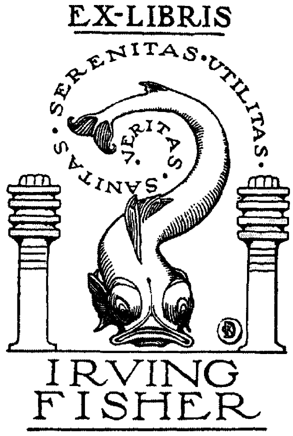
IRVING FISHER COMMITTEE
ON CENTRAL-BANK STATISTICS

ifc Bulletin

No. 23 • October 2005

The Irving Fisher Committee is part
of the International Statistical Institute

Contents



Irving Fisher Committee
on Central-Bank Statistics

Executive Body:
Jan Smets (Chair)
Paul Van den Bergh
Almut Steger
Rudi Acx
Radha Binod Barman
Kenneth Coates
Bart Meganck
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IFC-Bulletin

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*The IFC-Bulletin is
published at irregular intervals.
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Send requests to the IFC Secretariat.*

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No 23 – October 2005

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IRVING FISHER

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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

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. 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.

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 (BIS), which hosted it at its premises in Basle. 160 statisticians representing 73 countries participated. Some 50 papers were presented. In 2004, another IFC "Basel Conference" was held in cooperation with the BIS. Some 150 statisticians, mainly central bankers, and originating from 65 countries, discussed "Central Bank issues regarding Financial and National Accounts" in three sessions and eight workshops.

In 2003, at the 54th ISI Session in Berlin, the IFC participated with nearly 40 papers, presented in two Invited Papers Meetings and three Contributed Papers Meetings. The General Assembly of the ISI accorded to the IFC the Status of an independent ISI Section on a provisional basis up to the 55th ISI Session (Sydney, April 2005).

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. Institutions and individuals active in the field of central-bank statistics can subscribe to the Bulletin free of charge.

Members of the Irving Fisher Committee

Central banks and monetary authorities of

Albania
Aruba
Austria
Bangladesh
Barbados
Belgium
Bolivia
Botswana
Bulgaria
Burundi
Canada
Colombia
Costa Rica
Croatia
Cyprus
Czech Republic
Denmark
Eastern Caribbean
Ecuador
Estonia
Ethiopia
European Central Bank
Finland
France
Germany
Ghana
Greece
Guatemala
Guinéa
Guyana
India
Indonesia
Iran
Israel
Italy
Jamaica
Japan
Jordan
Korea
Kyrgyz Republic
Latvia
Lithuania
Former Yugoslav Republic of Macedonia
Malawi
Malta
Mauritius
Mongolia
Netherlands
Netherlands Antilles
New Zealand
Nigeria
Norway
Oman
Pakistan
Peru
Philippines
Poland
Portugal
Russian Federation
Rwanda
Saudi Arabia
Slovakia
Slovenia
South Africa
Spain
Sri Lanka
Sudan
Switzerland
Taiwan, China
Turkey
Ukraine
United Arab Emirates
United Kingdom
Uruguay
USA – Federal Reserve Bank of New York
USA – Federal Reserve Board
West African States
Zambia
Zimbabwe

Other institutions

Bank for International Settlements
Eurostat
International Monetary Fund
Ufficio Italiano dei Cambi

Message from the Chair of the Irving Fisher Committee on Central Bank Statistics

Jan Smets (National Bank of Belgium)

It is my pleasure to address the readers of the Bulletin for the first time as Chairman of the Executive Body of the Irving Fisher Committee on Central Bank Statistics. I am honoured to have been asked by the Executive Body to take over the chair from Paul Van den Bergh. I would like to thank the members of the Executive Body for their confidence in me to lead the Committee through the challenging but also exciting times ahead.

My chairmanship starts at a crucial moment in the history of the Irving Fisher Committee. Indeed, the IFC currently finds itself at a very important crossroad. Until now, the Committee has operated successfully on an informal basis under the umbrella of the International Statistical Institute and with the active secretarial support of the National Bank of Belgium, one of the founders of the IFC. A number of meetings have been organised since the Committee's founding in 1997 within the biennial ISI sessions (Istanbul 1997, Helsinki 1999, Seoul 2001, Berlin 2003, Sydney 2005). Moreover, the Committee has successfully organised a number of independent events with the assistance of the BIS (Basel 2002 and 2004, Ottawa 2005). The large number of participants at these meetings from all regions of the world, as well as the concrete contributions that many central bank experts have been willing to make as author, discussant, session chair or panellist demonstrates the growing interest that the IFC activities raise in the central bank statistical community.

The Workshop on Data Requirements for Analysing the Stability and Vulnerability of Mature Financial Systems co-sponsored in June 2005 by the Bank of Canada and the IFC has illustrated that the Committee can go beyond the informal organisation of meetings on a general topic of interest to central bank statisticians, to structuring a more organised and policy-oriented discussion on a specific statistical issue of concern to central banks, from either a financial or monetary stability perspective. Indeed, the findings of the workshop, as included in this Bulletin, have already been shared with other BIS-based groups and will provide input into ongoing discussions on improving the data for financial stability analysis in many central banks and international organisations.

It is therefore not surprising that the survey carried out of IFC members in 2004 has indicated that there is a broad consensus on the need to establish a more formal structure for the Committee and to anchor it as part of both the ISI and the BIS. Draft statutes were presented informally to the ISI Executive at the end of last year. Discussions with the ISI Executive and subsequently with the ISI Council have resulted in the IFC receiving provisional official section status for an indefinite period. Formal recognition will be reviewed after the IFC has taken further steps to formalise its internal structure and procedures and after the ISI has conducted its own internal reorganisation (the latter is in progress with a view to formulating proposals in time for the next ISI Session in Lisbon in 2007). Though there were some earlier reservations, the ISI and its various formal sections now recognise the importance of having an active association of central bank statistical experts that can work independently under the auspices of the BIS as well as cooperate actively with other ISI groups.

In order to move forward in a practical way, I have called a meeting at the National Bank of Belgium in October 2005 to discuss the IFC governance issues with the representatives of central banks of the major industrialised and emerging market countries represented in a high-level meeting of central bank Governors at the BIS. This meeting will be the opportunity for the participating central banks to discuss the draft statutes of the IFC and to express their willingness to take the lead in formally becoming institutional members of the Committee. The National Bank of Belgium would be ready to officially approach the BIS on behalf of the central banks represented at the meeting with the request that it takes over the Secretariat for the Committee.

This approach does not mean that institutional membership of the IFC will be restricted. On the contrary, once a core group of sponsors has been established and once the BIS has accepted to provide its support, all central banks will be invited to join the Committee, either through institutional or associate membership. I would also like to invite all central banks or central bank staff who have an interest in the Committee's activities to provide comments and suggestions on the draft statutes. To this end, the draft statutes are reprinted in this issue of the Bulletin. You can address any feedback directly to me or Paul Van den Bergh at the BIS. I should also note that, as envisaged in the draft statutes, all institutional members will be involved in the governance of the IFC in the future and be able to make active contributions to its activities.

Cooperation with other ISI sections is one of the objectives of the IFC and in that context the Executive Body has agreed to support the International Association of Official Statistics (IAOS) in organising its independent conference in Ottawa in September 2006. The topic of this conference is "People on the Move" and the IFC would be willing to sponsor a session on Financial Aspects of Migration: Measuring Remittances. You will find a call for papers for this session in this Bulletin.

Work is also progressing to organise various meetings in the context of the 56th ISI Session in Lisbon in August 2007. The following meetings (Invited Paper Meetings, in which papers are presented by invitation only) are being proposed by the IFC or by other ISI sections in cooperation with the Committee:

- Statistical tools used in financial risk management (IPM 65), tentative chair: P. Van den Bergh
- Measures of output and prices of financial services (IPM 83), chair: R. Barman
- Measures of flows and stocks in financial accounts (IPM 84), chair: R. Acx
- Measuring productivity (IPM 24, in cooperation with the IAOS): chair to be decided
- High Frequency Statistics in Finance (with Bernoulli Society), chair: Per Mykland
- Financial Data Mining and Modeling (with International Association for Statistical Computing, IASC), chair: P. Yu
- Computational Econometrics and Finance (also with IASC), chair: E.J. Kontoghiorghes.

Moreover, the IFC would be ready to propose additional meetings (so-called Contributed Paper Meetings, which are open for any submissions from within the Committee or the ISI more broadly). You will also find a call for papers and suggestions for additional meetings in this Bulletin.

That brings me to the organisation of the third independent conference of the Committee, which the BIS has accepted to host again in Basel in August or September 2006. I would like to invite you to provide us with any suggestions you may have with respect to general topics for the meeting. It would be useful if at least part of the meeting could focus on a statistical issues closely related to ongoing policy discussions in central bank circles related to monetary or financial stability, both in industrial and emerging market countries. The Executive Body/Council will be reviewing the various suggestions and make a decision by the end of the year. Invitations will be sent out to all central banks in early 2006.

Before I close, I would like to thank a number of people for their active contributions to the IFC in recent years. First of all, I would like to express my sincere gratitude to Paul Van den Bergh, Head of Information, Statistics and Administration at the Bank for International Settlements for the prominent role he has played to establish the Committee as a recognised international body of central bank experts interested in statistical issues. In particular, Paul has been instrumental in obtaining the support from the BIS for the Committee's activities. Together with his colleagues in Basel, he has helped to organise the two independent conferences of the Committee as well as the recent workshop with the Bank of Canada. He has also obtained the recognition by the International Statistical Institute of the merit of an active committee of central bank statistical experts operating under the umbrella of both the BIS and the ISI and has demonstrated that the IFC can cooperate closely with other international groups, including the various ISI sections and committees.

I also would like to congratulate Almut Steger for her election to the ISI Council in her personal capacity. Almut chaired the IFC in 2002–2003, in particular ensuring a highly successful contribution by the Committee to the 54th Session of the ISI in Berlin. Together with Marius van Nieuwkerk and Rudi Acx, she also initiated the discussions with the ISI on a more formal role for the Committee under the ISI umbrella. I trust that she will be a strong support of the IFC within the ISI Council and will contribute to umbrella strengthen the cooperation between the IFC and the other ISI sections.

I look forward to the opportunity to meet you in person on the occasion of a future IFC activity.

Jan Smets
Director
National Bank of Belgium

Draft statutes of the [Irving Fisher Committee on Central Bank Statistical Themes]

1. Name

The [Irving Fisher Committee on Central Bank Statistical Themes (IFC)] is a forum for discussion of statistical issues that are of interest to central banks. The [IFC] is a Section of the International Statistical Institute (ISI). The [Committee] has adopted the name of Irving Fisher, an internationally renowned economist and statistician, who has worked on many topics related to economic, monetary and financial stability of interest to central banks. His wide-ranging contributions to economics and statistics and his multi-disciplinary approach serve as an example for the Committee's objectives and activities.

2. Objectives and activities

2.1 The objective of the [IFC] is to provide a platform for the exchange of views amongst central bank economists and statisticians as well as others who want to participate in discussing statistical issues of interest to central banks, including those relating to economic, monetary and financial stability. One key objective of the [Committee] is to cooperate actively with other ISI sections and committees to discuss issues of common interest. The [Committee] is also ready to cooperate with central banking groups, at the BIS or elsewhere, that have an interest to explore particular statistical issues of interest to central banks. The [Committee] seeks to associate, amongst others, experts from international organisations, financial regulatory agencies, the academic community and the private financial sector with its work.

2.2 The [Committee] will, in particular, strive to strengthen the relationship between compilers of statistics and the community of users and analysts of statistical information, both in central banks and outside. Whilst the [Committee] will be able to discuss a broad set of methodological statistical issues of interest to central banks, it will avoid duplicating the activities of existing international bodies responsible for the development or implementation of international statistical methodologies.

2.3 In order to realise its objectives, the [Committee] may:

a) sponsor, or co-sponsor with other ISI Sections, meetings in the context of the biennial ISI Sessions;
b) organise conferences, seminars, workshops, lectures or related activities independently or in collaboration with other organisations, including other central banking groups or ISI Sections;
c) set up ad hoc working groups or task forces to analyse a particular topic;
d) collaborate on particular statistical issues with international, regional and national organisations and institutions having objectives consistent with those of the [Committee], including other central banking groups or ISI Sections;
e) support or sponsor the publication of periodicals, papers, reports or newsletters under any form independently or in cooperation with other organisations, including other central banking groups or ISI Sections;
f) maintain a public or restricted website to post information related to the [Committee's] activities;
g) undertake or participate in any other actions necessary for the advancement of the objectives of the [Committee].

