position to equity* gives an indication of the vulnerability of the sector to exchange rate movements. Finally, the *number of bankruptcy applications* serves as an index of financial distress.

Criteria to prioritize development efforts: core versus encouraged FSIs

FSIs are divided into two categories—a core and an extended set (Table 1). The core set contains those FSIs that the IMF Board decided are essential to surveillance, are relevant in all financial systems and can be produced use existing data. It contains only FSIs for the banking sector, reflecting the central role of banks in all financial systems. The extended set comprises FSIs for bank and non-bank institutions whose importance is likely to vary by country and where more conceptual or statistical work may be needed. In particular, it includes FSIs for the corporate, household and real estate sectors that are regarded as particularly useful to policymakers because they allow them to detect vulnerabilities at an earlier stage. For this reason, they have been singled out by the IMF board as other FSIs where developmental efforts should also be focused.

III. The role of FSIs in surveillance

As background for assessing the significance of limitations in the data used for FSIs, it is useful to briefly review several key issues relating to the role of FSIs in macro-prudential surveillance. First, surveillance involves monitoring a number of dimensions of risk to financial stability across which the uses of FSIs differ. Second, FSIs are only one of a number of surveillance tools, which play different, but complementary, roles in the surveillance process. Finally, the role of FSIs depends to some extent on the mandates of institutions using them for surveillance.

Dimensions of surveillance

A comprehensive assessment of the risk to the real economy from financial instability depends on the surveillance of a number of dimensions of risk to the financial system. The first dimension involves assessing the collective financial strength and vulnerabilities of financial institutions within a sector, including their access to liquidity under stressful conditions. FSIs can make an important contribution to this aspect of surveillance, as described above.

The second dimension involves surveillance to assess the fragility of non-financial sectors. Its relevance derives from the information it provides on the risks to the financial sector resulting from

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1   *Obviously, this does not apply to the real estate price FSI.*

banks' exposures to non-financial institutions. In this dimension also, FSIs can play an important role, especially with respect to the corporate sector for which the data are relatively good.

A third dimension of surveillance involves assessing the potential for contagion within the financial system. This risk is most pronounced in the banking sector due to the size of interbank exposures and banks' dependence on short term market funding. However, it can also be significant across financial sectors in financial systems where complex financial groups are important. Since it depend largely on the distribution of exposures within the sector, aggregated measures such as FSIs can only give a rough indication of this risk. Thus, the assessment of this risk needs to rely on other surveillance tools, especially stress testing, although data on the aggregate size of these exposures provides by FSIs can be useful.

The fourth dimension is concerned with the potential impact on the real economy of problems in the financial sector. This surveillance relies largely on macroeconomic analysis to assess the effects of financial developments on macroeconomic activity. FSIs can support this analysis by indicating the risk that such problems could develop. Also, FSIs for the non-financial sector can play a useful, complementary role in this analysis by providing data on the exposure of real economy (e.g. corporations and households) to the financial sector.

In addition to FSIs, there are a number of other surveillance tools that can be used in each of these dimensions to complement FSIs. While an analysis of the role of these other tools in surveillance is beyond the scope of this paper, they can help compensate for the data limitations of FSIs, as discussed below. These other tools include stress testing, Early Warning Indicators (EWIs), broadly defined to include financial market data, core principles and codes and standards assessments, and analysis of the legal and policy framework.

Uses of FSIs for surveillance by different types of institutions

FSIs can help meet the bilateral surveillance needs of range of different types of institutions, including the private sector, central banks and international organizations. The private sector (financial institutions, corporations and households) need FSIs to assess financial risks to their domestic and foreign investments and operations. Since these risks can originate domestically and abroad, they must rely on FSIs covering both their home and foreign financial systems.

For central banks, FSIs can play a role in evaluating the monetary transmission mechanism, which depends on conditions in the financial sector. They can also help assess risks to their inflation objectives deriving from the macroeconomic impact of financial instability. Thus, they need to monitor FSIs in parallel with monetary and financial market data used to assess monetary conditions, and with macroeconomic data used to monitor inflationary pressures and developments in the real economy. For these reasons, a number of central banks have introduced systems to compile and monitor FSIs. Similarly, supervisory authorities, whether within or outside the central bank, need to monitor FSIs of the financial sector as a whole because of its impact on the conditions of the institutions they supervise.

International organizations increasingly use FSIs to meet their surveillance responsibilities. The IMF, in particular, uses FSIs in surveillance on FSAPs and Article IV consultations. Surveillance on FSAPs is focused on the financial sector and typically use a number of surveillance tools in tandem, including FSIs, stress testing and core principles and standards and codes assessments. FSIs together with stress testing assess the strengths and vulnerabilities of this sector and the risk of a financial crisis. The core principles and codes and standards assess the effectiveness of the supervisory system and the robustness of the financial infrastructure. Article IV surveillance is focused on the broader macroeconomic situation, in which the financial sector plays an important role.

In this surveillance, FSIs complement a broad range of other macroeconomic and financial market indicators. For Article IV surveillance, FSIs can be used for continuous surveillance of the financial sector, reflecting the fact that Article VIs are typically conducted on annual cycle. Moreover, FSAP surveillance using FSIs, which is done on roughly a five or six year cycle, plays an important supporting role to Article IV surveillance by providing a more in-depth assessment of financial sector strengths and vulnerabilities than is possible on the more broadly-focused Article IV mission.

IV. Sources and limitations of the data used for FSIs

FSIs are based on existing data sources that are produced for a range of other purposes such as supervision and corporate governance. They are typically constructed by aggregating data for individual institutions within a sector so as to generate a measures for the sector as a whole. Inevitably, reliance on a variety of different data sources and adapting them to new uses will contribute to some limitations in the resulting measures. In some cases, for example, the data may imperfectly measure the risk that an FSI is intended to measure. In others, data definitions may differ across countries or sectors, limiting the comparability of FSIs. To assess the significance of these data limitations, it is useful to first briefly review the data sources for FSIs and then describe how limitations in these data affect the resulting FSIs.

Different FSIs data sources

FSIs use data from a number of sources (Table 2 shows the main ones). One source is supervisory returns, used by supervisors to assess the condition of financial institutions. Another is the financial statements disclosed by financial institutions and corporations, which play an essential role in corporate governance. These are typically prepared according to IAS or GAAP accounting principles. A third are the BIS consolidated banking data, which show the cross-border exposure for around 20 countries on a consolidated basis. Finally, the residence-based monetary, NIA, and BOP data,[1] are used to monitor financial flows between sectors in a country and across borders between residents and non-residents. Many FSIs can be compiled from more than one data source with the result that these FSIs will have different interpretations depending on the data used. In this case, the choice of data source should be determined by the intended use of the FSI. A key consideration in this regard is whether the source data are consolidated or not, for the reasons noted below.

Table 2 indicate for the FSIs in each cell the data sources used to construct them and whether they are consolidated on a cross-border basis or not. The use of consolidated data as the basis for many FSIs is appropriate because financial risk must typically be assessed on a consolidated basis. Consolidation makes it possible to capture risk incurred by institutions through their branches and subsidiaries located outside the home country.[2] In addition, it may be desirable to construct FSIs using data that are consolidated on both a cross-border and cross-sector basis. This is the case when complex groups or financial conglomerates are an important feature of a financial system because of the potential for risks incurred in one sector (e.g. insurance) to pose a threat to another sector (e.g. banking). The table also indicates in the bottom-right cell that unconsolidated monetary or NIA data are most useful for non-financial sector FSIs (of course, there are aspects of surveillance where financial sector FSIs based on unconsolidated data are relevant).

Table 2 – Data sources and data consolidation for selected FSIs

| | Main data sources for FSIs | | |
	Supervisory data (including BIS data)	Financial statements	Monetary, NIA and BOP data
Consolidated data	Capital ratios NPLs/loans (NPLs-provisions)/capital large exposures/capital open FX position/capital	Capital/assets (leverage) Return on equity Return on assets Interest margin/income Liquid assets/assets Liquid asset/ST liabilities	
Unconsolidated (residence-based) data	*Same data for subsidiaries*	*Same data for subsidiaries*	Household debt/GDP Household debt service/GDP Corporate sector data

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1 *Included with these data are the BIS locational banking statistics.*
2 *This is one reason for the reliance by supervisors on the principle of consolidated supervision, which a key feature of the Basel Accord.*

Limitations of data used to construct FSIs

These data sources have a number of limitations that affect usage of FSIs, reflecting, in part, the fact that they were typically designed to serve different purposes. Most were mentioned above in the context of the discussion of individual FSIs. Drawing on this discussion, it is possible to identify four types of data limitations. The first arise from the fact that data definitions or concepts differ across countries, and sometimes across-sector within a country, making comparisons difficult. An example of this is the variety of definitions of capital and treatment of provisions and NPLs in different countries.

The second derives from the different reporting and disclosures requirement for institutions within a country, which limits our capacity to aggregate the data they provide. An example of this is the widespread use of reporting exemptions for banks in some supervisory systems. This can results in situations where a number of banks do not report some data needed for FSIs, undermining their reliability.

A third derives from the fact that the some of the available data sources used for an FSI provides an imperfect measure of the risks that the FSI is intended to capture. For example, the NPLs/loans FSI serve as a useful indicator of asset quality but it measures the loans banks choose to declare as impaired, not their actual assessment of the credit quality of their portfolio. Another example are the FSIs of market liquidity, which only measure liquidity under normal conditions but may not give a particularly accurate indication of how market liquidity will hold up in a crisis. A third example is contagion risk arising from interbank exposures, which is not particularly well captured by the FSI on the distribution of lending exposures. Thus, as discussed above, while this FSI is a useful indicator, stress tests will probably be needed to adequately assess this risk.

Finally, some information necessary to assess financial sector risks is qualitative and thus cannot be captured by a quantitative measure such as an FSI. To some extent, this information can be obtained from sources such as core principles and codes and standards assessments done on FSAPs. The challenge is to develop procedures for using this information in combination with FSIs to enhances the effectiveness of surveillance, as outlined below.

V. Approaches to mitigate the effects of data limitations

There are a range of approaches available to mitigate the adverse effects of these data limitations on financial system surveillance. They fall into two categories: efforts to improve the quality and availability of underlying data used to produce FSIs; and, reliance on other, complementary surveillance tools that can compensate for these limitations. The IMF is undertaking efforts in both areas, each of which require extensive cooperation with national authorities, standard setting bodies and other international organizations. The effort in the first area is centered around the development of an FSI compilation guide, while the second is being implemented in the context of the FSAP. In addition to these tools, non-financial FSIs and EWIs can help compensate for limitations of financial sector FSIs, as outlined above. In particular, indicators of financial fragility in the corporate sector, such as the leverage ratio, can help detect asset quality problems at an early stage in the banking sector.

Role of the FSI compilation guide

An FSI compilation guide is being prepared by the IMF Statistics Department and is to be reviewed by the IMF Board in the context of an IMF Board paper on FSIs around the end of 2002. This work involves extensive consultation with experts from many countries, standard setting bodies and international organizations.[1]

The primary purpose of the guide is to provide guidance to compilers and users of FSIs on the concepts and definitions, and data sources and compilation techniques for the core and extended set of FSIs. The guide is based on the presumption that FSIs are to be based on existing data sources to the extent possible. It clarifies and formalizing the definitions and concepts on which these data are based and, by relating them to established balance sheet and income statements, shows how they derive from existing statistical system. Moreover, these definitions are formulated so as to be flexible enough to accommodate the variety of different types of data identified above.

In addition to providing definitions of FSIs and clarifying their relationship to established statistical systems, the guide offers guidance in a number of other areas. These include: methods for

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1   *Comments on a preliminary draft are to be provided by experts at a meeting on September 12-13, 2002, at the IMF.*

aggregating and consolidating data; defining the types of information on financial structure that could be disseminated to provide background for FSIs; and, providing methodological guidance on a range of measurement issues.

The guide should help mitigate some of the limitations of FSI data in several ways. First, it provides a conceptual framework that will make it possible document differences across countries in the definitions of the data used to construct FSIs. Specifically, if the compilers of FSIs indicate how the definitions of the FSIs they produce differ from that proposed in the guide, this would make it possible for users of the FSIs to know more precisely what is being measured. This, in turn, would make it easier for them to compare FSIs across countries even when they are measured differently.

Second, by providing standard definitions for FSIs, the guide can help achieve comparability between FSIs used in different countries by facilitating a convergence to a common definition for each FSI. The incentive for compilers to adjust the definitions of the FSIs they produce to match those in the guide derives from the rigorous conceptual basis for the guide definitions. This reflects the fact, noted above, that the definitions in the guide are firmly rooted in established statistical concepts and frameworks (NIA, prudential and for commercial accounting). Another factor encouraging this convergence is the need for data providers (e.g. individual banks and corporations) to comply with the reporting and disclosure requirements of standard setters such as the Basel Committee and the IASB. Also, providers (or their supervisors) may consider it advantageous to disclosure data according to a common standard because this enhances transparency.

Third, the guide could help encourage compilers to collect additional data that are needed to improve FSIs or produce new ones. One reason is that the guide, by providing widely accepted definitions and clear compilation methodologies, makes the process easier. Outreach and technical assistance by the IMF and FSAPs should help in this regard. In addition, the incentives for disclosure outlined in the previous paragraph could also encourage reporting of additional data needed for FSIs. Finally, a factor that could lead to the provision of additional data for FSIs is the strengthening of disclosure requirements by standard setters. Of particular importance in this regard are the proposals under Pillar III of revised Basel Accord. In sum, a long term objective of the guide is to encourage the rapid and widespread production and dissemination of FSIs in the ways outlined above.

Use of other surveillance tools in combination with FSIs

There are a number of different surveillance tools used by central banks, the IMF and others that used in combination with FSIs can compensate for many FSI data limitations. These tools include EWIs, financial market data, analysis of the policy framework, stress testing and core principles and codes and standards assessments. Since the use EWIs and market data in surveillance is well covered in other research papers, the analysis below will focus on the latter two surveillance tools.

The complementary role of stress testing

The relationship between FSIs and stress testing derives from the fact that FSIs are typically the output of stress tests. For example, the impact of a macroeconomic shock is usually measured as the impact on the capital ratio FSIs. Moreover, since the shock impacts NPLs, it provides a measure of the linkage between changes in the NPL-based FSIs and the capital ratio FSI.

Stress testing and FSIs are complementary approaches to assessing financial strength and vulnerabilities, where a stress test can give information in additional to that provided by an FSI. Specifically, an FSI provides a quantitative measure to assess a particular vulnerability, while the stress test, which is a shock to the relevant macroeconomic risk factor, yields an estimate the losses associated with this vulnerability (often reported as a change in the value of an FSI). This measure of loss from the stress test can be used as a surveillance indicator along with, or even in place of, the FSI itself. This is most common in the case of market risk where the shock takes the form of a change in an asset price such as an exchange rate or interest rate. For example, the FSI of the net open FX position measures the exchange rate exposure while the stress test estimates the losses that result from a plausible but large exchange rate change given the exposure.

A case where stress testing can play a particularly valuable complementary role is in the assessment of systemic risk arising from interbank exposures. The FSI measure provides an indication of the scale of interbank relative to other exposures, as described above. In contrast, the stress test uses information on the distribution of interbank exposures within the banking sector to assess the risk of a systemic crisis. It reveals to what extent a shock to the banking sector causing the failure of individual banks could precipitate the failure of other banks via their interbank exposures to the banks' whose failure was triggered by the shock.

Using core principles assessments to complements FSI surveillance

The core principles assessments, which serves as an another tool for strengthening the soundness of financial systems, provides information that can be used in combination with FSIs to enhance the quality of the surveillance. The objective is to identify the specific information provided by the different core principles that is relevant, and characterize how it can be used with FSIs. This involves identifying the information from the assessments relevant to the risk factor being monitored by a particular FSI and providing it in a form that can be used effectively for surveillance. Specifically, it is necessary to first determine what types of information relevant to financial stability needs to be extracted from the assessments; and, second, establish how it can be used in combination with FSIs. This analysis is beyond the scope of this paper and is reported elsewhere,[1] rather, this section will outline how the assessments can help mitigate FSI data limitations.

The focus of core principles assessments is on the effectiveness of financial system oversight rather than on providing a direct assessment of the condition of the financial sector. The core principles assess supervisory procedures and systems to see if they are effective in limiting the risks to financial institutions. Despite this focus on individual institutions, they contribute to the stability of the system as a whole, since they apply to all institutions in a sector. This contribution, however, is more indirect than that provided by surveillance using FSIs since the assessments are concerned with whether surveillance is being done effectively by supervisors.

The nature of the information provide by the assessments determines how the results for specific core principles can support surveillance using FSIs. It can help interpret FSIs in a number of ways. first, it indicates whether data being provided by institutions used to compute FSIs are the appropriate data. Second, it can help establish the underlying cause of observed movement in FSIs when there may be competing explanations. Third, it provides information on the effectiveness of financial institutions' risk management, which helps assess how effectively the banking system can respond to the risk associated with particular values for FSIs. And, fourth, it indicates the responsiveness of the supervisory system to emerging financial sector problems, which reveals how quickly they are likely to be corrected.

Role of Codes and standards assessments

The robustness of the financial system infrastructure can have an important influence on the financial strength and vulnerabilities monitored by specific FSIs. Thus, information on this infrastructure can contribute to the quality of FSIs surveillance. It can be derived from codes and standards assessments and, in the area of market functioning, also from the IOSCO core principles assessment. There are several features of the financial infrastructure that are particularly relevant to the assessment of financial soundness using FSIs: the liquidity infrastructure; the insolvency regime; and the disclosure and corporate governance regime. This section will only briefly outline how the assessments can help mitigate FSI data limitations since a more detailed analysis is provided elsewhere.[2]

The liquidity infrastructure refers to those structural features of the financial system that determine financial institutions' capacity to access liquidity, especially under stressful market conditions. Its relevance derives from the fact that banking crises are often triggered by loss of access to market sources of funding.[3] It includes factors such as how well the interbank market functions and whether banks have large enough, and sufficiently diversified funding sources to be able to absorb the loss of access to any particular funding source or large scale deposit withdrawals. Also important is the robustness or market liquidity in securities markets, as this determines how rapidly and at what discount financial institutions can liquidate their securities holdings in a crisis. A final consideration is the effectiveness of the central bank operating procedures in terms of their capacity to distribute liquidity to the financial sector in a crisis. The surveillance of these sources of vulnerability using FSIs that measure banks' access to liquidity and market liquidity should benefit directly from the information derived from the assessments on the robustness of these sources of liquidity under stressful market conditions.

The insolvency regime influences the banking system's capacity to limit losses in the event of counterparty or customer default by seizing assets or collateral. For example, in a regime that favors creditors (e.g. the UK), banks, losses in the event of default should, in principle, be smaller than in a more debtor-friendly regime (e.g. the US). This information is relevant to the interpretation of FSIs of financial sector vulnerability because, for example, it implies that, in such a regime,

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1   *"Using FSIs to Assess Financial Stability" by R. Sean Craig and V. Sundararajan, prepared for the Conference on Challenges to Central Banking from Gobalized Financial Systems at the IMF on September 17, 2002, and forthcoming in the conference volume.*

2   *"Using FSIs to Assess Financial Stability" by R. Sean Craig and V. Sundararajan.*

3   *This form of financial crisis is more common than the depositor bank run that has thus far received most attention in the theoretical literature on banking crises.*

the impact on capital of a deterioration NPLs would be less than in a debtor-friendly regime (as loss-given-default could be expected to be lower).

Information on the disclosure and corporate governance regimes is important because it allows an assessment of the effectiveness of market discipline. When market discipline is more effective, this creates pressures for the financial system to behave more prudently, which should reduce the risk associated by vulnerabilities identified using FSIs.