3. Membership

3.1 The [Committee] has three categories of members, without any restriction on the number in each category:

a) Institutional members, which will be central banks or international and regional organisations formally involved in central banking issues. Each institutional member will be entitled to designate up to five representatives at any one time who will all be entitled to participate in the activities of the [Committee]. One of the designated representatives will act as official contact for the correspondence with the Committee and represent his/her institution in the [IFC] Council. Institutional members will pay a yearly institutional membership fee.

b) Associate members, who will be entitled to participate in most of the activities of the [Committee]. They will consist of economic or statistical experts from international organisations, financial regulatory agencies, the academic community and the private financial sector. They can also include experts from central banks which do not want to become institutional member or staff of institutional members who prefer to register their membership on an individual basis. Associate members will pay a yearly associate membership fee.

c) Honorary members, which will be elected as a recognition of their outstanding contributions to the work of the [Committee]. An honorary member is elected for life and has the same rights and privileges as an associate member whilst being exempt from paying membership fees. Honorary members are elected by a unanimous decision of the Council.

3.2 Membership will be terminated either by resignation, or by the non-payment of the membership fees during the preceding calendar year, or for other reasons as may be prescribed by the Council.

4. Governance of the [Committee]

The governance structure of the [Committee] consists of the Council, the Executive and the Secretariat.

4.1. The Council

a) The [IFC] Council is the decision-making authority of the [Committee]. It is composed of the [Committee's] institutional members. Though the Council will strive to decide on the basis of unanimity, any member can request a vote. Each institutional member has one vote and a simple majority decides. Council decisions, with or without vote, can be made by mail, including e-mail, or during Council meetings.

b) As a rule, the Council will meet at least once every year. Each institutional member will be represented by its official contact or another designated representative. The location and venue of the Council meetings is proposed by the Executive.

c) The Council will review and identify statistical issues of interest to central banks, agree and prioritise the [Committee's] activities, initiate particular activities, and decide on the [Committee's] strategic orientation. The Council elects the Chairperson and Vice Chairpersons as well as the honorary members. Changes to the [Committee's] statutes will also be agreed in the Council, in line with art. 6 of the Statutes.

d) All members and the ISI [Permanent Office and Executive Committee] will be notified of decisions made by the Council.

4.2. The Executive

a) The Executive will manage the affairs of the [Committee] in accordance with the Statutes and the decisions and guidelines of the Council.

b) The Executive will comprise the Chairperson, a maximum of four Vice Chairpersons, and the Secretariat. The Chairperson and Vice Chairpersons will be elected for a term of three years and have overlapping terms. The Chairperson and Vice Chairpersons shall have balanced representation from different geographical areas and from major financial centres and emerging markets. Representation on the Executive will be ensured of at least one of the central banks of the countries in which a future Biennial Session of the ISI is scheduled to be held.

c) The Chairperson will be a senior central bank executive, preferable someone with responsibility of research and statistics in his institution and experience in international central bank cooperation. He/she will be the spokesperson and official representative for the [Committee], in particular vis-à-vis the organs of the ISI. The Chairperson chairs the meetings of the Council. He/she keeps the Vice Chairpersons informed of all important [Committee] matters and consults them on a regular basis. Meetings of the Executive will be organised regularly, usually through teleconference.

d) The Vice Chairpersons assist the Chairperson and the Secretariat in identifying issues of interest to the Committee. Upon the proposal by the Chairperson they may also take on the responsibility for a particular activity of the [Committee] or the liaison with a particular ISI Section or committee or another central banking group.

4.3. The Secretariat

a) The Secretariat of the Committee will be provided by the Bank for International Settlements (BIS).

b) The Secretariat will prepare the meetings of the Executive and the Council as well as the various activities of the [Committee]. It will maintain the records and correspondence of the [Committee].

c) The Secretariat will liaise with the ISI Permanent Office, which will provide it with general advice and guidance in administrative affairs. In particular, the Permanent Office will act as a liaison between the IFC and the organs of the ISI such as the Executive Committee, the Council, the General Assembly, and the Organising Committees for the biennial sessions of the ISI and for other joint meetings with the ISI or its Sections. The Secretariat will also liaise with other central banking groups, at the BIS or elsewhere on matters relating to central bank statistical themes.

d) The Secretariat will act upon instruction of the Executive, and, through it, of the Council. It will maintain complete neutrality in matters relating to the [IFC's] activities and regarding the views and interests of institutional members.

5. Finance

a) The [IFC] is a non-profit organisation. Its financial resources will consist of membership fees, donations, profits from publications, income on reserves and other contributions.

b) The membership fees, which may be different for institutional and associate members, will be set by the Council upon proposal of the Executive. The fees shall be collected by the ISI Permanent Office in accordance with its Statutes.

c) The members of the Executive will serve without compensation.

d) The accounts of the [Committee] will be managed by the ISI Permanent Office. They will be reviewed once a year by the Council.

6. Amendments of the Statutes

Proposals to amend the Statutes may be made in writing to the Chairman of the Committee by any institutional member. Proposed amendments shall be considered by the Executive. If approved by the Executive, it will be submitted to the Council which can adopt them with a two-third majority vote. A notification of any finalised amendments will be presented to the ISI Executive Committee.

The dissolution of the [Committee] or the alteration of its name shall be treated as an amendment of its Statutes.

7. Language

The working language of the [Committee] will be English.

Annex 1

The yearly membership fees as of the 1 January 2006 are:

a) Institutional members: Euro 250,-

b) Individual members: Euro 30,-

IFC Conference, Basel
August/September 2006

Call for Topic Suggestions

Name: ……………………………………………………………………………………….

Title / Function: ………………………………………………………………………………

Organisation / Institute / Company: …………………………………………………………...

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Address: ………………………………………………………………………………………

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Telephone: …………………………………………………………………………………….

Fax: ………………………………………………………………………………………..

Email: ………………………………………………………………………………………..

☐ I would like to suggest the following topic(s) for the conference

………………………………………………………………………………………..

☐ If this topic is selected, I would be interested in presenting a paper

Topic of paper ………………………………………………………………………..

Please return this form to the Contact address:

Ms. Madeleine Op't Hof and Mr. Christian Dembiermont
Bank for International Settlements
Centralbahnplatz 2
CH-4002 Basel
Switzerland
Tel: 41 61 2808335
Fax: 41 61 2809100
Email: madeleine.opt-hof@bis.org and Christian.dembiermont@bis.org

IAOS Conference "People on the Move", Ottawa, 6–8 September 2006

IFC Session on Financial Aspects of Migration: Measuring Remittances
Session Chair:
João Cadete De Matos, Banco de Portugal
Call for Papers

Name: ……………………………………………………………………………………….

Title / Function: ………………………………………………………………………………

Organisation / Institute / Company: …………………………………………………………...

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Address: ………………………………………………………………………………………

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Telephone: …………………………………………………………………………………….

Fax: ………………………………………………………………………………………..

Email: ………………………………………………………………………………………

☐ I am interested in participating in the Session

☐ I am interested in presenting a paper

Topic of paper ……………………………………………………………………...

☐ I am interest in acting as a discussant ……………………………………………….

Please indicate how you would like to receive more detailed information on the Conference:

☐ By e-mail ☐ By fax

Please return this form to the Contact address:

Ms. Madeleine Op't Hof and Mr. Christian Dembiermont
Bank for International Settlements
Centralbahnplatz 2
CH-4002 Basel
Switzerland
Tel: 41 61 2808335
Fax: 41 61 2809100
Email: Madeleine.opt-hof@bis.org and Christian.dembiermont@bis.org

56th ISI Session in Lisboa, August 2007

Call for IFC Sponsored Contributed Paper Meetings (CPMs)

Name: ……………………………………………………………………………………….

Title / Function: ………………………………………………………………………………

Organisation / Institute / Company: ……………………………………………………………...

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Address: ………………………………………………………………………………………

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Telephone: …………………………………………………………………………………….

Fax: ………………………………………………………………………………………..

Email: ………………………………………………………………………………………

☐ I am interested in organising a Contributed Paper Meeting

Title of the CPM ………………………………………………………………………

☐ I am interested in presenting a paper in a Contributed Paper Meeting

Title of the CPM/paper …………………………………………………………………

Please return this form to the Contact address:

Ms. Madeleine Op't Hof and Mr. Christian Dembiermont
Bank for International Settlements
Centralbahnplatz 2
CH-4002 Basel
Switzerland
Tel: 41 61 2808335
Fax: 41 61 2809100
Email: Madeleine.opt-hof@bis.org and Christian.dembiermont@bis.org

56th ISI Session in Lisboa, August 2007

Call for Papers of Invited Paper Meetings (IPMs)

Name: ……………………………………………………………………………………………….

Title / Function: ………………………………………………………………………………………

Organisation / Institute / Company: ……………………………………………………………...

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Address: ………………………………………………………………………………………………

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Telephone: …………………………………………………………………………………………….

Fax: ………………………………………………………………………………………………..

Email: ………………………………………………………………………………………………

☐ I am interested in participating in an IPM

Title of the IPM ……………………………………………………………………………

☐ I am interested in presenting a paper in an IPM

Title of the IPM/paper …………………………………………………………………….

The list of IPMs sponsored by IFC can be found in the Chair's Introduction in this volume.

Please return this form to the Contact address:

Ms. Madeleine Op't Hof and Mr. Christian Dembiermont
Bank for International Settlements
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CH-4002 Basel
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Proceedings of the Bank of Canada/ Irving Fisher Committee Workshop on:

"Data Requirements for Analysing the Stability and Vulnerability of Mature Financial Systems" Ottawa, 21 and 22 June 2005

Overall summary, Governor's speech and introductory remarks

Session 1:
What information is needed to properly address financial stability and vulnerability issues?

Session 2:
What is the usefulness of existing statistical frameworks and of new initiatives currently being taken?

Session 3:
What are the data gaps regarding banking institutions and how can they be narrowed?

Session 4:
What are the data gaps regarding non-bank financial institutions and how can they be narrowed?

Session 5:
What are the data gaps regarding non-financial sectors and how can they be narrowed?

Session 6:
What is the availability and usefulness of data on financial infrastructures?

Session 7:
What data do we need on financial markets and how can they be obtained?

Session 8:
Can improved disclosure/transparency as well as innovations in technology and financial products be expected to improve the availability of relevant financial data?

Session 9:
Panel discussion: Improving financial data: what are the priorities and what steps can be taken to achieve progress allowing for budget constraints?

Overall summary, Governor's speech and introductory remarks

Overall summary of the workshop
Brian O'Reilly (Bank of Canada) and Paul Van den Bergh (BIS)

Governor's speech
Mr. David Dodge (Governor, Bank of Canada)

Introductory remarks to the workshop
Mrs. Sheryl Kennedy (Deputy Governor, Bank of Canada)

Overall summary of the workshop

Brian O'Reilly (Bank of Canada)
and Paul Van den Bergh (BIS)

In 2005, the Bank of Canada (the Bank) and the Irving Fisher Committee jointly sponsored a workshop on "Data Requirements for Analysing the Stability and Vulnerability of Mature Financial Systems" held at the Bank on 21 and 22 June. The workshop brought together senior representatives from selected central banks, national statistical offices, the academic community, and the private sector from countries with mature financial systems, as well as officials from international organisations, to examine the current and future challenges for meeting the data requirements for financial system analysis and possible measures to improve the availability of data in key areas.

The workshop began by examining the definition of financial system stability and identifying the framework and concepts for determining the type of information required by policy-makers and analysts. Session 2 reviewed the usefulness of existing statistical frameworks or data sources for analysing financial system stability, as well as initiatives already under way to improve data availability. Sessions 3 to 7 examined the various elements of the financial system in a more detailed and systematic way, covering in turn: banks, the non-bank financial sectors, the non-financial sectors, financial infrastructures, and financial markets. Session 8 focused on whether improved disclosure/transparency and innovations in technology and financial products would be likely to improve the availability of relevant financial data. The workshop closed with a panel discussion on the priorities for improving the availability of relevant financial system data and on the concrete steps that can be taken to achieve progress at reasonable cost.

Background papers by various workshop participants facilitated the discussions. These discussions were guided by questions posed by Sheryl Kennedy, Deputy Governor, Financial Markets, Bank of Canada, in her introductory remarks and by observations made by Bank of Canada Governor, David Dodge, in his dinner speech. Both the Governor and the Deputy Governor reminded participants that central bankers were concerned with the efficiency, as well as the stability, of the financial system and therefore participants should consider both perspectives when discussing data needs. The Deputy Governor encouraged the workshop participants to discuss whether there was a consensus on the purpose of financial system data; the type of data needed; major gaps in the data; and best practices for obtaining adequate data. The Governor outlined several principles that he saw as relevant to determining statistical priorities, such as not letting the best become the enemy of the good; cross-country data comparability; and the importance of co-operation among users and suppliers of data. On this last point the Governor noted that the Irving Fisher Committee not only contributed to the efforts of central bank statisticians to learn from one another but could also help them find ways to better manage demands from external agencies.