VI. Conclusion

The paper outlines a number of approaches to mitigate some of the limitations of FSIs arising from shortcoming in data and the qualitative nature of some information. This work on FSIs has proceeded on two complementary tracks aimed at strengthening their statistical and conceptual foundations. The first track is centered around the preparation of an FSI compilation guide by the IMF Statistics Department. The primary purpose of the guide is to provide guidance to compilers and users of FSIs on the concepts and definitions, and data sources and compilation techniques for the core and extended set of FSIs. The objective is to encourage the widespread compilation, use and dissemination of FSIs, and to improve comparability of FSIs across countries.

The analytic work that constitutes the second track focuses on how the role of FSIs in macro-prudential surveillance can be strengthened by taking into account the relationships among FSIs and by using them in combination with other surveillance tools. Specifically, an analysis of accounting relationships, stress test results and the results of econometric analysis can help clarify the linkages between different FSIs. Stress testing complements the ongoing surveillance using FSIs by providing point-in-time estimates of the potential loss associated with a particular vulnerability. The core principles assessments provide information that enhances users' capacity to assess the risk to financial stability associated with developments in particular FSIs. For example, they also indicate how rapidly and effectively supervisors and financial institutions' risk management are likely to address vulnerabilities identified by FSIs. Information on the robustness of the financial system infrastructure derived from codes and standards assessments complements FSIs covering current liquidity and market liquidity conditions. They help assess the extent to which banks will be able to maintain access to different sources of liquidity or to liquidate their asset portfolios to raise liquidity under conditions of stress.

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Macro-prudential indicators
A pilot compilation exercise for
the Netherlands

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1. Introduction

Macro-prudential risks have increased in recent periods. The unprecedented terrorist attacks in September 2001 have resulted not only in huge human losses, but also in problems for the financial industry. Banks have increased their loan provisions following crises in Turkey and Argentina. More recently, financial scandals involving Enron and WorldCom revealed that some banks and other financial corporations have large exposures on these former giant companies.

Therefore, the need for adequate information on financial markets and economies has further increased. The IMF introduced some years ago the Special Data Dissemination Standard, to which the Netherlands subscribed from the very start. This was followed by discussions about macro-prudential indicators[1]. Theoretical foundations for these indicators have been thoroughly investigated by the IMF, BIS and ECB and the availability of potential indicators has been surveyed.

The IMF encourages national authorities to compile this type of indicators in order to start systematic monitoring of financial soundness and improve the possibilities to execute macroprudential analysis at country level. To increase insight into this matter, it seems useful to explore the practicalities of the compilation of these indicators, which have been renamed *financial soundness indicators (FSI)*. What data are already available; how can we deal with the aggregation problem of available micro-data? These issues have already been investigated by some countries.[2] This is the first attempt for the Netherlands to compile a comprehensive data set of FSIs. This paper will mainly focus on compilation and aggregation issues.

2. Core set of financial soundness indicators

Following discussions about macro-prudential analysis, the IMF has proposed to distinguish between a *core set* of indicators for the banking industry and an *encouraged set*, which includes additional indicators for deposit-taking institutions as well as data on other financial institutions and markets. Taking into account data availability and compilation issues, this pilot exercise focuses on the IMF core set. In the framework of this pilot exercise, only data for 2000 and 2001 are calculated. The greater part of these data has not been published up till now.

A few remarks have to be made before entering into a compilation exercise. At this stage a workable data set is only partly available. To a large extent prudential supervision data can be used. Further, these supervision data can be supplemented by money and banking statistics data, but the latter refer to a different population and are sometimes based on different accounting rules. Improvement of data availability would require reporting of additional data, which is not yet foreseen.

2.1. Capital adequacy

The solvency ratio or *Basel capital adequacy ratio* is, because of its widespread use, probably the indicator best suited for making international comparisons of the capacity of financial institutions to cope with economic shocks. The use of the weighted average ratio for all banks in the Netherlands – and of the Tier 1 capital ratio – as a Financial soundness indicator raises two issues. The

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1 *Macroprudential Indicators of Financial System Soundness, IMF Occasional Paper, no. 192 (2000) and Financial Soundness Indicators: Analytical Aspects and Country Practices, no. 212 (2002).*

2 *See S. Wharmby, Recent Developments in Statistical Requirements for Financial Stability, and their Use. The perspective of a Central Bank of a Developed Country, IFC Bulletin 9, July 2001, pg. 14 – 17.*

IMF core set of FSIs

Capital adequacy	Regulatory capital to risk-weighted assets
	Regulatory Tier 1 capital to risk-weighted assets
Asset quality	Nonperforming loans to total gross loans
	Nonperforming loans net of provisions to capital
	Sectoral distribution of loans to total loans
	Large exposures to capital
Earnings and profitability	Returns on assets
	Return on equity
	Interest margin to gross income
	Noninterest expenses to gross income
Liquidity	Liquid assets to total assets (liquid asset ratio)
	Liquid assets to short-term liabilities
Sensitivity to market risk	Duration of assets
	Duration of liabilities
	Net open position in foreign exchange to capital

first one is the reference population. As usual in the framework of supervision this includes foreign subsidiaries and branches of Dutch banks as the activities of these entities could impair the financial position of the parent substantially. Also included are banks resident in the Netherlands that are owned by foreign parents. From the perspective of financial stability of the Dutch banking system it is, however, the question whether these foreign owned banks should be included. In case a foreign owned bank gets into problems it is the responsibility of the foreign parent to solve these. This is also reflected in the EU home country rule by which solvency supervision is the responsibility of the supervisor authority of the home Member State. Therefore, it is proposed to restrict the reference population to domestically owned banks. For all subsequent indicators this reference population will be used.

Table 1 – Capital adequacy

	2000	2001
Regulatory capital to risk-weighted assets		
All banks		
Average rate (weighted)	11.3	11.5
Average rate (unweighted)	59.3	59.6
Standard deviation	98.1	101.7
Domestically owned banks		
Average rate (unweighted)	35.6	22.8
Standard deviation	70.2	22.6
Skewness	4.7	2.1
Kurtosis	23.9	3.9
Regulatory tier 1 capital to risk-weighted assets		
Average rate (unweighted)	35.6	22.8
Standard deviation	70.5	23.3
Skewness	4.7	2.1
Kurtosis	23.8	3.9

The second issue is the aggregation and the presentation of the Basel ratio. The weighted average ratio, which is usually presented, gives a quick overview of the financial soundness of a national banking system. This weighted number, however, conceals a weaker bank, as its small amount of capital or large risk weighted assets will be evened out by better performing other banks. In order to reduce this disguising effect it is recommended to use an unweighted average, which takes into account the Basel ratios of the banks as such separately. This will be done for all subsequent indicators. As this is still an average, additional information about the dispersion, in particular on the low side, is necessary. For that matter, this need is – and this is a more general observation – limited by

the fact that data on individual banks are not to be disclosed as this information might be confidential and publication might cause potential problems becoming real ones. Statistical measures as the standard deviation and skewness might help to get the required insight, but not in this case. The standard deviation, which was 23 for domestically owned banks in 2001, indicates a wide variability. This was influenced by a particular outlier for the Nederlandse Waterschapsbank, which had a Basel ratio of 81%.[1,2,] A skewness[3] of 2.1 reveals that there is an asymmetrical tail on the right side – reflecting the fact that there are several banks with such a high Basel ratio – but it indicates in this case nothing about the left side, the financially weak spots. However, a large kurtosis of 3.9 indicates that a high number of banks have a Basel ratio near the mean.

2.2 Asset quality

The core set mentions several indicators for measuring the quality of the assets. The amount of *nonperforming loans* is one of them. Data on that subject, which are published by one bank only in its annual report, are not reported to the supervisory authority in the Netherlands. Given the lack of data an alternative would be the amount of provisions for loan losses. In case a bank perceives a risk of non-repayment, the amount of the loan is adjusted downwards; this allowance, which could be lower than the amount of the loan involved, is determined on a statistical basis or per item taking into account collateral. As a percentage of total loans extended to government and the private sector the loan loss provisions by the domestically owned banks amounted in 2001 to 0.6 % with a very small standard deviation.

Table 2 – Asset quality

	2000	2001
Loan losses provisions to total gross loans		
Average rate (unweighted)	0.5	0.6
Standard deviation	0.7	0.8
Skewness	1.5	1.9
Kurtosis	1.5	3.8
Sectoral distribution of loans to total loans		
Average rate (unweighted) *)	29.6	33.0
Standard deviation	30.5	29.5
Skewness	0.8	0.5
Kurtosis	-0.6	-1.1
All reporting banks **)		
Residential mortgages		
Average rate (unweighted)	31.8	37.6
Standard deviation	26.8	30.3
Skewness	0.3	0.0
Kurtosis	-1.0	-1.2
Loans to nonfinancial corporations		
Average rate	30.3	30.8
Standard deviation	30.3	30.9
Skewness	1.3	1.2
Kurtosis	1.2	0.9
Large exposure to capital	N.A.	N.A.

A data limitation also exists with respect to the *sectoral distribution of loans*. Supervisory data give only one important breakdown by activity or subsector of the private sector, namely those on residential mortgages. About a third of the loans has been extended for house purchases. For some banks this percentage is even higher. This large exposure was indeed reason for the Nederlandsche Bank to investigate more in particular the mortgage loan procedures and the real estate market. In Money and banking statistics, data are further broken down by, for instance, non-financial private corporations and households. The reporting population for money and banking statistics, however,

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1 *Nederlandse Waterschapsbank, Jaarverslag 2001, pg. 58.*

2 *For the whole Dutch banking system the standard deviation amounted to 100% as some of the foreign owned banks have very high ratios (up to 475%), mainly because of their relatively low risk weighted assets.*

3   *In case a measurement of skewness is used it should be made clear which coefficient – even by formula -, as there are a large number of them with different result which will be difficult to judge otherwise. The formula used is:*

$$\frac{n}{(n-1)(n-2)}\sum\left(\frac{x_j - \overline{x}}{s}\right)^3$$

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is different from the reporting population for supervisory data, because nonbank subsidiaries are not included in the former. As this information might be very relevant it has to be accepted that this data set is inconsistent with the one used for other indicators. For that matter, in this population residential mortgages also make up a large part.