Participants covered a wide range of issues in their discussions under the leadership of the chairs for each session. Chairs identified specific issues for discussion prior to the workshop, together with specific participants to be lead interveners to introduce these issues. Chairs also summarized the discussions in their respective sessions, and these summaries are included in this *Bulletin*, together with the background papers and other workshop documents. As noted by David Longworth, Deputy Governor, Financial System, Bank of Canada, in his closing remarks, a number of common themes emerged from the workshop.

One such theme was that workshop participants could find no universally shared definition of financial system stability and efficiency, a conclusion which is consistent with the literature to date. However, a framework for conducting analysis on these topics is gradually emerging, based on the key elements of a financial system: namely, financial institutions, financial infrastructures, financial markets, and the non-financial sectors in the economy that use the financial system. Understanding of the possible interrelationships and transmission mechanisms among the key elements of the financial system is also improving. As a result, there are useful pointers to what financial data are needed.

Another common theme was that existing data sources provide a large set of useful information. These sources include the national and financial accounts, balance of payment statistics, money and banking statistics, the BIS international financial statistics, and various commercial databases. Other current initiatives were noted, including the IMF's financial soundness indicators, that would deliver additional useful data. Nevertheless, it was felt that these data, by themselves or in their current formats, do not suffice for a full in-depth analysis of financial stability and efficiency, particularly for mature financial systems characterised by rapid innovation, ongoing changes in financial market structures, and increasing internationalisation.

Fortunately, there were many examples of how existing data could be better exploited, including:

- the development of centralised securities databases (security by security) on the basis of information from commercial data vendors or market infrastuctures;
- the sponsoring of household surveys to improve the understanding of the overall distribution (particularly the tail of the distribution) of their liabilities, assets, income, and debt-service levels;
- the mining of transactions data in payment and settlement systems and other financial infrastructures to understand the microstructure of financial markets and to understand transaction patterns, in normal circumstances, as well as in stress situations;
- the use of price data for financial instruments to derive measures of credit risk, risk aversion/appetite, or even composite indexes of financial stability.

In many cases, central banks had been innovators in developing better data on the basis of existing sources or statistical exercises, and they would clearly benefit from each other's experience. Discussions with market participants, the academic community, other national statistical agencies, and international organisations in order to share experiences and best practices, were also seen as valuable.

Not surprisingly, the workshop identified a number of data gaps, several of which had been recognised in other forums or meetings. These included:

- timely and relevant balance sheet data for, and exposures of, non-bank financial institutions, including hedge funds and large complex financial institutions;
- more detailed and timely data on the financial positions of households and of the non-financial corporate sector, including small and medium-sized enterprises;
- relevant data from financial infrastructures other than payment and settlement systems, such as trading platforms, netting schemes, collateral arrangements, clearing houses, or custody and correspondent banking relationships;
- more refined data on counterparties and risk exposures (operational, market, and credit risk) in financial markets, as well as measures of financial market liquidity.

A number of common themes also emerged that were not directly related to particular data needs or key elements of the financial system. For example, there were interesting discussions on the need to combine hard data with soft data; e.g., based on market intelligence or informal surveys. But workshop participants agreed that appropriate interpretation of the data, particularly soft data, required people with the right mix of experience, skills, and knowledge and that the sum of anecdotes did not equal hard data.

The issue of cost vs. benefit of any new, or even existing, statistical exercises came up repeatedly during the discussions. Participants agreed that the cost-benefit analyses should take into account not only the cost of collecting, processing, maintaining, and disseminating data, but also the burden imposed on those required to provide the data. They agreed that substantial efforts should be made to fully exploit not only statistics provided as final outputs under a particular framework (for example the system of national accounts framework) but also statistics used as inputs in constructing these final outputs. In addition, co-operation among agencies gathering statistics, both domestically and across countries, was felt to be key to controlling costs and getting full benefits.

Finally, there was a feeling that better technology, more complete financial markets and improved disclosure – including disclosure of internationally comparable accounting information – could enhance the availability of useful and timely data in the future. It should be possible, for instance, to link data on securities issues with the balance sheets of the firms that issue them. Technological developments that had raised the prospect of fast, easy, and cheap data and metadata in the past had sometimes been disappointing. At the same time, the advents of web technology and of new standards for exchanging statistical and accounting data were seen as promising.

The type of additional data ultimately desired varies across countries, depending on existing sources, priorities in analysis and research work, legal constraints, and cost-benefit analyses. Central banks are, however, increasingly facing similar challenges in adapting the statistical datasets and tools they need to support their mandate with respect to financial system stability and efficiency. They will continue to benefit from exchanging views on these important issues, and the Irving Fisher Committee can help to facilitate this exchange in the future.

Brian O'Reilly (Bank of Canada) and Paul Van den Bergh (BIS)

Remarks to the Bank of Canada/ Irving Fisher Committee Workshop

David Dodge (Governor, Bank of Canada)

I am delighted to be with you this evening, and I hope that your time with us during this workshop will be enjoyable and instructive. I should tell you that I'm very interested in what you are doing. And I'm truly sorry that my schedule today did not allow me to attend any of the sessions. But I'm told that you had good presentations and a lively exchange of views on a number of issues of great import to us all.

As central bankers, the statistics we require are fundamentally determined by what we are expected to do under our mandate. Besides keeping inflation low and stable, many central banks are also charged with promoting the efficiency and stability of their national financial systems. And some are expected to regulate financial institutions. In carrying out these responsibilities, central banks collect, and often generate, great amounts of statistical information.

With very few exceptions, these data are a public good. And so it makes sense that central banks should make this information accessible to researchers and the public in a convenient format. Indeed, we could do more to share the data we collect while, at the same time, making the most of limited national statistical resources. Central banks that are regulators, in particular, produce vast amounts of statistics that could be shared. But legal changes may be needed to allow the sharing of such information. And, of course, we should ensure that the data are aggregated and presented in a meaningful way that maximizes their value for the user by drawing on, and relating them to, other data collected by our national statistical agencies.

As I said a moment ago, the data requirements of central banks are primarily driven by their responsibilities with respect to the pursuit of price stability and the promotion of an efficient and stable financial system. For this particular workshop, the emphasis is on the data requirements for the financial system function. So is the focus of my remarks tonight.

Central banks have had a long-standing interest in promoting the efficiency and stability of their national financial systems. This objective has not changed all that much over time. But the way we organize ourselves to work has clearly changed. An obvious reason for this is that, with globalization and with growing trade and capital flows, our economies are continuously evolving and becoming more interdependent. As policy-makers, it is very important that we have a good understanding of how, and to what extent, these forces are likely to affect the achievement of our objective with respect to the efficiency and stability of the financial system, so we can adjust our policies accordingly. Identifying the sources of potential challenges and threats to our objective, and determining how we should adjust to changes, is quite a task. But finding ways to measure the effects of changes in our economies and in our financial systems is no less important or complicated a job.

So what are the broad trends and challenges with respect to the efficiency and stability of the financial system today? And what do they mean in terms of our data requirements?

Financial liberalization has led to tremendous growth in global financial activity and to more integrated financial markets. With the growth in the operations of cross-border firms, the demand for financial services has also risen. And in many countries, there has been a merging of the traditional segments of the financial sector and a proliferation of financial products, including derivatives and hybrids.

With globalization, and with increasingly complex financial markets, the effects of financial disturbances have also tended to reverberate around the world. Concern about these spillover effects has led to efforts to strengthen the ability of central banks to understand the implications for the efficiency and stability of domestic financial systems. Investors everywhere now demand more and better information about the behaviour of industrial and financial enterprises. After the Asian crisis of 1997–98, which highlighted the lack of transparency and the insufficient surveillance of financial systems in several countries, national authorities (including central banks) dedicated more resources to studying the workings of financial systems and communicating that information to the public.

Today, the key policy objectives of the various national agencies that are charged with setting standards and codes for the financial system are: safety, soundness, and efficiency. For no economy can function well unless supported by a robust, efficient financial system and by sound financial institutions that can help to appropriately channel savings and investments.

Central banks take a system-wide approach to financial efficiency and stability. Because of this, our focus is on the nature and causes of vulnerabilities that could have system-wide implications. Once such vulnerabilities have been identified, we would then work with other standard-setting bodies to find ways to deal with them and to limit any negative effects on efficiency.

In this context, data increase our ability to monitor the financial system and its major components – financial institutions, financial markets, and financial infrastructure – from the perspective of stability, efficiency, innovation, and quality of regulation. We also need data that would allow us to have a better understanding of the investment decisions and of the risk-taking behaviour of non-financial firms, the household sector, and, I dare say, the government sector.

To better understand financial behaviour and its implications for efficiency and system-wide vulnerabilities, we need to link financial market data (such as new issues, and secondary pricing, of bonds and equities) to industry or sector characteristics and also to economic activity more generally. In our experience, this has proven to be a rather cumbersome and time-consuming exercise. This is unfortunate because if we had been able to cross-reference financial and economic data, we would probably have been able to explore, in a more scientific manner, questions of financial vulnerability. And so this is where I see closer co-operation between central banks and national statisticians as being vital.

From a monetary policy perspective, high-quality data on the financial condition of households will always be a priority, given the implications for consumer spending and for overall economic performance. But at a time when households have taken on increasing amounts of debt in response to low interest rates, it is particularly important that we have a good handle on household sector balance sheets in order to identify potential vulnerabilities in the financial system. Unfortunately, the availability of data in this area is far from optimal. Moreover, published Canadian non-proprietary data do not allow the development of a disaggregated picture of the financial situation of households.

Fluctuations in asset prices have recently become a more prominent feature of the economic picture. Because property is by far the world's largest asset class, it is not surprising that movements in the real estate market have been attracting a lot of public attention. What is surprising is that there are no comprehensive quality-adjusted data on housing prices and rents, even though in most countries investment in housing is a major portion of household spending and, for most people, their homes represent their most valuable asset. So, there is an urgent need to expand our limited international experience in constructing standardized housing price and rent indexes. The IMF-BIS initiative to encourage improvements in the collection and dissemination of such data is helpful. Given how often real estate booms have triggered banking crises around the world, this issue is clearly very important from the point of view of financial system stability.

From a public-good perspective, it would also be useful if a broad representation of relevant domestic parties (central banks, regulatory bodies, statisticians, etc.) could work together to define needs and to share expertise on financial statistics. Such groups could also share knowledge on international initiatives currently underway to improve data on the financial system. As you know, the IMF is coordinating a project to develop national Financial Soundness Indicators. The BIS is planning to provide consolidated cross-border banking exposures on ultimate risk. The Financial Stability Forum is monitoring the consistency and comprehensiveness of international financial standards and codes. And the Irving Fisher Committee (IFC) provides a forum for central banks to learn from one another (as in this workshop), so we can make the most effective use of our limited resources to construct the databases we need. Given that all of these international initiatives essentially draw from the same pool of resources, I believe that some effort to coordinate demands is appropriate. Discussions within the IFC may help central bank statisticians to find ways to better manage demands from other external agencies.

The other issue here is that, in order for data to be useful for policy-making purposes, we should try to standardize and make them as comparable as possible across countries. I'll have more to say about this in a moment.

This brings me to the final part of my remarks. Here, I intend to stay away from specific data requirements. Instead, I would like to highlight some of the general principles that I see as relevant in guiding discussions and determining statistical priorities in the future. You may have heard me mention them before – in a speech to the Conference of European Statisticians, two years ago. They are still every bit as relevant today.

The first principle goes like this: ***Don't let the best become the enemy of the good***.

We central bankers have to make decisions in real time and often under less-than-ideal conditions. For this type of decision making, we need the best *available* information.

We simply cannot afford to wait for *the* absolute best.

The second principle has to do with ***cross-country data comparability***. With national economies and financial systems becoming increasingly integrated, central banks have to rely more and more on information and concepts from other jurisdictions to read the trends and to figure out what is going on in their own economies. For this exercise to be effective, data need to be internationally comparable. Comparability is important because we use cross-country variation as a way of identifying and distinguishing between hypotheses as to what is working and what is not. If we cannot compare the data, we lose a major source of identification of the cross-country differences that are relevant to the decision-making process. We also lose a valuable yardstick for measuring our performance relative to other countries. But as important as this is, we should not lose perspective and put the comparability principle above all else. Again, central bankers cannot afford to wait until they have *the* best, most comparable data.

Finally, I would highlight, as a third principle, the importance of ***co-operation among users and suppliers of data***. The demand for additional, more timely, and more accurate information keeps growing. Given staffing and financial constraints, we all need to use our resources more effectively. All the more reason then to work “smart,” by pooling resources on how to address common data challenges. Another thing to keep in mind here is that, as firms become global, they report in different ways to many different statistical agencies. We could gain a better understanding of the operations of these firms by pooling our resources. Co-operation would also be helpful in pursuing the goal of cross-country data comparability.

To conclude, I believe that it is extraordinarily important that we get together to discuss needs, priorities, and best practices. That’s a key step toward better, more comparable data. Besides, meetings like this provide excellent learning opportunities for all of us.

I wish you many fruitful discussions during the rest of your stay here.

David Dodge (Governor, Bank of Canada)

Introductory remarks to Bank of Canada/Irving Fisher Committee Workshop

Sheryl Kennedy (Deputy Governor, Bank of Canada)

Good morning everyone. Welcome to Ottawa and thank you for accepting our invitation to participate in this Bank of Canada/Irving Fisher Committee joint Workshop on *Data Requirements for Analyzing the Stability and Vulnerabilities of Mature Financial Systems*.

The Bank of Canada's current medium-term strategic plan (2003–06) outlines several "things" we will do to "actively promote safe, sound, and efficient financial systems." The Plan commits the Bank to playing an important role in: promoting the safety and efficiency of domestic and international financial systems; being more active in promoting efficient and well-functioning financial markets; and increasing research in these areas. The Plan also notes that the Bank will collaborate with others, such as legislators, prudential supervisors, securities regulators, and accounting standard setters, to analyze the incentives facing participants in the financial system, monitor behaviour, identify the relevant implications for the financial system, and make recommendations for policy changes or other initiatives as appropriate.

In its efforts to deliver on these commitments, the Bank has found that the existing financial data for Canada are not sufficient to build a complete, integrated financial framework, address many of the questions our researchers, policy-makers, and industry players have posed. This problem is not unique to Canada. It has been flagged in speeches by senior central bankers[1] in a number of countries and in presentations at IFC-sponsored conferences. This workshop is further proof of this interest in, and the need to improve, the availability of data in key areas related to financial systems.

I would like to take a few moments to outline the main areas where we, at the Bank of Canada, would like to see better financial data. These include: (i) financial markets, (ii) non-financial firms, and (iii) households. I will not comment on data requirements for financial firms since this is well-plowed ground where we, like many other central banks, have been gathering and publishing data for years.

You should think of my remarks today as a small appetizer to the feast before you. In reviewing the documentation for this workshop, I am impressed by the abundance of excellent material to chew on.

Financial markets

The pressing need to understand the robustness and efficiency of Canada's financial system in the face of rapid and extensive innovation has resulted in a call for more comprehensive data on financial markets. At the broadest level, there is a need for data to help to answer questions related to the cost of capital and the functioning of markets, and to determine what motivates the behaviour of participants in these markets. Financial markets play a crucial role in bringing borrowers and lenders together and thus are increasingly important as a source of capital. In addition, more and more individuals have a significant portion of their wealth invested in financial markets, either directly through stock ownership or indirectly through mutual funds and pension funds. The development of more extensive databases on a broad range of financial market instruments, including government debt, corporate debt, futures, options, credit derivatives, equities, and others, is essential if we are to: understand and predict behaviour in markets, especially during volatile periods; link pricing data on financial instruments to financial statement data for the issuing firm; and determine how well markets are functioning.

1 *For instance: Glenn Stevens, Deputy Governor, Reserve Bank of Australia at the Irving Fisher Committee for Financial Statistics of the International Statistical Institute on 8 April 2005; and William White, Economic Adviser, Bank for International Settlements, at an Irving Fisher Committee conference on "Central bank issues regarding national and financial accounts," on 9–10 September 2004.*

Non-financial firms

As far as non-financial firms are concerned, better financial data would permit the creation of a consistent time series that would link distinct characteristics of individual issuing firms – for example, balance sheet data, credit rating, and industrial classification – to the amount and type of securities they issue. This should help deepen our understanding of how markets function and of the dynamics of business investment.

Second, more data are needed to help us better understand the sources of, and the barriers to, innovative financing – such as venture capital – and possibly help determine whether or how to encourage asset classes that exist elsewhere in the world, but not yet in Canada.

Third, better data on non-financial firms would help to identify imbalances and to assess the financial situation of businesses in order to facilitate the monitoring of financial system stability.

A fourth benefit would be to improve our understanding of the financial liabilities facing various sectors. The development of these types of data could enhance the understanding of investment decisions and of risk-taking behaviour, and improve the functioning of markets.

Households

Obtaining high-quality data on the financial condition of the household sector has always been considered as essential in the context of monetary policy, given the implications for consumer spending and for the overall economic outlook. More recently, there has been increased attention devoted to the evolution of household sector balance sheets in connection with financial stability issues. We do not currently have any readily available data to identify potential vulnerabilities developing in the household sector. Moreover, published non-proprietary data in Canada do not allow development of a disaggregated picture of the financial condition of the household sector. We would like to have disaggregated data in order to study the distribution of household financial liabilities and determine how that might change in response to, or be affected by, various shocks.

The Bank of Canada's learning objectives for the workshop

This outline of the areas that the Bank of Canada would like to have better financial data provides the context for our interest in hosting this workshop. But I would be remiss if I did not go one step further to give you an idea of what we would like to learn from your discussions today and tomorrow. We have invited you to a feast, but there is no free lunch!

First, we would like to learn whether there is a consensus among participants about the purpose of financial system data. What are the key concepts that we need to measure?

Second, what are the major gaps between what we want to know and what we can measure? How will structural changes and innovations affect our efforts over time? And are data gaps expected to increase or decrease?

Third, how accurate or detailed do these measures need to be? Do we need data both at the micro and the macro levels? Are new data requirements add-ons or substitutes for existing data?

Finally, in producing data, are there best practices that we can all aspire to? How do we measure the imprecise benefits relative to the costs, which seem large and much easier to quantify? Given the global nature of financial markets and many financial system issues, does it make sense to collaborate on definitions and approaches in order to facilitate cross-country comparisons and better capture global flows?

I look forward to the discussions over the next two days. We have a lot to consider. I am particularly encouraged that we have amongst us today central banks, statistical agencies, government ministries and agencies, academia, international organizations, regulatory agencies, and private sector firms – all prepared to work together to address these important and challenging questions.

We may not be able to answer all of the questions before you leave Ottawa for home. But I hope that we will get far enough along to facilitate continuing work on these issues, and that we can come back to any unanswered questions in future meetings of this Committee.

Sheryl Kennedy (Deputy Governor, Bank of Canada)

SESSION 1

What information is needed to properly address financial stability and vulnerability issues?

Chair's summary: Mr. Walter Engert (Bank of Canada)

Papers:

Background note on a framework for financial stability analysis and informational inputs
Mr. S. Kal Wajid (IMF)

A note on indicators and methodologies used in regular publications concerning financial system stability
Mr. Satoshi Yamaguchi (Bank of Japan)

Macro prudential analysis and statistics: are available figures up to the job?
Mr. Stefano Borgioli (ECB)

Selected indicators of financial stability
William R. Nelson and Roberto Perli (Federal Reserve Board)

Financial stability analysis and data needs
Mr. Walter Engert (Bank of Canada)

A stylised framework for financial system analysis
Mr. Paul Van den Bergh (BIS)

Assessing the financial system stability: the experience of Spain in launching the Financial Stability Review (FSR)
Ms. Cristina Luna (Bank of Spain)

Chair's summary

Walter Engert[1] *(Bank of Canada)*

1. Key themes

Session 1 of the workshop, put broadly, addressed the nature of financial-system stability, the concepts and frameworks that could determine the type of information that would be required by policymakers and researchers, and the relevance of existing data. Accordingly, key issues concerned the following questions.

- Do we understand what we mean by "financial stability and vulnerability" in mature economies? Is there a tractable, and operationally useful, definition of financial stability?
- Are there associated analytical frameworks that are insightful and useful?
- Do these frameworks identify the information needed to assess risks for mature financial systems? Are there gaps in our understanding and what are the implications for information needs?
- Does this lead to coherent and reasonable data requirements? Are the associated or required data available? Are the costs reasonable?

2. Overview of lead interventions

The first intervention in this session, by **Kal Wajid (International Monetary Fund)**, focused on the notion that financial stability is a broad concept with various macro-prudential, institutional and infrastructural aspects. He argued that the information set for financial stability analysis is accordingly wide-ranging, and goes beyond quantitative data. In addition to measures of key risk exposures, there must be consideration of institutional attributes, such as transparency and disclosure practices, and the robustness of regulatory and payments infrastructures.

In his intervention, **Satoshi Yamaguchi (Bank of Japan)** explored some inferences from a survey of 12 central banks' financial stability reports. More specifically, without necessarily providing comprehensive answers, Yamaguchi raised the following issues.

- What appears to be the main objective of the central bank with regard to financial stability?
- How important are the aggregate (macro) indicators compared to individual institution data?
- What is the objective of publishing a Financial Stability Report?

The third lead intervention was by **Stefano Borgioli (European Central Bank)**, and considered definitions of financial stability, and particularly the difficulties in nailing down a "workable" definition. He then focused on the banking system and on the statistics used at the ECB for macro-prudential analysis.

Finally, in his intervention, **Roberto Perli (Board of Governors of the Federal Reserve System)** described the role and activities of the Monetary and Financial Stability section of the Federal Reserve Board in monitoring financial markets. In addition, he discussed the importance of having not just data, but also the expertise and the flexibility to quickly understand and interpret new market developments in real time, and he stressed the importance of good market contacts.

3. Concluding remarks

Taken together, the lead interventions and the following lively debate pointed to the fact that both monetary stability and financial stability were important for the sound functioning of a market economy. While monetary stability can be summarized with reference to considerations of price stability, financial stability is unavoidably broad in scope, given its multi-faceted nature, and a precise, singular definition might not be feasible – or necessary.

In this regard, workshop participants noted that a functional definition is implied by the work of central banks and international organizations on the various elements that can influence the behaviour of the financial system, including financial-system analysis, policy advice and

1 *The assistance of Philippe Muller of the Bank of Canada in the preparation of this summary is gratefully acknowledged.*

oversight. Indeed, whether formally described as "financial stability" or not, most central banks are involved in dimensions of this work.

It was observed that important progress has been made the development of frameworks for financial stability analysis. Important in this regard has been increased understanding of the different components of the financial system and their inter-relationships. Frameworks for the analysis of the financial system include assessment of whether there are: (i) robust and efficient underlying infrastructures; (ii) buffers to absorb shocks; and (iii) adequate mechanisms to manage crises, and possibly prevent them. At the same time, some workshop participants argued that there were important gaps in understanding, particularly with regard to how to integrate information from the micro or sectoral levels to provide a broader system-wide perspective on financial stability.

Given the multi-faceted nature of financial stability, the data relevant for financial stability analysis are correspondingly eclectic, and some are based in other central bank roles, such as monetary policy formulation. As well, workshop participants noted that the relevant data are a mix of quantitative and qualitative information. With regard to the latter, the importance of good contacts with financial system participants to provide "soft data" to complement "hard data" was stressed by a number of speakers. It was also observed that central banks need to consider the underlying incentives, including the policy frameworks, that condition the behaviour of financial-system participants, and therefore the generation of observed data and system operating characteristics – what some called the "meta-data".

More generally, the importance of expertise and sound judgment – human capital – was seen as critical for the appropriate analysis of the range of diverse information.

Finally, in considering the development of new sources of data, given the potential costs of data generation, analysis and management – including for the private-sector providers of such data – it is important that central banks consider not only the potential benefits but also the costs of generating additional sources of financial stability data.

Walter Engert (Bank of Canada)

Background note on a framework for financial stability analysis and informational inputs

S. Kal Wajid (IMF)

A framework for financial stability analysis

Financial system stability has become a key area of focus among policy makers globally. Several entities around the world, including national authorities, multilateral institutions and standard setting bodies are focusing on the tools and methodologies for financial stability analysis. This note discusses the broad framework underpinning the various strands of the IMF's ongoing work in this area. It draws, in particular, on the Fund's experience with the Financial Sector Assessment Program (FSAP) and its broader operational and policy development work on financial systems.[1]

Financial stability analysis is intended to help identify risks to financial system stability and devise appropriate policy responses. At the Fund, this is based on three pillars: (i) macroeconomic prudential analysis; (ii) assessment of regulatory and supervisory environment; and (iii) evaluation of robustness of financial infrastructure. The analysis focuses on exposures, buffers, and linkages in assessing the soundness and vulnerabilities of the financial system, and their economic, regulatory, and institutional determinants (Figure 1).