For *large exposures to capital* an aggregate number does not seem very useful. A low aggregate for the whole banking system conceals whether a single bank has a large exposure. Another issue is what is to be considered a large exposure. In the Netherlands, the banks have to report in general all individual claims above 10% of its actual own funds. However, a bank only needs to provide for additional capital requirement – the exposure considered really relevant – in case the item is more than 25%[1] after taking into account for instance the availability of collateral and the status of the counterparty (is it a bank or not?) and where it is located (inside or outside EC/G10?). This measurement results in a very low number of large exposures, which can not be presented because it involves individual banks. To follow a tougher approach for this indicator would implicitly entail a tightening of prudential supervisory rules, which might complicate things even more..

2.3 Earnings and profitability

As for net income, which is used for calculating *return on assets* and *return on equity,* various measures are possible. For reasons of international comparability, it would seem preferable to focus on normal business, that is before tax, which is subject to national laws, and before (net) extraordinary expenses. However, these items also influence to what extent capital and reserves are strengthened. So, it is not an easy choice. In line with the traditional presentation in the Annual Report of De Nederlandsche Bank, net income after provisions and after tax is used. For domestically owned banks a wide range of return on equity, as indicated by the standard deviation, shows that the profitability differs quite a lot between banks, of which several ones with very low figures.

Table 3 – Earnings and profitability

	2000	2001
Return on assets		
Average rate (unweighted)	1.5	0.7
Standard deviation	1.7	1.0
Skewness	2.2	1.5
Kurtosis	4.7	3.2
Return on equity		
Average rate (unweighted)	14.8	8.5
Standard deviation	9.5	7.7
Skewness	1.1	-0.2
Kurtosis	0.4	0.3
Interest margin to gross income		
Average rate (unweighted)	59.7	63.0
Standard deviation	31.6	29.2
Skewness	-0.3	-0.6
Kurtosis	-1.2	-0.6
Noninterest expenses to gross income		
Average rate (unweighted)	55.0	57.9
Standard deviation	25.3	29.6
Skewness	-0.3	-0.1
Kurtosis	-0.7	-1.1

To interpret *the interest margin to gross income* it is important to know the composition of the banking system. The percentage differs quite substantially per bank depending on its activities (standard deviation of 29). Therefore, it might make sense for a good judgement of this indicator to distinguish between various types of banks. The same applies to *noninterest expenses to gross income,* as this is almost a complement of the former.

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1   *Also in the case all items smaller than 25% add up to an amount over 800% of its actual own funds the bank has to provide for additional capital requirement.*

2.4   Liquidity

Data on liquidity of assets and of liabilities are reported. The Dutch banks have to do this for their domestic entities only, which is in line with the division of labour to the effect that the host supervisor deals with liquidity supervision.

If we accept that the indicator *Liquid assets to total assets (liquid assets ratio)* is derived from another data set than is used for the other indicators the calculation as such is no problem. In the Dutch case, however, a choice has to be made between broad liquidity and cash liquidity. As for the *Liquid assets to short-term liabilities* the problem is that not for all liabilities, for instance savings deposits, a residual maturity is given. The Dutch supervisor assumes for this particular item a risk of withdrawal of 10%; for some other items a similar assumption is made. Taken this into account an amount of short-term liabilities can be derived. Again we have a choice between broad liquidity and cash liquidity.

Table 4 – Liquidity

	2000	2001
Liquid assets to total assets 3)		
Average rate (unweighted)	27.1	21.7
Standard deviation	18.6	15.8
Skewness	0.9	1.2
Kurtosis	-0.4	-0.2
Liquid assets to short-term liabilities *		
Average rate (unweighted)	448.9	160.0
Standard deviation	1079.0	173.9
Skewness	3.7	2.1
Kurtosis	14.7	4.4

2.5   Sensitivity to market risk

Banks in the Netherlands have to report on their interest rate risk with respect to their trading book as well as the nontrading book and off-balance items. Available data, however, do not make it possible to calculate *duration of assets* and *duration of liabilities*.

Table 5 – Sensitivity to market risk

With respect to *Net open position in foreign exchange to capital,* an aggregate number does not seem to be a useful indicator either. It is the position of individual banks that is relevant, not only

	2000	2001
Net open position in FX to capital		
Long		
Average rate (unweighted)	1.4	1.1
Standard deviation	1.9	1.3
Skewness	1.5	2.2
Kurtosis	1.2	5.2
Short		
Average rate (unweighted)	1.2	1.2
Standard deviation	1.8	1.9
Skewness	1.7	2.0
Kurtosis	1.8	3.0

that of the whole system. Therefore, again in addition to the unweighted average, standard deviation and other statistical dispersion measures are indispensable to gain further insight. For that matter, it seems necessary to distinguish between a short and a long position.

3. Concluding remarks

This pilot exercise for the Netherlands makes clear that methodological and practical choices have to be made. For instance, which reference population to take and, given the limitations, which data to use. Currently, the available data sets in the Netherlands for compilation of financial soundness indicators and macroprudential analysis are not consistent. In addition, the data sets might not meet in full the requirements of international comparability, which for that matter still have to be agreed upon. To get a harmonised and ideal data set would imply an additional reporting burden for financial institutions, but public disclosure requirements might help.

Further, this exercise confirms that for proper analysis of FSIs a wide range of descriptive statistics have to be used. A simple use of measures of position, such as mean, could disguise financial soundness problems. Measures of variability and in addition skewness and kurtosis are indispensable.

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Are data sources adequate for the Federal Reserve?

Richard D. Porter (Board of Governors of the Federal Reserve System) [1,2]

Most central banks represented in this session view financial stability from the supervisory prism. Without question this perspective has relevance for the United States as well; here, however, I consider the functioning of asset markets and skirt issues of banking supervision. A key question is the following: What can we learn from financial market quotes about financial stability in the United States? In particular, how well are such markets performing their basic market functions including perceptions and willingness to bear risk?

The question is not one of some esoteric notion of market efficiency but rather one of basic function—performing the basic operations one associates with being a financial entity of a certain type, say, for example, hedging, investment banking, market making—that the institution or collection of institutions is expected to perform. When bad things happen in financial markets and important players loose large sums, do they retreat to the sidelines in the face of large losses that have occurred or continue to function in about the same way as before. [3] Presumably, large losses that create such market disruptions also create market opportunities for new entrants and with sufficient time the market place will resolve the problem and return to something akin to more normal market functioning. But over some time interval, the difficulties created may force the central bank to act to stabilize the situation; it may also have to act in its capacity as the lender of last resort.

Such an emphasis makes sense for a number of reasons. In the United States the basic policy rate for the monetary authority is the short-term interest rate on federal funds, the lending medium between depository institutions. The target funds rate anchors the short-term end of the maturity spectrum for all rates. Moreover, perceptions of its future level, future rates on federal funds, anchors rates going out the maturity spectrum. Since other interest rates in the economy have been largely deregulated for nearly a quarter of a century, differentials between the targeted funds rate (or future expectations of it) and other rates of comparable maturity typically represent risk spreads.

Although the interest-rate channel is important in a well-developed financial environment like that of the United States, if the Federal Reserve changes its policy interest rate and financial markets are strained, the monetary authority may need to supplement its usual information about the interest rate channel with more detailed information on how well financial markets are working themselves. Examples of this phenomenon are easy to come by: (a) in the late 1980s and early 1990s during the Savings and Loan/ Banking crisis when depositories were sufficiently constrained by regulatory and market forces to restrict credit issue in a way that appeared to impact spending, or (b) in 1998 after the Russian default and the subsequent difficulties with the Long Term Capital hedge fund, (c) in the immediate aftermath of the 9/11 terrorist attacks on the World Trade Centers and the Pentagon when the infrastructure for the payments system was severely damaged in New York city.

In such circumstances, an additional set of indicators of such strains may be helpful in guiding monetary policy responses depending on the situation being faced. In the Savings and Loan/ Banking crisis, in which concerns about an impending credit crunch were heightened, detailed information from banks made it clear that weakness in demand was a more crucial factor than supply restraint. The evidence for demand being relatively more important came from the following observation: Although under-capitalized banks were shrinking their balance sheets in the face of a high-level of loan loss provisioning and rising capital (Basel) standards during this period,

well-capitalized banks were tending to invest in securities rather than to lend to businesses. But there was also some evidence that the supply side was a contributing factor to some degree. The survey of terms of bank lending showed that non-price terms on banks' lending to businesses had become more stringent. As another example, in the fall of 1998, the possibility arose that the prospective financial losses by some important financial firms could become sufficiently large so as to impair market functioning for a time and lead potentially to more widespread financial contagion without some monetary policy easing, which, in the event, did occur as the strains in the bond market became ever more conspicuous. At that time, the seizing up of the bond market was reflected in both bid-ask and risk spreads, and in implied volatilities, among other measures routinely monitored. Finally, monitoring bubble or bubble-like phenomena that may engender a financial market collapse requires a comprehensive theory of asset pricing.

From this perspective, Paul Tucker's question about the adequacy of existing data sources can generally be answered in the positive. The Federal Reserve does have access to financial market quotes, which are generally of extremely high frequency. High-frequency information on most financial markets is available from screens, such as Bloomberg, Telerate and Reuters, which display instant-by-instant price quotes together with other newsworthy stories and publicly available releases. This information is routinely supplemented by direct contacts with market participants themselves through the Markets Group at the Federal Reserve Bank of New York, which facilitates routine calls about market conditions twice daily and special surveys on market conditions when unusual market conditions justify them. On the quantity side, our information sources are less frequent but sufficient to give us a sense of balance sheets and impending stresses, though, of course, to the extent that only micro information can truly convey the particular stresses in play, our information is limited. In addition, we are able to draw upon survey information to assess non-price lending terms facing households and firms and household balance sheets.