Pillar I: Macroprudential analysis

Macroprudential analysis focuses on the potential impact of macroeconomic factors on the soundness and stability of financial systems. Financial market and macroeconomic developments provide the context for assessing the likelihood of shocks to the financial system. The analysis also focuses on how changes in financial soundness may affect macroeconomic and real sector developments in order to capture the two way linkages between the macroeconomy and financial soundness in the overall stability assessment.

The Fund's various macroeconomic surveillance activities are key elements of its broader ongoing work on financial stability from a global perspective. These include the preparation of *World Economic Outlook* and the *Global Financial Stability Report*, Article IV consultations, and internal work on macroeconomic vulnerabilities. A combination of early warning approaches using macro-based indicators of currency crises and market-based models are employed in the work on vulnerabilities.[2] This work also uses quantitative and qualitative inputs on the financial sector.

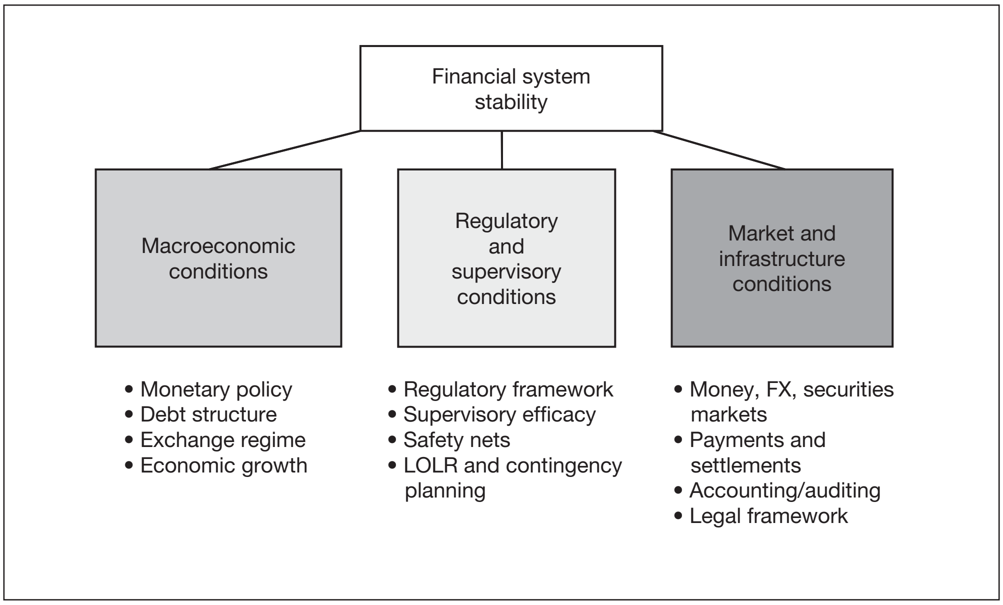
Together, the macroeconomic surveillance activities provide the key macroeconomic and financial market related inputs for country specific macroprudential analysis. In FSAPs, the evaluation of macroeconomic risks is also based on analysis of historical data and consultations with country authorities. The risk factors then feed into the assessment of financial sector soundness. The latter encompasses analysis of financial soundness indicators (FSIs), stress-testing, and analysis of the structure of the financial system, including its efficiency and competitiveness.

Analysis of FSIs and market indicators

The analysis of the FSIs – grounded in a CAMELS type framework – includes assessment of their variation over time and among peer groups, and of the underlying macroeconomic factors

1 *The material in this note draws primarily from the IMF's FSAP Handbook (forthcoming).*
2 *Kaminsky, Lizondo and Reinhart (1998), Berg and Pattillo (1999), Gapen et al. (2004) and IMF (2002).*

Figure 1 – Broad analytical framework of the FSAP



driving them. FSIs are analyzed for the key subsectors of the financial system, including the banking system, the insurance sector, other relevant non-bank financial institutions, and securities markets. In most countries, the *banking sector* forms the core of the financial system, and thus warrants close monitoring for indications of potential vulnerabilities. Banking sector FSIs cover capital adequacy, asset quality, management soundness, earnings and profitability, liquidity, and sensitivity to market risk. An important part of interpreting the FSIs is a full understanding of the underpinning definitions, classifications and relevant regulatory requirements and their comparisons with some benchmarks.

Insurance is an important and growing part of the financial sector in virtually all developed and many emerging market countries. The importance of the insurance sector for financial stability has also increased recently due to greater linkages between insurers and banks, increasing the potential for contagion. These linkages can include cross ownership, credit risk transfers, and financial reinsurance. Assessing the soundness of the insurance sector involves analysis of various financial soundness indicators of this sector while recognizing the differences in the risk profiles of insurance companies and banks.

Securities markets are a major component of the financial sector in many countries. The capitalization of equity and bond markets in industrialized countries dwarfs the aggregate assets of the banking system. Exposures of households, corporations, and financial institutions to securities markets have increased substantially, through investments in primary and secondary markets and through trading of risk in financial markets. The stability of securities markets is gauged through a range of quantitative indicators measuring depth, tightness and resilience of markets.[3]

Market based indicators are also used to monitor financial institutions' soundness. Such indicators include market prices of financial instruments, indicators of excess yields, market volatility, credit ratings, and sovereign yield spreads. Market prices of financial institutions' securities can reveal information about their condition beyond that obtained from balance sheet and other aggregated microprudential data. Similarly, sovereign yield spreads are commonly watched indicators of country risk. Price data from the stock, bond, derivatives, real estate, and other financial markets are used regularly to monitor sources of shocks to the financial sector, and indicators of market price volatility also help in assessing the market risk environment. Sovereign ratings and ratings of financial institutions and other firms (as well as the accompanying analysis by the rating companies) are additional important sources of information in the analysis of vulnerabilities.

3 *See chapter 8 of IMF (2004) for an overview of statistics on securities markets, and BIS (1999, 2001) for a detailed discussion of market liquidity.*

Stress testing

Stress tests assess the vulnerability of a financial system to exceptional but plausible events, by providing an estimate of how the value of a portfolio may change with large changes in some of the risk factors (such as asset prices). The analysis applies a common set of shocks and scenarios to a set of individual financial institutions and subgroups of institutions, in order to analyze both the aggregate impact as well as the distribution of impact among the institutions. While stress tests are widely used as a risk management tool by financial institutions, the techniques have been applied to measure the sensitivity of a group of institutions (such as commercial banks) or even an entire financial system to common shocks.

System-focused stress testing involves a multi-step process of examining the key vulnerabilities in the system and providing a rough estimate of sensitivity of balance sheets to a variety of shocks. This includes identifying the major risks and exposures in the system, defining the coverage and identifying the data required and available, calibrating the scenarios or shocks to be applied to the data, selecting and implementing a methodology, and interpreting the results. System-focused stress tests attempt to marry a forward-looking macro perspective with an assessment of the sensitivity of a collection of institutions to major changes in the economic and financial environment.

Stress tests have been performed for every country participating in the FSAP. Data availability is a key factor in determining the approach and sophistication of stress tests performed as part of the FSAP. Most analyses are performed on a bank-by-bank (bottom-up) basis, based on single factor and scenario approaches. Contagion risks and second round effects have typically not been addressed in many FSAPs, although some have incorporated elements of interbank contagion into the exercise. The involvement of the authorities has varied, according to their expertise and ability or willingness to provide data, with some country authorities precluded from providing data on individual institutions by bank secrecy laws or conventions.

A variety of metrics are used to summarize the results of stress tests, with the most common ones using measures that express the impact of a shock as a percentage of capital, assets, or profitability. For example, the estimated decline in the value of assets, or in equity, or a reduction in net income due to higher provisions or interest rate shock is expressed as a ratio of capital or assets or profitability. The dispersion of impact-standard deviation of the impact across the sample of banks-is also used a key statistic.

Data used in macroprudential analysis

Macroprudential analysis uses data such as balance sheets of the various sectors in the economy to assess the extent to which private owners would be able to inject new capital to cover the potential losses. Macroeconomic, financial market, and financial soundness indicators are the main data used in macroprudential analysis. A range of financial soundness indicators (FSIs) of banks, key non-bank financial institutions, and relevant non-financial sectors are used, including a "core" and an "encouraged" set FSIs (a full set of data requirements is presented in Annex).[4]

- The *core set of FSIs* covers only the banking sector, reflecting its central role. These FSIs are considered essential for surveillance in virtually every financial system and so serve as a small common set of FSIs across countries.
- The *encouraged set of FSIs* covers additional FSIs for the banking system as well as FSIs for key non-financial sectors, as balance sheet weaknesses in these sectors are a source of credit risk for banks and, thus, help detect banking sector vulnerabilities at an earlier stage.
- Quantitative information on the *structure, ownership, and degree of concentration* of various financial subsectors is used to analyze the structure of the financial system. This information indicates the relative importance of different types of financial institutions (e.g., banks, securities companies, insurance companies, pension funds); the relative importance of different types of ownership (private, public, foreign); and the concentration of ownership.
- Institution specific detailed *balance sheet and income statement* data are typically used for stress testing purposes, but the exercise can also be performed at an appropriate aggregate level. Relevant data includes composition of credit, foreign exchange exposure, maturity structure of assets and liabilities, etc.

4 *See IMF (2004) for further details of the use of FSIs.*

- Quantitative indicators for the securities market focus on market liquidity, because of the important role that liquid securities play in the balance sheets of financial institutions. The FSIs that measure market tightness and depth are *bid-ask spreads* and *market-turnover*.

Pillar II: Financial system supervision and regulation

To help gauge the risks and vulnerabilities, protect market integrity, and provide incentives for strong risk management and good governance of financial institutions, country practices are assessed against various international standards and codes. Such qualitative assessment, which is based on related assessment methodologies, is an integral part of the IMF's financial stability assessment framework and complements the quantitative macroprudential analysis. Observance of a wide range of standards is assessed in the context of FSAPs, including the Basel Committee's Core Principles for Effective Banking Supervision (BCP), the International Association of Insurance Supervisor's Insurance Supervisory Principles (IAIS), the International Organization of Securities Commissions' Objectives and Principles for Securities Regulation (IOSCO), the Committee on Payments and Settlements Systems Core Principles for Systemically Important Payments Systems (CPSS) and IOSCO's Recommendations for Securities Settlements Systems (RSSS), the IMF's Code of Good Practices on the Transparency of Monetary and Financial Policies (MFPT), and the Financial Action Task Force's (FATF) 40 + 8 Recommendations.

In the banking area, efforts have been focused on identifying information related to key risks contained in the Basel Core Principles (BCPs) assessments, given the importance of the banking sector in most countries. In addition, efforts have been made to develop a metric for the observance of the BCPs by countries. The BCP assessments provide information on risks that cannot be captured adequately in purely quantitative analysis – for example operational and legal risk. They also provide information on the effectiveness of banks' risk management systems and the responsiveness of the supervisory system to emerging financial sector problems, indicating how quickly vulnerabilities identified by macroprudential analysis are likely to be corrected. BCP assessments also help to interpret FSIs by clarifying the definitions underpinning the data provided by institutions – for example, regarding capital.

Similarly, the analysis and interpretation of soundness indicators in the insurance sector draws on the assessment of observance of IAIS Supervisory Principles. This provides information on the effectiveness of supervision, the structure and characteristics of companies in the sector, and other useful qualitative information that is not always captured in financial ratios. In particular, the specifics of supervisory and regulatory environment affect asset composition and the mix of risks, and must be taken into account in interpreting insurance FSIs.

In assessing the stability of securities markets, the key qualitative methods focus on the legal, judicial, and regulatory framework, and governance practices. The robustness of market liquidity depends on market micro-structure, including whether markets are OTC-based or exchange-based. For OTC markets, information on features affecting the capacity of market makers, such as their number, capitalization and the size of the positions is useful. For exchanges, information on the trading systems, price transparency, margining rules, and capital committed by the exchange to support trading is used. For electronic trading systems an indicator of liquidity is the standard transaction size.