Typically, we look at an array of interest rate quotes over a wide spectrum of instruments, maturities, and credit qualities for both longer-term corporate bonds and commercial paper and public issues (Treasury and Agency) including indexed debt covering both domestic and international markets. The term structure information for these instruments is massaged to reveal implied forward rates and to closely examine the shape of the term structure and its relationship to ongoing economic developments. These data are supplemented with pertinent information on subordinated debt rate spreads for banks and other depositories, as well credit default swap spreads for a wide variety of financial and non-financial institutions. Shifts in these various measures along with estimates of liquidity (bid-asked spreads, liquidity premiums, transaction volumes) can be used to review market functioning. Also, with Fedwire, we can back out a good deal of information on aggregate volumes as well as some more limited micro information. While much of the focus is naturally on the interest-rate side of financial markets, equities and relevant commodity markets such as that for oil and other basic commodities, also enter into an overall assessment of market functioning.

Typically, we can gauge market uncertainty by looking at volatility (implied using options on futures quotes or realized day-to-day outcomes) and risk appetites on a variety of instruments by comparing various tiers (risk ratings, liquidity) and considering anomalies in the term structure. Against this backdrop, it is also necessary to parse out changes in benchmark interest rates such as Treasuries, agencies or swaps according to that due to new information either in the form of (a) economic surprises, or (b) policy surprises if and when they occur, and that due to other unusual influences, including changes in volatility.[1] For example, by regressing rate surprises, the change in an interest rate registered immediately after an economic announcement, on the economic surprise in the announcement, the difference between the announcement and the expected announcement by experts in financial markets, we can determine whether there is an unusual component in a given economic announcement. Policy chatter is more difficult to gauge but one can usually perform a kind of event study around the time a new piece of information regarding the policy process hits the airwaves. Given the relatively more transparent environment in which monetary policy is now conducted, separating policy developments from other developments has probably become easier. Futures rates on the basic policy rate of the Federal Reserve, the federal funds rate and on Eurodollar futures make it possible to back out the market's perception of relatively near-term policy moves with some accuracy.

Beyond these direct more measurable features of related financial markets, there are also multivariate patterns that are helpful in sorting out how financial markets are functioning. For example, there are cross linkages between financial markets either geographically between advanced or emerging economies or between substitutes such as bonds and equities that often follow recognizable patterns such as flights to liquidity or the reverse.

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1   *I have in mind new developments, such as the revelation during 2002 of faulty earnings information for prior years or the 9/11 attacks, which have sizeable impacts on financial markets either immediately or over long periods of time.*

Discussion Comments

Ivan Alves [1] *(ECB)*

Comments on the first part of the session

One of the difficult challenges confronting statisticians and practitioners in the field of financial stability is the elaboration and effective implementation of monitoring tools and indicators. The three papers presented in the first part of this first session highlight progress made in bridging the gap between micro-based indicators and macroprudential analysis. However, they also serve us as a reminder of further challenges that await us beyond these initial steps.

In particular, the papers provide a good overview of the key issues, touching on the broad scope for the use of the soundness indicators, ranging from a very micro-oriented approach *(Calvo)* to a wider macro/international implementation *(Hawkins)*. They also illustrate in turn inherent difficulties of each type of approach. Whereas working at the institutional level require defining criteria for the performance assessment (for instance calibrating optimality ranges), working at the macro level raises the conundrum of selecting relevant sets of indicators that are sufficiently focal but still cover broad issues. In presenting the different approaches, the papers also highlight difficulties in reaching a consensus on the relevant set, as some of the well know CAMELS micro-based indicators are difficult or impossible to translate to the more macro-based set proposed in work by the IMF which one could coin as "CAELS". Another difficulty uncovered by the presentations involves the extent to which monitoring the soundness of financial sectors can be used to address early warning needs stemming from the policy making process.

The papers also allude to important shortcomings that shine because of their absent coverage, and these precisely embody the more challenging tasks that lie ahead. The first one of these is the difficulty of arriving at a *stable set of criteria* for the assessment of financial fragility (more on this below). Then there is the issue of *interlinkages* in and between financial markets. On this one, while we have somewhat addressed the macro-micro and international relations, we have so far shied-away from constructing a working model of interactions between the different economic sectors and actors that are so relevant for systemic stability. Finally, there is the ever present role of *investors' perceptions*, and our only superficial understanding of the triggers of confidence crisis or of the role of information transmission channels in this process. We furthermore need to do further work in fully accounting for how changes in our indicators themselves can precipitate a crisis.

There are, naturally, specific issues that could enhance the content of the papers. *Mr. Calvo*'s paper could usefully elaborate on how calibration is decided upon and revised, and illustrate where possible the evolution of the CAMELS set prior and during a crisis. *Mr. Caliço* could be less modest about the usefulness of the Central Credit Registry, as it provides unique high frequency data (as far as lending information is concerned), has a wide coverage of sectors, could in principle help in deriving consolidated information, and can be usefully exploited in the context of sectoral stress-testing. *Mr. Hawkings* could further elaborate on the motives and goals of revisions to the BIS methodology he presented, especially regarding the banking sector (incorporation of ratings). He could also usefully illustrate the performance of the scoring model in the recent Argentine and Turkish crises.

Comments on the second part of the session

The second set of presentation are closer to the "bread and butter" of the financial stability work today, in particular that related to macroprudential indicators developed at the ESCB's Banking Supervision Committee. The work can be grouped in two camps, with the papers elaborating on the IMF's framework on the one side, and those based on more autochthonous methodologies on the other. Both approaches have in common the issue of the extent to which micro-based CAELS are useful and the growing need to combine these with additional sources of information discussed in the first part of the session.

Regarding the financial soundness indicators (FSIs) currently under elaboration at the IMF, the papers by *Craig, Elfferich and De Jong*, and *Wood*, provide a good overview of both the criteria for

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1 *The comments reflect the author's personal views and not those of the European Central Bank.*

selecting a core surveillance set, and the problems involved in arriving at a stable and lasting one. The three criteria that seem to emerge from their presentation can be roughly grouped into indicators on *financial strength*, those uncovering the *vulnerability* of financial systems, and those pointing at the *risks* that may lie ahead. Problems on the consistency, relevance and comparability of the indicators are raised explicitly or implicitly in the papers, and are a painful reminder of our own difficulties. In addition to these, one can always add the issue of information availability, which quickly becomes an important bottleneck. Of course, the relative importance of the different components, and the difficulties involved are different across countries, or group of countries, as the characteristics of their financial sectors can vary widely.

The work of the Bank of England and Reserve Bank of India illustrates how heterogeneous and issue-specific approaches provide a lot of insight and make use of alternative sources of statistical information. More specifically, *Mr. Gracie* elaborated on the use of money and banking statistics, information from regulatory activities and BIS data, which combined cover a broad range of issues. These include analysis of consolidated and non-consolidated flows of funds, issues of internationalisation of financial activities, as well as sectoral flows of funds. If one may underline one important pattern to remember, it is the gradual progression from a national to a supra-national sphere of financial activities that we have been witnessing. The more diverse approach presented by the authors highlights the key role of statisticians in developing the information infrastructure supporting the breadth and depth needed in financial stability monitoring. It also stresses some painful issues concerning the confidentiality of data and the growing need for a common regulatory and accounting framework for the collection of information. *Mr. Ravikumar* also highlighted another important aspect of the strategy for the future, namely the importance of an appropriate information infrastructure. While only stressing the preventive supervisory context currently encompassing the use of a sophisticated multidimensional database environment, the additional insight obtained with the use of such multidimensional framework was also keenly illustrated.

Summary comments

As a whole, the presentations have touched on both the important progress achieved and the obstacles still standing in the way of developing a working framework for macroprudential indicators. Indeed, we are gradually coping with disparate and only broadly complementary sources of information emanating from supervisory authorities, unconsolidated central banks' money and banking statistics, and BIS consolidated statistics.

I can think of three key areas that have been identified as deserving particular attention. The first is the wider and deeper co-operation both between statisticians and practitioners and across countries. On both grounds we are confronted with urgent needs, as an appropriate set of indicators necessarily requires a proper understanding of the economic and financial issues involved, the physical, economic and institutional limitations to detailed information sharing, and the ever growing interconnection of global financial markets. The second key issue, and possibly the thorniest, is the need for greater harmonisation of the regulatory framework for collecting statistics, and making these available to a wider audience in multilateral bodies such as the BIS. It is undeniable that in our daily work we are confronted with the need to make comparisons and to set benchmarks, and that both are difficult or outright impossible in an environment of incoherent definitions across countries. The final area concerns the development of appropriate modelling techniques that allow policy makers to have a broader, deeper and timely understanding of relevant developments in the financial markets. And "broader", "deeper" and "timely" are here essential, as all are fundamentally tied to further progress achieved in our statistical frameworks.

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R. Sean Craig (IMF)

The second discussant in Session 2, Mr. R. Sean Craig (IMF), focused on several key themes that each were common to a number of the papers:
1   the importance of using consolidated data to assess risks to financial stability;
2   the analysis of financial strength and vulnerabilities of a financial sector using FSIs should involve disaggregating the FSIs into peer group; and
3   financial market data and early warning indicators intended to indicate the risk of a financial crisis needs to be used in combinations with information on the condition of the financial sector, such as FSIs.

The first theme arose in the context of a discussion of the paper by the B*ank of England* combining publicly available UK monetary data, which is on a residence basis, with BIS consolidated banking data to estimate the domestic and foreign credit exposures of UK banks. Mr. Craig commented that this approach misses credit exposures to UK entities by the foreign branches and subsidiaries of UK banks and that, while this gap in the data may not be that significant for the UK banking system as a whole, it is important for peer groups, such as UK Large Complex Financial Institutions. He also pointed out that similar problems arise when using a credit register to measure banking sector exposures, as described in the paper by the *Bank of Portugal*. Mr. Craig addressed the second theme by highlighting a common lesson of the papers by the *Netherlands Bank*, the *Bank of Costa Rica* and the *Reserve Bank of India*, which all report and analyze indicators of the financial sector – that information on financial structure is needed to identify peer groups and interpret the indicators. With respect to the third theme, the description of how the Federal Reserve Board uses market data to assess financial risks by *Mr. Richard Porter* prompted the comment that the usefulness of market data will depend on the importance of markets versus banks as a source of finance and that FSIs created by aggregating supervisory data are needed to assess risks to the latter.