Information used in the assessment of standards and codes

Informational inputs for standards and codes assessments are wide ranging and cover qualitative and descriptive information, as well as quantitative data pertaining to each sector. The relevant quantitative data inputs sought are included in the Annex. The following is a listing of the main items:

- Qualitative information includes laws, regulations, relevant circulars, and guidelines governing the intermediaries in the sector.
- Data on the structural characteristics of the sector, such as the number of institutions, the share of total assets of largest 5–10 institutions, share of foreign-owned institutions, performance indicators, composition of assets and liabilities, etc.
- Quantitative information on regulatory thresholds such as limits on large exposures, connected lending, net open foreign exchange positions, etc.

Pillar III: Financial system infrastructure assessment

Institutional and other financial infrastructure constitutes the third pillar in the financial stability assessment. The financial market infrastructure – trading systems, payment and clearing and settlement systems, central bank operations and other systemic liquidity arrangements and government foreign exchange reserve and debt management practices – affects financial institutions' access to funding on the liabilities side of their balance sheets, their ability to liquidate positions on the asset side, and their exposure to systemic and operational risk stemming from the clearing and settlement system. The key elements of the broader institutional infrastructure encompass:

- Legal infrastructure for finance, including insolvency regime, creditor rights, and financial safety nets.
- Systemic liquidity infrastructure, including monetary and exchange operations, payments and securities settlement systems, and microstructure of money, exchange, and securities markets.
- Transparency, governance and information infrastructure, including monetary and financial policy transparency, corporate governance, accounting and auditing framework, disclosure regime and market monitoring arrangements for financial and non-financial firms, and credit reporting systems.

Information used in assessing financial system infrastructure

Information on the operation of the payment and clearing and settlement systems and safety nets provides indications volumes of transactions and access to liquidity in a crisis.

- Payment system functioning is gauged, inter alia, by the relative size of intra-day interbank exposures and daylight overdrafts, settlement lags, loss sharing arrangements, reliance on collateral, and which markets have Real Time Gross Settlement. These indicators provide information on the potential credit and settlement risks in the payment system.
- The safety net and central banks' provision of liquidity to markets influence the extent to which banks and other market intermediaries can continue to access market liquidity in a crisis. Central bank operating procedures are a key determinant of money market liquidity and of the liquidity of other markets in longer-term paper, where position taking by dealers is supported by access to money markets.

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Annex

Table 1 – Financial system structure

	Annual data for recent periods		
	Number	Assets billion [local currency]	Percent of total assets
Depository institutions			
Commercial banks – total			
Large domestic banks			
Major foreign banks			
Other banks			
Development banks			
Credit unions and cooperatives			
Microfinance institutions			
Mortgage finance companies			
Building societies			
Other non-bank depository institutions			
Non-depository intermediaries			
Insurance companies			
Life and retirement			
Non-life			
Pension funds			
Collective investment schemes			
Money market mutual funds			
Finance companies (incl. leasing and venture capital)			
Securities firms			
Other (specify)			
Total financial system			
Memorandum items:			
Banks that are more than 50 percent owned			
Banks that are foreign-owned or controlled			
Subsidiaries of foreign banks in Country Y			
Branches of foreign banks in Country Y			
Subsidiaries of Country Y's banks abroad			
Branches of Country Y's banks abroad			

Sources:

Table 2 – Aggregate balance sheet for the banking system

	Annual data for recent periods
A. Assets	
1. Cash (domestic notes & coins)	
2. Balances at CBK and other banks	
3. Placements (including o/night lending)	
4. Government securities	
5. Investments	
6(a) Local currency advances (gross)	
(b) Foreign currency advances (gross)	
(c) Total advances (gross)	
(d) Less: Provisions for bad debts	
(e) Advances (net)	
7. Other foreign assets	
8. Fixed assets	

Table 2 – (continued)

	Annual data for recent periods
9. Other assets	
10. **Total assets**	
B. Liabilities	
11. Local currency deposits (including interbank borrowing)	
12. Foreign currency deposits (including interbank borrowing)	
13. Accrued interest	
14. Other foreign liabilities	
15. Other liabilities	
16. **Total liabilities**	
17. **Net assets/liabilities**	
C. Capital and reserves	
18. Paid up/assigned capital	
19. Shareholders' loans	
20. Revaluation reserves	
21. Other reserves	
22. Profit and loss account	
23. Less additional provisions recommended	
24. **Total shareholders' funds**	
Other items	
25. Contingent liabilities (off-balance sheet items)	
26. Non-performing loans (NPLs)	
27. Core capital (PR8)	
28. Supplementary capital (PR8)	
29. Total capital (PR8)	
30. Total risk weighted assets (TRWA)	
31. Other non-performing assets	
32. Investments in subsidiaries	
33. Total earnings assets (TEAs)	
Average net advances	
Average placements	
Average govt. securities	
Average investments	
Average other earning assets	
Average net earning assets	
Average deposits	
Average other liabilities	
Average capital	
D. Performance indicators	
Measures of capital adequacy	
34. Gearing ratio (24–32–75% of 20)/(11 + 12 + 13)	
35. Core capital/total deposits (27/(11 + 12 + 13))	
36. Core capital/TRWA (27/30)	
37. Total capital/TRWA (29/30)	
Measure of liquidity	
38. Liquidity ratio (per liquidity statement)	
39. Cash ratio	
Measures of asset quality	
40. NPLs/gross advances (26/6c)	
41. (NPLs − Prov)/gross advances (26 – 6d)/6c	
42. Provisions/NPLs (6d/26)	
43. Advances/deposits (6c/(11 + 12 + 13))	
44. NPAs/assets ratio (26 + 31/10 + 6d)	

Table 3 – Profit and loss analysis for the banking system

	Annual data for recent periods
A. Income	
51. Interest on advances	
52. Interest on placement	
53. Dividend income	
54. Interest on govt. securities	
55. Foreign exchange gain (loss)	
56. Other interest income	
57. Other income	
58. **Total income**	
B. Expenses	
59. Interest on deposits	
60. Other interest expenses	
61. Occupancy expenses	
62. Director's emoluments	
63. Bad debts charge	
64. Salaries and wages	
65. Other expenses	
66. **Total expenses**	
67. **Profit before taxation**	
68. Number of employees	
69. Number of branches	
C. Performance indicators (annualized)	
70. Yield on earning assets (51 + 52 + 53 + 54 + 56)/33	
71. Cost of funding earning assets (59 + 60)/33	
72. Interest margin on earning assets	
73. Yield on gross advances (51/6c)	
74. Cost of deposits (59 + 60)/(11 + 12)	
75. Return on assets (including contingencies) 67/(10 + 6d + 25)	
76. Return on shareholders funds (67/24)	
77. Overheads (non-interest expenses)/total income (61 + 62 + 63 + 64 + 65)/58	
78. Staff cont. to profit (per employee)	
79. Bad debts charge/total earnings (63/58)	

Table 4 – Measures of financial system interconnectedness (Units in local currency)

	Annual data for recent periods
Banking system lending (exposure) to shareholders[1]:	
On-balance sheet	
Off-balance sheet	
Banking system lending (exposure) to:	
Insurance companies	
Finance companies	
Securities firms	
Pension funds	
Banking system equity investments in:	
Insurance companies	
Finance companies	
Securities firms	
Pension funds	
Gross inter-bank lending (exposure) to[2]:	
Domestic banks	
Foreign banks – parent or related company	
Foreign banks – unrelated	

Source:
1 *Banking system is defined here to include banks and all quasi-banks formally classified as non-bank financial institutions.*
2 *In this question, domestic banks are defined as all bank operating in Country Y (i.e., including foreign-owned).*

Table 5 – Financial soundness indicators for the banking sector (In percent, unless otherwise indicated)

	Annual (or quarterly) data for recent periods
Capital adequacy	
Regulatory capital to risk-weighted assets*	
Regulatory Tier I capital to risk-weighted assets*	
Capital (net worth) to assets	
Asset composition and quality	
Sectoral distribution of loans to total loans*	
Sector A – please list 5–10 most important sectors	
Sector B	
Sector C	
Sector D	
Sector E	
etc.	
Geographical distribution of loans to total loans	
Country A – please list 3 most important countries	
Country B	
Country C	
FX loans to total loans	
NPLs to gross loans*	
NPLs net of provisions to capital*	
Large exposures to capital*	
Gross asset position in derivatives to capital	
Gross liability position in derivatives to capital	
Spread between highest and lowest interbank rates	
Earnings and profitability	
ROA*	
ROE*	

Table 5 – (continued)

	Annual (or quarterly) data for recent periods
Interest margin to gross income*	
Non-interest expenses to gross income*	
Personnel expenses to non-interest expenses	
Trading and fee income to total income	
Spread between reference loan and deposit rates	
Liquidity	
Liquid assets to total assets*	
Liquid assets to total short-term liabilities*	
Customer deposits to total (non-interbank) loans	
FX liabilities to total liabilities	
Sensitivity to market risk	
Net open positions in FX to capital*	
Net open positions in equities to capital	

** Included in the "core set" of FSIs.*

Table 6 – Data on ownership, exposures, profitability and costs in banking (In percent, unless otherwise indicated)

	Annual data for recent periods
1. Share in total assets, or in the assets of 10 largest banks of state owned financial institutions	
2. Share in the capital of all banks, or of 10 largest banks of industrial or financial agglomerates	
3. Classification of assets into normal, precautionary substandard, doubtful, and loss and the associated provisioning amounts	
4. Value of connected lending for banks in the aggregate and for peers groups	
5. Value of loans to large customers (regulatory definition based on specified thresholds for each bank)	
6. Holdings of real estate by financial institutions – not related to provision of banking services	
7. Deposits and claims of all banks held abroad classified by country; and deposits in related banks by foreign owned banks	
8. Unused lines of credit and guarantees provided by banks against different types of counterparties:	
Domestic non-financial firms	
Foreign banks	
Foreign non-financial firms	
Domestic government and states	
9. Off-balance sheet exposures to various types of derivative contracts in domestic and foreign currency units	
10. Sources of revenue for all banks and peer groups of banks:	
Lending	
ATM/deposit A/C services	
Trust	
Security underwriting/market making	
Proprietary trading	
Fees on investment, and other traditional off-balance sheet activities	
11. Data on interest rate spread (average yield on loans minus average cost of deposit), for both dollar and domestic currency intermediation by various peer groups of banks	

Table 7 – Stress testing of banking systems: Overview of input data[1] (All data should be bank-by-bank)

	Annual data for recent periods
General	
Basic balance sheet and income statement data, in particular capital, assets, risk-weighted assets, profits, net interest income	
Credit risk	
Breakdown of total loans by classification categories	
Loan-loss provisions (total or by the above classification groups)	
Breakdown of loans by currency of denomination (and by classification)	
Breakdown of loans by sectors (and by classification). The sectors may be defined by main activity (agriculture, manufacturing, etc.) or by residency/legal form (residents/non-residents, households/firms, etc.)	
Interest rate risk[2]	
Maturity/repricing structure of assets and liabilities, and off-balance sheet positions	
Holdings of debt securities by banks, duration of these holdings	
Exchange rate risk[2]	
Currency breakdown of assets, liabilities, and off-balance sheet positions	
If substantial off-balance sheet positions, other information (such as deltas of FX options) may be needed	
Interbank contagion risk	
Uncollateralized lending (and similar) exposures between bank *i* and *j*, for all pairs of banks	
Other risks	
Depending on the features of the financial system, may include more detailed data on exposures such as equity holdings, real estate exposures (including collateral), commodity exposures	
Other data	
Selected macroeconomic indicators (e.g., interest rates, exchange rates, output growth rates)	
Selected data on borrowers (e.g., corporate sector leverage, by economic sector)	

1 *The input data shown here are for a simple stress test in a small, non-complex system with a large role of banks, facing a standard set of interest rate, exchange rate, and credit risks. The data requirements will generally be much higher for complex financial systems. They may also be different for systems where preliminary analysis suggests substantial exposures to specific risks, such as commodity price risk or real estate price risk. In systems with substantial role of non-bank financial institutions, additional data may be included for those.*

2 *These are only direct interest rate and exchange rate risks, respectively. Data on indirect risks (i.e., interest or exchange rate induced changes in credit risk) are under credit risk.*

Table 8 – Statistics on structure and performance of insurance companies

	Annual data for recent periods
Structure and concentration	
1. Number and total assets of insurance companies by type of ownership:	
Joint stock	
Mutual	
State owned	
Foreign owned/controlled	
2. Number and total assets of branches and subsidiaries of different types of insurance companies operating domestically and abroad	
3. Number and total assets of domestic and foreign reinsurance companies operating domestically	
4. Frequency distribution of asset size or premium incomes or new business of insurance companies and concentration indicators such as the shares of 3 or 5 largest insurance companies in terms of the chosen indicator	
5. Ownership structure of Insurance sector, such as the share of capital of all insurers or largest insurers, held by government, overseas insurance group, mutual, bank, other financial services or industrial group etc.)	
Operation and performance	
6. Gross and net (of reinsurance) domestic premium income reported (earned for non-life) – in currency and as percentage of GDP	
7. Domestic policy holder liabilities (as a percentage of GDP) and as a percentage of domestic commercial and savings bank deposits	
8. Capital and surplus (life) or net assets (non-life) as a percentage of net policy holder liabilities	
9. Net non-domestic premium income reported (earned for non-life)	
10. Investment portfolio net of investment in subsidiaries	
11. Percentage of gross written and net written premium for each main type of insurance products	
12. Number of insurer new entrants and exits in the past 10–15 years	
13. Distribution costs operating expenses, commissions, and reinsurance premiums, for major insurance products and lines of business as a percentage of sales (new business for life, gross written for non-life)	
14. Surplus/profit, before and after tax as a % of beginning capital and surplus or shareholder's funds, as a % of annual premiums and of average total assets	
15. Gross rate of return on investment and total assets	
16. Asset composition and Investment policy of different insurers – life, property, casualty etc. – based on amounts (and shares) invested in various asset classes (short-term paper, long-term paper government bonds, corporate bonds, corporate equities (listed and unlisted), real estate, loans to private sector, etc. foreign assets also classified by type of securities, and currency of denomination	
17. Liability composition in terms various asset classes, including insurance reserves and own funds, both domestic and foreign	
18. Contingent and off-balance sheet accounts, including derivatives and asset swaps	
19. Actual solvency margins, required minimum solvency margins, separately for life and non-life business, and for large insurance groups on a consolidated basis	

Table 9 – Capital markets overview and their structure and performance selected

	Annual data for recent periods
Overview and structure security of markets	
1. Number of stock exchanges (list of country's stock exchanges and other regulated markets, including Junior and OTC markets)	
2. Number of listed companies (official lists of publicly traded companies)	
3. Ownership ratios of domestic and foreign investors in listed companies	
4. Share of most actively traded (top 3–5 equities) shares in total traded value	
5. Market Capitalization of listed companies:	
● as % GDP	
● as % of all companies including privately held and state-owned	
6. Number and value of transactions in each major market, and for companies in major indices:	
● Turnover ratio	
● Total number of shares outstanding, and % closely held stocks and float	
7. Value and number new issues	
● Value as a % of total fixed capital formation	
8. Number of delistings and their value	
9. Number and size of merger transactions	
10. Classification of number and market capitalization of listed companies by industrial sectors (according to SIC codes)	
● Number of companies in each sector	
● Market capitalization of the sector	
● Maximum, minimum, and medium market capitalization in each sector	
● Average price earnings ratio in each sector	
● Return on equity (over 3 years, assuming dividends are reinvested)	
11. Assets under management-bonds and equity separately of pension funds, mutual funds, banks, insurance companies, retail investors, foreign	
12. Number and total assets held, and total capital of market markers, primary dealers, and brokers in the bond and equity markets	
13. Number and list of credit rating agencies and their range of services	
14. Number and list of clearing and settlement facilities including securities depositories and the range of their services	
15. Cost of new issues, cost of trading, including settlement cost, in secondary markets, including OTC markets	
Fixed income securities	
16. Government Bond holdings and trading volume of different classes of investors (pension funds, primary dealers, retail investors, banks etc.)	
17. Maturity profile of outstanding government debt and non-government debt separately	
18. Outstanding amounts and new sales of government bonds by type of instruments, selling techniques (auction, and on tap): and frequency/timing of issues	
19. Market value, interest rate, face value, and new issues of non-government bonds by type and maturity	
20. Cost of new issues and cost of trading non-government debt	
21. Outstanding volume by rating category (AAA, AA^{+}, AA, ..., BB), average (or maximum and minimum) size of capital of the issuer in each rating grade, total number of issuers, average maturity, percentage of face value that is guaranteed (if applicable)	
22. Trading volume, average number of trades per trading day (for most active and least active issues), average quote size, bid-ask spreads, and quarterly standard deviation of price/yield change	
23. Holdings of corporate bonds by various classes of financial institutions	
24. Outstanding amount and issuance of various types of securitized assets, by maturity, and type of issuing institutions; Holdings of securitized assets by different types of financial institutions	
Derivatives	
25. Number and Types of guaranteed derivative contracts	
26. Annual and daily average volume of trading in guaranteed derivative contracts and their notional and market values	
27. Volume of trading in derivatives classified by type of investor	
28. Number and Types of OTC contracts; Annual and daily average turnover in OTC contracts and their notional and market values	

Table 10 – Structure and performance of pension and investment funds
(Annual data for selected periods)

	Annual data for recent periods
Mandatory pension schemes	
1. Number and total assets of pension funds	
2. Holdings by categories of assets (government bonds, equities, loans, deposits, etc.) and an indication of applicable investment rules for each category	
3. Value of derivatives and asset swaps in the portfolio	
4. Capitalization and amount of deposited funds in each pension fund	
5. Returns on pension fund assets, and return on pension fund deposits, and other financial performance indicators	
6. Disclosure requirements and related data	
Occupational pension schemes	
7. Same as above	
Investment funds	
8. Number and total assets of all licensed investment and mutual funds	
9. Number and total assets of different types or classes of mutual funds (bonds, equity, mixed, money market, etc.)	
10. Number of mutual fund families and types of sponsors (foreign owned or connected with foreign financial institutions, and domestically sponsored)	
11. Size distribution of mutual and investment funds (and mutual fund families) including the share of total net assets of the 3 largest mutual funds and the largest 3 fund families	
12. Data on composition of assets – distinguished between short term paper, longer term instruments, overseas securities, and loans to private sector – of all mutual funds	
13. Data on total foreign assets of mutual fund and investment companies	
14. Data on volume of purchases and redemptions of mutual funds	
15. Data on returns, entry (or exit) commissions, management fees of different types of mutual funds	

Table 11 – Structure and performance of other financial institutions[1]

	Annual data for recent periods
1. Number and total assets of: ● Non-bank non-deposit taking financial institutions ● Leasing companies providing financial leasing facilities[2] ● Leasing companies providing operating leasing facilities[3] ● Factoring companies ● Institutions providing SME or microfinance ● Government owned or joint (Public–Private) specialized banks or financial institutions ● Institution that specialize in primary housing loans 2. Primary sources of funds – private of public equity, bond issues, etc. – for: ● Non-bank non-deposit taking financial institutions generally ● Leasing companies ● Factoring ● SME and microfinance providers ● Specialized institutions	

1 *It includes non-bank financial institutions – other than security market intermediaries, insurance firms and pension funds – both deposit taking, as well as non-deposit taking that provide a range of specialized financial services.*
2 *Financial leasing can be defined as a leasing arrangement wherein the lessee takes on most of the benefit and burden of ownership of the leased asset – lease payments will comprise a large part, if not all, of the leased asset's cost, and title to the asset will most likely pass on to the lessee at the end of the lease.*
3 *Operating leasing is generally defined as a leasing arrangement wherein the lessor retains many of the benefits and burdens of ownerships of the leased asset, such as the right to claim depreciation or other tax benefits of ownership. The term of the lease generally lasts only for a portion of the working life of the asset, and title is retained by the lessor.*

Table 12 – Systemic liquidity infrastructure: Money, exchange, and debt market

	Annual or higher frequency data for recent periods
Inter-bank money market ● Average daily volume of transactions and bid and offer interest rates (or average, maximum, and minimum interest rates) broken down by maturity (overnight, 1 week, 2 week etc.) and by instruments (unsecured inter-bank loans, repos, etc.) ● Aggregate data on financial institution's exposure to the inter-bank money market by type of financial institution and by maturity (quarterly) ● Average daily volume or end period volume and yield to maturity of Central Bank bills (if any), treasury bills, and commercial bank bills, and negotiable certificate of deposits sold on the primary issue market (by maturity) ● Average daily volume (or total during a period) and yield to maturity of central bank bills, treasury bills, and Bank bills and NCDs (of different residual maturities) transacted in the secondary markets ● Ownership structure (domestic versus foreign, banks, non-banks, Public, Private etc.) of key money market instruments **Inter-bank foreign exchange markets** ● Average (or end of period) domestic currency/USD exchange rate on the spot market, bid and offer spot exchange rates, average daily volume of transactions (Number, and value) on the spot market, ● Average domestic currency/USD exchange rate and average and total volume (number and value) of for forward transactions (by maturity) ● Distribution of foreign exchange transactions by type of investor ● Volume of Central Bank operations in the spot – and forward FX market ● Central Bank or Monetary Authority, Liquidity Management operations (excludes emergency lending)	

Table 12 – (continued)

	Annual or higher frequency data for recent periods
• Value and frequency of liquidity management operations (open market operations in specified money market or other market instruments) by the Central Bank • Aggregate (end of period stock) Liquidity provided to/withdrawn from the banking system due to OMOs • LOLR activities (outstanding stock and rates) broken down by type of instrument, types of borrower, and currency, including standing and discretionary loan facilities, access limit per institution (average), interest rates charged, (by maturity structure and type of loan collateral) • Number of institutions that account for 50% or 70% of total liquidity provided through discount window/other liquidity adjustment facilities • Data on liquidity ratios (if any) imposed by Central Bank by type of authorized financial institutions • Foreign exchange SWAP arrangements with foreign Central Banks, Monetary Authorities and Commercial Banks • Required Reserves, Excess Reserves, and Free Reserves, and selected liquidity ratios **Public debt management and government bond markets** • Public sector debt outstanding broken down by issuer (Central Government, Central Bank, State owned entities, States local governments), by instrument, by type of investor, and by maturity • Public sector holdings of liquid financial assets • Average duration or term to maturity of government debt outstanding	

Table 13 – Systemic liquidity infrastructure: Payments and securities settlement systems

	Annual or higher frequency data for recent periods
Volume and value of transactions processed in specified payment settlement systems, including: • Number of participants • Daily average volume and value processed • Projected trends in volume/value • Breakdown of payment transactions by financial market transactions, commercial transactions, and consumer transactions • Frequency distribution of number of participants by value groupings • Netting ratio • Concentration ratio • Overnight/intraday credit – size and rates • Volume and type of transactions returned or not processed at the completion of clearing and settlement process • Average time to settle – for recent months and for three peak days – after payments enter the system for testing through the day for payment by size; number and value of payments in various “time to settle” bands • Average number and value of queued payments in recent months and on peak days	

Table 13 – (continued)

	Annual or higher frequency data for recent periods
● Total notes and coins issues, transferable deposits, narrow money supply, transferable deposits in foreign currency and broad money ● Required reserved, portion of required reserves available for settlement, excess reserves, transferable inter-bank deposits, Central Bank Credit to Banks (both in domestic and foreign currency) ● Volume and value of transactions by payment instrument: Checks (domestic, foreign currency) payment by cards (credit, debit, and stored value) Paper-based credit transfers (customer initiated, inter-bank large value) Paperless credit transfers (customer initiated, inter-bank/large value, direct debits, E-money, other) ● Number of checking accounts, ATMs, POS, ATM-debit Cards, Credit Cards ● Total volume and value (annual) of transactions in various inter-bank transfer systems (low value systems, and large value systems, domestic and foreign currency transaction) ● Volume and value of instructions handled by various securities settlement systems (government, securities, corporate shares, corporate debt, other)	

Table 14 – Legal, governance and information infrastructure

	Annual data for recent periods
Safety net and emergency 1. Size distribution of deposits for the banking system and for major banks, and the percentage of total deposits (and depositors) that is insured 2. Depositor payouts – amounts and number of depositors – by deposit protection fund 3. Timing, number of banks, value of assets and duration of the operation for various types of bank intervention operation (statutory management, bank license withdrawals, liquidation, purchase and assumption, government takeover, etc.) 4. Size of operations and their timing for policy holder and investment protection funds 5. Volume, and terms of emergency lending operations and their rationale **Insolvency regime and creditor rights** 6. Volume and percentage of total of different types of lending (corporate, personal, real estate, automobile, etc.), connected lending and, large exposures, in Banks, NBFIs, and DFIs 7. Percentage of corporate loans that is securitized, classified by type of security 8. Level and percentage of NPL in Banks, NBFIs and DFIs, classified by type of lending and by industry; value and percentage of classified loans in each classification category	

Table 14 – (continued)

	Annual data for recent periods
9. Number of credits, amounts and percentages (as a % of total credit under collection or recovery) in each of the following: ● Sale of credit to a third party ● Debt rescheduling ● Informal workout ● Non-judicial foreclosure or execution ● Judicial foreclosure (immovable assets) ● Judicial proceedings and execution (movable assets) ● Liquidation proceedings (bankruptcy) ● Rehabilitation proceedings (formal, court supervised, etc.) ● Dept to equity conversion ● Other (describe, country specific)	
10. For each of the above categories of debt resolution, annual data on: ● Average recovery rates (as a % of total credit plus interest due) ● Average recovery rate (as a % of nominal value of credit) ● Average duration of recovery ● Average costs incurred in trying to collect the loans (e.g., costs of litigation, costs for external lawyers)	
Corporate governance	
11. Overview of Capital Markets (see Table 9)	
12. Number of employees, sales, assets of companies by types of ownership and incorporation (proprietorship, partnership, limited liability company, …), and by listed and non-listed separately	
13. Percentage of the listed sector owned by state, foreign, domestic; institutional investors, holding companies, families, etc. and indicators of ownerships concentration and pyramid structures etc.	