(Résumé)

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Richard D. Porter[1] (Board of Governors of the Federal Reserve System)

I am pleased to act as a discussant in this second session. I think each of the papers in its own way makes a useful contribution to the session. In total, they indicate the variety of ways that different central banks approach the problem of financial stability, depending in part on their history and experiences and their stage of economic and financial development.

But I do sense that in these papers there is, perhaps, too much *measurement without theory* in Tjalling Koopman's memorable phrase. It is not that one shouldn't approach the issue empirically. Of course, one should. But the economic framework in which the empirical effort is embedded matters as well and should not be overlooked. One typically thinks about financial stability from a quality control perspective: if all of the appropriate financial ratios were to fall within the appropriate bands, then, at least according to the information in hand, the system would appear to be financial stable. While such an outcome might represent some "reduced-form" wisdom of the past, it need not be appropriate any more. If the financial ratios fall out of some general equilibrium process in which in some key conditioning variables have changed, and if we haven't taken those new linkages into account, the benchmarks for the ratios may not embed the wisdom that they once did.

Partly, the argument is the same type of argument that Koopmans was making in his critique of Burn's and Mitchell's business cycle methodology. Their work went against the grain of the empirical approach that the Cowles Commission, which Koopmans headed, was touting at the end of the 1940s. The Cowles Commission demonstrated to the profession how to take the structural approach to economic modeling.[2] The message of the Cowles Commission was that, absent some Wold causal ordering, reduced forms, or correlations, were not the right framework for doing policy analysis. They were insufficient for doing policy analysis with or without the Lucas critique influencing the subtleties of how to undertake the analysis.

Similarly, analyzing financial stability without an understanding of the economic forces that gave rise to it may be a fruitless exercise. Typically in an economic crisis, something occurs that has not been well anticipated – not properly discounted or priced into the analysis. When financial markets wake up to this mispricing, asset prices will move sharply by large amounts. Quotes in financial markets do not embody the correct price until the crisis reveals it. If the mispricing is large enough, then some of the economic rules of thumb that worked before the crisis, including those relevant for keeping track of financial stability, may need to be rethought.

An example of this phenomenon may fix ideas. When in the latter part of the 1990s price earnings ratios rose sharply in the United States was that necessarily foreshadowing a period of financial instability? We can't answer that without more of a context. The fact that price earnings ratios were at stratospheric heights did not by themselves make them unsustainable if a new chapter in the economy were being written, which, say, entailed much higher productivity growth for the indefinite future under a very rosy new economy scenario. Alternatively, the high ratios might simply represent temporary bubble phenomena, which often occur when influential new technologies come forward. My point is simply that that thinking needs to be done in the context of an economic framework, an economic model of some sort, not just an empirical one that can only identify a ratio as being unprecedented statistically.

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Fisher's Short Stories on Wealth 71-74: Prevention of economic waste

Arthur Vogt

Irving Fisher was noted for his scientific contributions in the world of economic science, but he was also well-known to the US public at large for his dedication to the advancement of health, the propagation of prohibition and the creation of the League of Nations – quite generally: for his pursuit of the betterment of mankind. Already in 1890, long before the League of Nations had come into existence, Fisher proposed such a league (Allen 1993:16). With his many crusades (Allen 1993) Fisher "lost" about half of his working time. If he had contributed all of his working time to economic theory, he would have become even more famous as an economist. His scientific "pillars and arches", as Schumpeter called his contributions to theoretical economics, would have grown to a kind of temple of economics (Vogt and Barta 1997:8).

In the present batch of Short Stories, Irving Fisher deals with the economic

Cost of the World War
compared with
the Cost of All the Wars in the World
from 1793 (beginning of Napoleonic Wars) to 1910

23 BILLIONS

ALL WARS
1793·1910

186 BILLIONS

WORLD
WAR
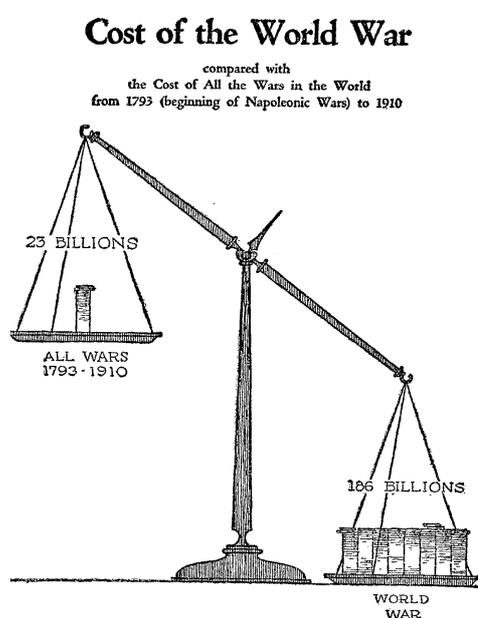
What will "the next war" cost?

Fisher's Short Stories on Wealth, 1926-1933

*Dr. **Arthur Vogt** has drawn our attention to a series of simple explanations of elementary principles of economics which Fisher wrote in an agreement with the Worker's Education Bureau. Fisher called them "Short Stories of Wealth". The bureau issued them monthly for publication in any union newspaper that desired to print them. They appeared in the "Brotherhood of Locomotive Firemen and Enginemen's Magazine", "Trade Union News", "Labor Herald" etc.*

The stories had never been reprinted and had not been included in "The Works of Irving Fisher" (General Editor W.J. Bates, Consulting Editor J. Tobin), which was published in 1997. However, the Stories are worth to be read up to the present day. Besides the scientific and historical interest they are of didactical use as they are models of explaining economic phenomena to the public. The IFC Bulletin decided to publish all these "Short Stories of Wealth"

How Nations Gamble
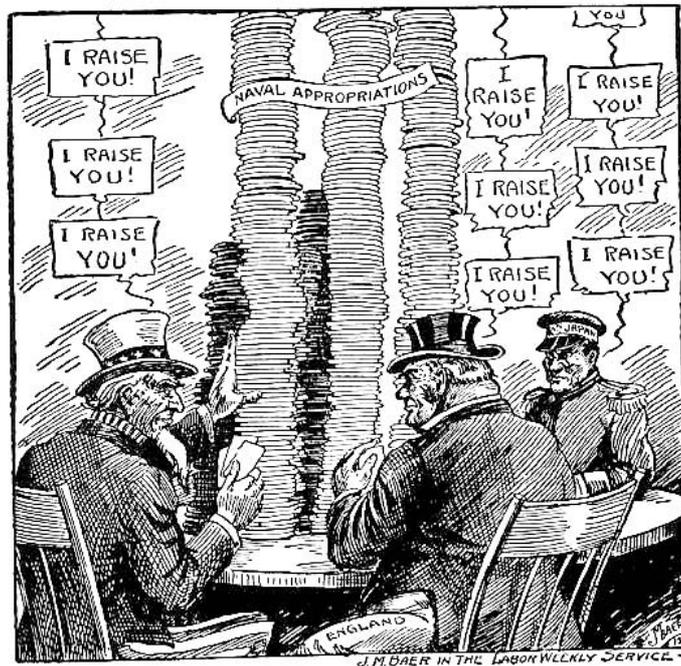
COMPETITION IN ARMAMENTS

waste caused by war, disease and destruction of natural resources. Our introductory remarks will highlight some aspects of Fisher's crusades to promote peace, health and ecology.

War and Peace

Interesting is Fisher's view that wars are largely due to international trade: "The idea that trade will promote peace is all wrong; it promotes quarrels." In this field, Fisher did not see much scope for actions of individuals. But he was a strong advocate of peaceful methods to settle disputes between nations: general agreements to keep peace (in his time: the Kellogg Pact), the World Court for arbitrage between countries, the League of Nations as a forum to discuss problems and formulate remedies, and disarmament agreements (the Disarmament Conference was about to be held in Geneva). Sadly, the prevention of war has not very much progressed since Fisher chose it as a subject for his Stories. In this prelude, we restrict ourselves to presenting a few cartoons Fisher published during the interbellum period to demonstrate the waste by war.

Free medical check-ups

In this prelude, we will mainly give our attention to Fisher's treatment of the waste caused by disease. Otherwise than in the case of war, individuals are often in a position to do something against disease. During his whole life, Fisher took many initiatives to prevent disease and to discourage bad habits. One of the many organisations he founded was the "Committee of One Hundred on National Health", which united many prominent Americans who felt dedicated to improving sanitary conditions. Early in the century, Fisher recommended life insurance companies to reimburse the cost of voluntary periodical medical check-ups to its policy holders. This recommendation was based on the maxim of life insurance companies: "Good health means good business." Good health is a common interest of the policy holder and the insurance company. Nearly everybody will agree that the policy holder's health is of more value than any sum of money, however great. Even the joke of the Scottish widow rather confirms than refutes this proposition, just because it is a joke. That lady, when being paid out the capital on her late husband's policy, said with tears in her eyes to the agent of the insurance company: "Believe it or not, but I would give you back at least half of this money if you could bring my good old Mac back to life again" (Linsmayer 1950).

To help putting his idea into practice, Irving Fisher founded, together with Harald A. Ley, the Life Extension Institute (Story 73). In America the first insurance company offering free medical

Letterhead of the Committee of One Hundred of which Irving Fisher was the President

check-ups was the Metropolitan in 1909. Others followed. The success was great in terms of the health improvement of the policy holders who used the offer of free medical check-ups. It was estimated that 1 dollar spent in these free medical check-ups saved 2 dollars of insurance benefits. However, the success was not great in terms of the number of policy holders using the offer to undergo a periodical medical examination at the company's expense. Less than 8% of the qualified policy holders took advantage of it. The reason for this weak participation was that the insurance company put itself between doctor and policy holder: Metropolitan Life charged Fisher's Life Extension Institute with this, other American companies charged doctors of their choice to do the check-ups (Linsmayer 1950).

In Europe the Swiss life insurance company VITA started the practice of free check-ups in 1925. In contrast to the American practice, the policy holder could choose any doctor, also his family doctor. The doctor was mandated by the policy holder and directly paid by the insurance company (Linsmayer 1950). That is why the quota of the policy holders who used the health examination facility was substantially higher than in America. Initially it was 30% and later even 60%.

The first jogger

Fisher was the first jogger. Once, when he jogged in town, together with his collaborator Cohrsson, a policeman warned them: "Gentlemen, the railway station is in the opposite direction!"

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71. Peace and prosperity

In this Story, Fisher enters upon the question of "wealth and poverty". He discusses three approaches in the field of income and wealth to achieve an improvement (the numbers between brackets refer to the Stories where these approaches are treated):
- raising the average (56-78),
- raising the lowest level (80),
- lessening inequalities (79, 84).

Fisher sees the first of these – raising the average – as equivalent to saving waste. He lists seven waste-saving movements:
1. eradication of war (71, 72),
2. reduction of disease (73),
3. conservation of natural resources (74),

4. promotion of scientific research and invention (75),
5. promotion of scientific management (76),
6. stabilization of monetary units (56-70),
7. reform of the tax system (77, 78).

Number 6, the stabilization of monetary units, was treated in earlier Stories.

72. The economic importance of world peace and disarmament

In addition to the "economic importance" of peace, Fisher, in a letter dated July 12, 1924 to his wife, very personally expressed also the subjective importance of peace: "… in this battle for a warless world I feel that I am needed. The danger of a world war is still with us. We lost our first born through the last war and we may lose our baby (grandson) through the next. Isn't it worth a big effort to prevent such tragedies, not simply for you and me but for millions of others." (Fisher 1947:214).

In his battle for a warless world Fisher wrote books and pamphlets, e.g. Fisher (1923) and – which is its résumé – Fisher (1924).

73. Disease as economic waste

Fisher (1909) treats the subject of hygiene in detail. In common with the present Story, Fisher distinguishes public hygiene, semi-public hygiene and personal hygiene. Public hygiene is provided at the municipal, the state and the federal level. Semi-public hygiene, in his definition, comprises medical research, medical doctors' practices, institutions, insurance companies, voluntary and business organizations. An example of semi-public hygiene in the last-mentioned category is the Life Extension Institute founded by Fisher himself. Categorized as personal hygiene, Fisher treats subjects on which we will come back in the next batch.

Enjoyment constitutes, in Fisher's view, a key economic concept. It is not astonishing to place enjoyment in the rank of key concepts. However, it is typical of Fisher to consider it as a key *economic* concept. Thus, in his Story, he notes that it is the most important end of health to get the maximum of enjoyment with the minimum of effort. Fisher (1906:326) summarized a kind of "algebra for mental experiences" as he did later with respect to price indices. He distinguished objective and subjective magnitudes as well as flows and funds, e.g.:

	Flows *(corresponding to a period of time)*	Funds *(corresponding to an instant of time)*
Objective	The objective income and outgo	The objective mass of capital *(Objective capital stands for anticipated services)*
Subjective	Efforts and satisfaction, being subjective outgo and income	Desirability or utility, being subjective capital, or the subjective esteem in which the capital is held *(Desirability stands for anticipated efforts and satisfactions)*

Fisher (1906) closes this section with a comparison of the objective economic world with the microcosm of the mind of man. This comparison is similar to the one Fisher made in his last, 86th, Story, where he equated the contents of the entire series of Stories with four stages of medicine of the body of man – Anatomy, Physiology, Pathology and Therapeutics (cf. comment to Story 1).

74. Conservation

Conservation, or, in a more modern term, ecology, is another of the many fields in which Fisher was pioneer and crusader. In the present story, Fisher treats four natural resources: water, forest, soil and minerals. He compares their renewal times. The renewal time of water is short, that of forest long and that of soil very long; the renewal time of minerals is infinite.

In an address, Fisher (1911) stated: "As I understand it, the idea of conservation has its center of gravity in our love for posterity". A few lines later, he put in a nutshell the problem of ecology: "We are cutting up our oxen of today, and eating up our seed without much regard for future generations." Fisher (1907:108) applies the motto "After us the deluge" for times that leave little or nothing to offspring and that are characterized by a high rate of time-preference and a high rate of interest.

Fisher thus mentions in the context of conservation the "love for posteriority". In story 28, in the context of interest theory, Fisher mentioned the "love for one's children" as an influence tending to reduce the rate of interest. These two trains of thought are united in the conclusion that a low interest rate favours ecological practice: When interest rates are high, the owner of natural resources tends to exploit them to be able to sell them and to invest the proceeds in interest-bearing assets. When interest rates are low, the owner of natural resources will leave them untouched, to the benefit of posterity.

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Short Stories on Wealth

Irving Fisher

71. Peace and Prosperity[1]

OUR next problem is that of "wealth and poverty." What can be done by way of improving the situation?

We may divide the subject into three heads:

Raising the average of wealth and income.

Raising the lowest levels.

Lessening the inequalities.

First, as to the average: Anything we can do to raise the average economic well-being, we may count as economic gain. This is equivalent to saving waste. So this first problem is the problem of "How to save waste." I have listed here seven great waste-saving movements. We may save economic waste:

- By reducing or abolishing war;
- By reducing or abolishing disease;
- By the conservation of natural resources;
- By the promotion of scientific research and invention;
- By the promotion of scientific management;
- By stabilizing monetary units;
- By reforming our tax systems.

One of these, the stabilization of monetary units, has already been discussed. Let us next take up the problem of how to reduce or abolish war. War is very wasteful economically, to say nothing of its other evils; practically everyone today is agreed that war not only ought to be reduced or abolished, but can be.

To my mind there are two wrong ways proposed. One is that of the pacifist, who wants to get people to agree never to bear arms – never to fight.

This is a religious tenet on the part of orthodox Quakers and some other sects; when war comes it is often a matter of individual, conscientious objection and very often such people are excused from going to war, or are given something else to do than actually fighting – some service behind the lines.

In other cases these people resist any kind of service that would help win a war, and accept imprisonment instead, so that every war results in a certain number of high grade, conscientious, even courageous, people being put in jail, because they have this pacifist dogma by which they swear.

I think pacifism as a doctrine is quite admirable – something to be respected – not laughed at or despised or twisted into an accusation of cowardice. But it is not a very practical solution of this problem of war, for two reasons:

In the first place, you can't get enough people to agree on that solution.

In the second place, to be even more practical, to the extent that any one country should get a pacifist philosophy, to that extent that country is apt to be taken advantage of by other countries.

In a sense of course we are all pacifists – but someone said, "I am a pacifist – with the emphasis on the 'fist'."

This leads us at once to the opposite alleged solution – and that is the solution of "preparedness." I believe in adding to armament if you can't get an agreement not to. Especially I believe in it for the United States, because the United States is so powerful, and so rich, that if we have got to have competition in armaments – if we have got to have a showdown as to the biggest, most fearful navy and army, to make other nations afraid – we have already the strongest potential position in the world.

But preparedness of one nation leads to the preparedness of others, and in the end this competi-

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tion invites war and makes the war bigger when it comes. There is simply more ammunition to shoot off.

The World War was largely caused by that very thing – rivalry between France and Germany with respect to armies, and rivalry between England and Germany with respect to navies.

That's what made the World War so fearful. And yet such competition can't be avoided if you have complete individualism among the nations. As long as you don't have agreement, each nation has got to be individualistic, just as in cut-throat.

72. The Economic Importance of World Peace and Disarmament[1]

IN my last "Short Story" I spoke of the economic importance of World Peace and Disarmament. I pointed out that: "Either we must compete with other nations in armaments or combine with them in disarmament."

Such combined action takes on several forms, of which the following four are proving to be the most important.

The first is a general agreement to keep peace. This is the Kellogg Peace Pact by which every nation renounces war. It is of psychological value in binding each nation, as a matter of honor, to keep the peace.

But it will not solve the whole problem. Quarrels are sure to arise and these have to bet settled by some method. If no peaceful method is supplied they will be settled by war. When a dispute becomes acute there are just ways to settle it. The two nations may fight it out or they may refer it to a third disinterested body. This last is the Court method.

So the second important way of abolishing or abating war is the establishment of a World Court. War comes from the fact that the economic contacts between nations are increased without any corresponding political or judicial relations to take care of the resulting inevitable quarrels.

If you have trade between nations you are going to have quarrels – you can't help that – the only other way would be not to have contacts at all.

The idea that trade will promote peace is all wrong; it promotes quarrels. It may increase the need for peace, but it doesn't, of itself, increase the probability of peace.

The wars we have had – even the great wars – are largely due to trade. The trouble in Manchuria today is primarily a matter of railways, the soy bean, trade, and other trade interests.

When you have trade develop, you have need of some kind of peaceable methods to settle disputes that insure peace, and the court is the best method. So we are just following old traditions when we establish the World Court. America should join this court at once.

It is the institution of courts that is always developed as civilization demands larger and larger areas under peace.

When people say you can't abolish war, I say we have already done it to some extent. We have abolished inter-family war, inter-city war, and inter-State war. We simply haven't yet abolished inter-national war. There is just this one kind of war left as an institution – and that can be abolished by the institution of the court in the same way. When we have done that we have reached the end. For there is no group left to fight. The whole world is in one group. We have a court now to cover the whole world. Unless we are to fight with Mars or some other planet!

But the Pact and the Court aren't enough. You need also some kind of a legislative or conference body – a forum for discussing problems and formulating remedies. The League of Nations provides that. It gets the disputes before they need to go to court – and often settles them out of court. It also helps lay down new rules. It is thus somewhat analogous to a legislative assembly – but it is chiefly important as a forum for discussion. So we see, we need a pact, a court, and a forum, or league.

The fourth method is by agreements to disarm and we are soon to have a Disarmament Conference at Geneva.

So there are at least four sorts of combined action as exemplified by the Kellogg Pact, the World Court, the League of Nations, and a Disarmament Agreement.

A very slight degree of combination will often effect a marvellous prevention of armament. It

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1) *The Lather, Cleveland, Vol. XXXII, No. 6, February 1932, pp. 21, 25.*

was a very simple agreement that Sweden and Norway avoided fortifying their boundary. The same was true as between Chile and the Argentine (as the statue of the Christ of the Andes so eloquently testifies), and as between Canada and the United States – with not a single fortification on 3,000 miles of boundary.

The agreement between Canada and the United States was made in President Monroe's administration by his Secretary of State without even the formality of a treaty, but has endured uninterrupted for over a century. It reads in part as follows:

"The naval force to be maintained upon the American lakes by his Majesty and the Government of the United States shall henceforth be confined to the following vessels:

"On Lake Ontario, to one vessel not exceeding 100 tons burden and armed with one 18-pound cannon.

"On the upper lakes, to two vessels not exceeding like burden each and armed with like force.

"On the waters of Lake Champlain, to one vessel not exceeding like burden and armed with like force.

"All other vessels on these lakes shall be forthwith dismantled, and no other vessels of war shall be there built or armed."

Though no explicit arrangement was made as to destruction of forts, these were presently dismantled and no more built. This understanding (partly tacit only) has saved untold millions of dollars to both Canada and the United States, to say nothing of possibly saving human life.

When war as an institution is wholly abolished by the fourfold method of Pact, Court, League and Disarmament agreement, one of the world's greatest curses and sources of economic waste will have practically disappeared and its disappearance will increase the average wealth and welfare of mankind. We shall no longer fear another world war with its destruction of billions of dollars worth of wealth to say nothing of its destruction of human beings.

73. Disease as Economy Waste[1]

LAST month I spoke of War as an Economic Waste.

Waste. We are all hoping that the Disarmament Conference may result in reducing this waste. This month I shall speak of Disease as another great waste which can likewise be reduced.

We may divide the methods of improving health into three parts: Public hygiene, or the hygiene of the public officers, who provide for sewage disposal, sanitary housing, clean streets, pure air, pure milk and other food, who provide for vaccination, isolation, and so on.

Whenever the hand of the government is felt to help our health, we call that public hygiene.

Then there is semi-public hygiene – the hygiene of large institutions and organizations like hospitals, public schools, business concerns, tuberculosis associations, and the medical profession – added to what the government does.

In particular semi-public hygiene includes the industrial concerns which protect the health of their employees in various ways.

Finally we have personal, private, or individual hygiene, which I regard the most important of the three. In fact, from a practical point of view, I think individual hygiene is the most important matter I can bring to your personal attention, from the standpoint of raising the average well-being of yourself and of society.

When you consider that income is really for enjoyment, the most important thing a person can do is to keep his nervous system in such a condition that he can actually get the maximum of enjoyment with the minimum of effort and get it through the maximum length of time instead of for a short time only.

The average person dulls his nervous system, partly through ignorance, and partly through intemperance and lack of self-control, and therefore is usually miserable when he might be happy.

It is often true of rich people that while they have tremendous incomes on paper, yet in terms of actual enjoyment they get less out of life than the average working man who lives more normally, has physical exercise, not so many narcotics and other evil influences or the unwise utilization or misuse of wealth.

If we were to have a correct analysis of what income is, in terms of enjoyment, and then have a correct understanding of how to obtain that enjoyment we would see that the greatest folly is the

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1) *The Lather, Cleveland, Vol. XXXII, No. 7, March 1932, pp. 21, 25.*

lack of attention to health. As Emerson is quoted saying, "Health is the best wealth."

From the strictly economic point of view, health is fundamental. I wouldn't give up my own health for all the billions of dollars in the world. Even from the standpoint of productive power it has been estimated by Dr. Dublin of the Metropolitan Life Insurance Company that human beings are worth as producing machines five times all other capital put together.

In my National Vitality I estimated in 1908 that at least one and a half billion dollars worth of human life could be saved annually.

A very little investment in health will often produce a vast return. The Rockefeller work in curing hookworm in the South cost less than one dollar per patient and probably added over a dollar a day to his earning power. Here is a return of over 100 per cent per day on the investment. Every one could add to his health and so to his power to produce and consume.

But it is human nature to need a stimulus or prod to do anything; and it is only after personal experience when one finds he is in danger of losing his health that he wakes up a little bit. This is one reason why the greatest step toward inducing individual hygiene is the practice of periodical medical examinations.

I was one of the two men who started the Life Extension Institute for that purpose. The idea has now spread and the whole medical profession now promotes periodical examinations in general.

There are a large number of people, especially in New York, who are getting checked up once a year and gradually change their habits. Practically 100 per cent of the people examined find that there is something wrong, even if very slight. Many take this discovery seriously enough to correct the error in some degree.

We found this to be true. The second annual examination of the Life Extension Institute usually shows that 50 per cent of the defects found in the first year's examination have been corrected. I will say that I have little doubt that if a healthy young man or woman should become enthusiastic (but without first having impaired his or her health in any serious way), he or she ought to double the number of years they can earn and enjoy their earnings. Moreover old age need not mean a period of senility. It should be the happiest part of life. The ordinary person begins to fail along about 40, is an old man at 60, and dead before 70, and during the last 10 or 15 years doesn't enjoy life very much; for he isn't able to produce very much, and has lost his usefulness and capacity for pleasure.

Many people think of life extension as meaning merely to prolong the agony. That is unfortunately often done because so many persons get interested in health only after it is too late. They lock the barn after the horse is stolen. But true life extension means not only increased length, but increased breadth and depth of life. It means that they "live more abundantly."

Some day, let us hope, the majority of people will come to see the emptiness of physical wealth without vital wealth. When that time comes we shall be able to reform human life, drop unhygienic habits, live a balanced life as to work, play, rest and sleep and have a heightened enjoyment which now is known only to a few of us beyond childhood. And health includes moral, as well as physical and mental health.

Any wealth at the expense of health is a delusion and a snare. "What profiteth a man if he gains the whole world and loses his own soul?"

74. Conservation[1]

WE come now to the subject of conservation of natural resources. Under the Roosevelt Conservation Commission there were four subdivisions: forests, soils, minerals and waters.

The point of view of the conservationist is a long-time point of view. Private initiative is always apt to be short-sighted. You can't depend on private initiative altogether. The average man who owns a forest and who is hard up will cut it down even though he may be sorry for it later. Of course, a far-sighted self-interest will sometimes lead to preserving a forest. The owner may say, "I will make more money if I wait, and cultivate," But it is always a temptation to cut and, unfortunately, through our foolish forest tax laws, we encourage early cutting. We put a penalty on waiting, because we tax a man before he gets any results.

It is a case of confusing capital and income – where we tax a man when there is no income. Ideally taxes should be levied on a forest when there is a cut and not until then – but the Government doesn't like to wait, so it assesses the property and charges a property tax.

1) *The Lather, Cleveland, Vol. XXXII, No. 8, April 1932, pp. 27-28.*

But the problem of waiting can often be solved by an equalization fund by which part of a State, such as a county, where forests are allowed to grow without being taxed, is "carried" by the State as a whole, the State being repaid later when the forest is cut and taxed. It is a matter of financing or tiding over. But forestry is an example of the need of far-sightedness, and where the individual hasn't got the far-sighted view it ought to be put into him by education, or he ought, in the interest of the general public, to be prevented from destroying the forest.

In this, as in many other ways, self-interest leads sometimes to disaster. It reacts on the soils also; the preservation of soil by growth of some kind – either forests or crops or grass – is necessary. Soils will wash away if there is no growth.

If there is a forest, or crops, or grass, or plants of any kind, the water seeps through the soil slowly, but if there is a plowed field on a slope you may, if you are not careful, lose all the arable value there by the wash. The late Professor Shaler of Harvard in his book "Man and the Earth," said that one torrential storm on a plowed field will do as much damage as 1,000 years without the plowing. Plowing, by taking away this vegetation, makes it very easily hurt by the rain. It is stated that in China there are great spaces which have become practically desert through devastation or deforestation and the failure to conserve.

Of course, there are various ways of treating the soil surface to help that – terracing, planting, holding flood waters by dams, etc. Largely through Mr. Pinchot and President Roosevelt we have developed big projects of conservation of the soil in all these and other ways.

The minerals are different from the forests and the soils, in that minerals are not replaced. Forests are replaceable. Forestry conservation consists very largely in seeing that replacement is equal to the consumption. Likewise soils are replaceable, and the same thought applies to soil conservation – but minerals are not. Quarries and mines simply take the product away once for all. When a mine is mined, that is the end of it.

Therefore the problem of mineral conservation consists of three parts: first, be sure that there is as little waste as possible in the process of mining or quarrying; second, to see that the mining and quarrying is not too rapid – that you leave something for future generations – do not eat it up faster than you need it; and third, that substitutes are sought and found.

We are using up our petroleum fast, and our natural gas sti11 faster, our coal less fast, and iron still less fast; but sooner or later, of course, we shall use them all up, and the question arises, what are we going to do then? We should be preparing all the time for that rainy day in the history of civilization.

For instance, oil, it is supposed, can be gotten from shales, if we once find a cheap process. This and many others are technical problems constantly arising, and specialists are working on them all the time. So, although it looks as though we are going to be absolutely without fuel in future centuries it may not be so at all.

Unlike forests, soils and minerals, water is automatically renewed. Nature seems to take care of that unaided. Rainfall and evaporation go on in a circle. None is used up. So in this case it isn't a question of making a balance of inflow and outflow, but a question of utilization. Forestry conservation and water conservation fit into each other, because the forest makes the water flow more uniformly. If you take away the forest rain runs off instantly. It may make a torrent and do damage, instead of being harnessed up and doing good. The problem of water conservation is the problem of fitting it in with forest conservation and soil conservation and connecting it up with electric transmission so as best to utilize every part of it. Probably, ultimately we shall get from our water power in this country a tremendously large system of "giant power," connected together by electricity. The problem of water power is already one of the great political problems affecting New York State and many other regions.