Table 15 – Financial sector taxation

	Annual or higher frequency data for recent periods
1. Tax treatment – rate, withholding, deductions and exemptions if any, – of incomes (interest, dividend, capital gain) from different categories of financial assets (deposits, stocks, bonds etc.)	
2. Tax treatment – rate, deductible items such as loan loss provisions and other exclusion – of incomes, transactions or gross receipts (or other VAT and Sales Tax) of various classes of financial institutions	
3. Tax treatment of transactions in different financial markets	
4. Tax treatment of pension funds and life insurance – tax rates on premia/contributions, on earnings on the fund while invested, and on withdrawals/pension?	
5. Remuneration of required reserves and excess reserves	

Table 16 – Indicators of access to financial services

	Annual data for recent periods
Financial institutions	
1. Number of branches, or other banking service outlets, for each bank, non-bank financial institution (NBFI) and development finance institution (DFI), and each province (state and local jurisdictions)	
2. Number of ATMs for each Bank, NBFIs, and DFI and each province	
3. Size distribution of loans for banks, NBFIs and DFIs; Similar distribution data for deposits	
4. Number of employees for each bank, NBFI and DFI and each province	
Payments[1]	
5. Percentages of households with transaction accounts, payment cards; total number of transaction accounts, payment cards in the system	
Savings[1]	
6. Percentages of households with savings accounts; total number of savings and time deposit accounts	
Allocation of funds[1]	
7. Percentage of households with residential mortgage; with other borrowings in last year (stock or flow)	
8. Percentage of enterprises (including unincorporated) with borrowing from formal financial intermediaries	
9. Percentages of enterprises reporting credit refusal in last year or discouraged borrowers	
Monitoring users	
10. Number and percentage of loans covered by various credit registries	
Risk transformation[1]	
11. Percentage of households with life, motor, and household insurance	
Cost of financial services (banking charges)[1]	
12. Average or lowest quintile, of the cost of maintaining standard transactions accounts (all inclusive cost) for financial intermediaries	
13. Cost of standard internal retail payment; Cost of standard international remittance from a specified source country	
14. Percentage of households more than one hour traveling distance from a bank branch by public transport	

1 *These information are those proposed by Honohan (2004) as Basic National Access Indicators. Compilation of these will typically require surveys of households, financial service providers, and experts with knowledge of the field. Further breakdown of the proposed access information by socioeconomic classes of households or types of enterprises (e.g., micro-enterprises) would increase the value of available information for policy and research purposes. Such information can be combined with data on holdings of various financial assets and liabilities by households, non-financial corporates, and financial institutions for a more detailed assessment.*

A note on indicators and methodologies used in regular publications concerning financial system stability

Satoshi Yamaguchi (Bank of Japan)

Over the past several years, central banks and regulatory agencies around the world have begun issuing regular publications to address issues of financial stability. These publications use a variety of indicators and methodologies in an effort to evaluate financial system conditions. This note examines indicators and methodologies used for analysis in the regular publications on financial system conditions issued by 12 central banks and regulatory agencies in major countries (seven from Europe, two from North-America, and three from Asia[1]).

The publishing of financial stability reports (FSRs) has become quite common among central banks and regulatory agencies since its introduction by the Bank of England (BOE) in 1996. Ten out of the 12 publishers selected for this survey now issue periodical publications referred to as "financial stability reports/reviews".[2,3]

Of these ten institutions which publish FSRs, the European Central Bank (ECB) and the Deutsche Bundesbank publish their reports annually, and the others publish their reports semi-annually.

A typical financial stability report has two main parts. The first part contains regular assessments of financial stability including assessments of macroeconomic conditions, developments in international and domestic finanical markets, conditions of the banking sector and other financial sectors, and developments in financial infrastructures (mostly payment systems). Exceptionally, Banco de Espana (BdE) focuses on analysis of the banking and insurance sectors. The second part contains special articles and research papers.

For comparative analysis within this note, indicators are collected from the first part of the latest issues of the reports published by the 12 central banks and regulatory agencies. The indicators are classified by sector (banking sector, non-bank financial sector, non-financial sector, financial markets, and market infrastructure), and then further organized into several categories within each sector.

Findings

Similar indicators and methodologies are used in all the reports. Indicators commonly used by each sector are described in the following sections. Some characteristic data/indicators are then highlighted, although the choices are inevitably subjective to some extent.

In general, the analysis in the first part of the FSRs employs relatively simple and not-highly-processed data and indicators. Data and indicators derived from calculations using publishers' own methods are rarely used; for example, some publishers use data provided by Moody's KMV for expected default probabilities for banks and firms inferred from stock prices. More analytical (econometric) work is often carried out in staff reports or research papers, which may be included in the second part of the FSRs.

1 *Europe(7): European Central Bank, Bank of England, Sveriges Riksbank, Banco de Espana, Banque de France, Deutsche Bundesbank, and De Nederlandsche Bank; North America(2): Bank of Canada and Federal Reserve Board; Asia(3): Hong Kong Monetary Authority, Monetary Authority of Singapore, and Bank of Japan.*

2 *The regular publications issued by the Federal Reserve Board and the Bank of Japan are not called financial stability reports. They explain the developments of banks' annual financial statements.*

3 *BOJ has announced that it will begin publishing regular reports on the stability and functioning of the financial system from this July.*

A. Banking sector

Indicators can be classified into the following seven categories:
1. profitability,
2. solvency,
3. balance-sheet items,
4. non-performing loans,
5. interest rates,
6. risk measures, and
7. others.

1. Profitability

Most of the publishers use return on equity (ROE) and return on assets (ROA) as profitability indicators.

Profitability indicators are often broken down for detailed analysis into components such as net interest income, non-interest income, and cost-to-income ratios.

2. Solvency

Most of the publishers use regulatory adequacy ratios (i.e. Basel and/or Tier 1 capital ratio) as solvency indicators.

3. Balance-sheet items

Most of the publishers examine the proportions of bank assets (by sector, by borrower, by country, etc.). Many of these publishers consider growth of particular assets (i.e. lending to the household sector (mortgage, card loan), foreign assets, etc.) as risk factor.
- BOJ uses breakdown of loans to “normal borrowers” by bank internal credit rating (low, intermediate and high) in order to observe the ratio of the higher-rated borrowers.
- BOJ monitors annual changes in bond holdings by remaining maturity.

4. Non-performing loans (NPLs)

Besides provisioning and write-offs, the publishers often use delinquency rates.
- BOE, BdE and FRB use breakdown of non-performing loan-related indicators by sector (e.g. by household and corporate, and by industries).
- BOJ monitors distribution of credit cost, distribution of NPL ratios, and banks’ sales of NPLs.
- BOJ breaks NPLs down into three elements: new NPLs, existing NPLs, and write-offs.

5. Interest rates

Besides lending and deposit rates, the publishers often monitor interest margin.
- ECB monitors the share of adjustable rate mortgages in new mortgages.
- De Nederlandsche Bank (DNB) monitors mortgage interest rate periods.
- BOJ monitors net return on loans (interest margin after deducting the realized credit cost ratio and general and administrative expense ratio).

6. Risk measures

Many of the publishers use VaR to measure trading book market risks. Some publishers also use credit risk related indicators as below:
- ECB monitors loan-to-value ratio.
- BOE monitors banks’ participation in unsecured interbank market to measure counterparty risks, and major banks’ large exposures to financial firms.
- Sveriges Riksbank carries out scenario analysis of the effects on bank income and loan losses of an interest rates rise of 100 basis points accompanied by a stock price fall of 30%. Riksbank

also analyzes changes in Tier 1 capital ratios of the four major Swedish banks after a default of their largest counterparty and after a default of one the other major Swedish banks.
- BOJ calculates VaR for stocks and bonds in both the trading and the banking book for major banks.

The publishers use a variety of indicators to measure liquidity risks. For example, ECB and BOE use funding gap of banks as liquidity risk indicators. BOE, BdE and the Monetary Authority of Singapore (MAS) use maturity mismatches. BOE, the Hong Kong Monetary Authority (HKMA) and MAS also monitor stock liquidity ratios. Riksbank carries out detailed analysis of funding by individual bank, by instrument, and by currency.

7. Others

Some of the publishers (ECB, Riksbank, DNB and FED) monitor changes in demand and/or supply for credit by conducting bank surveys.
- BOJ uses net upgrade/downgrade of borrower categories[4] based on banks' internal ratings.
- BdE shows a particular interest in developments in electric banking. BdE analyzes its profit structure and share of deposits out of the whole banking sector.

B. Non-bank financial sector

Many of the publishers (except for Riksbank, BdF, FRB, HKMA and BOJ) assess the insurance sector and collect data such as profit, contracts, and premiums. The publishers (except for Bundesbank) seem to put less emphasis on analysis of the insurance sector compared with the banking sector.

ECB, BOE, BdF, Bundesbank, and DNB show a strong interest in the development of hedge fund industry, but the availability of data seems to be limited to a certain extent (data such as the number of hedge funds and assets under management are commonly used).

C. Non-financial sector

Indicators are classified by area (global environment, domestic and foreign markets) and by sector (household, non-financial corporate, etc.).

Choice of area and market for analysis varies among the publishers, depending on the size of the banking sector exposure; for example, BdE chooses Latin America, and Riksbank chooses the Nordic area and Baltic states.
- ECB uses current account balance, short-term external debt, foreign reserve, etc. as vulnerability indicators for emerging market economies.

Many of the publishers monitor oil prices and house prices.
- ECB computes correlation of expected default frequencies and oil price changes dividing the periods into two phases – stable and volatile oil prices.
- Bundesbank refers to the results of simulations by the IMF of the impact on global growth of an increase in price of oil.
- BOC estimates the future path of debt-service ratio for the household sector by carrying out simulations under different interest rate assumptions.
- MAS examines survey results on negative housing equity provided by the Central Provident Fund Board.

Many of the publishers monitor credit ratings (or changes in credit ratings) for the non-financial corporate sector.
- ECB, Riksbank and Bundesbank monitor expected default frequency (Moody's KMV) for the non-financial corporate sector.
- BOJ calculates credit scores by using data from financial statements statistics and shows the distribution for 84 categories of firms (=28 industries by three firm sizes).

4 *Net upgrade/downgrade is calculated as follows: subtract the number of downgrades from the number of upgrades in each fiscal year and divide the number by the total number of borrower firms at the beginning of the fiscal year in each borrower category.*

- BOJ calculates break-even interest rates for loans by using financial data of small and medium enterprises stored in CRD (credit risk database for small and medium enterprises) and credit ratings given by the CRD.

D. Financial markets

Indicators are classified into the following four categories:
1. interest bearing instruments,
2. equities,
3. exchange rates, and
4. others.

1. Interest bearing instruments

The publishers monitor government bond yields (short-term, long-term), forward rates, and volatility (historical, implied). Many of the publishers use CDS premia for banks and corporate bonds and/or spreads between government bonds and other securities (i.e. bonds issued by emerging countries or other institutions) as credit risk indicators.
- BOE uses the proportion of B- and below rated US domestic bond issues out of total sub-investment-grade issues as a precursor of an increase in defaults.
- ECB uses net non-commercial positions in the 10-year Treasury futures and net secured financing of US primary dealers as indicators of positioning and leverage in the US bond market.
- ECB uses implied skewness of options on long-term German bond yields to determine whether market participants expect sudden rises in bond yields.

2. Equities

The publishers monitor equity price index and volatility by country and by sector. Some of the publishers also monitor price earnings ratio (PER).
- ECB uses the US risk aversion index produced by Goldman Sachs.
- BOE uses implied index skews to determine whether possible extreme outcomes are above and below the mean of the distribution.
- BdE monitors stock market liquidity using Kyle lambda (a parameter determined by the average amount of cash necessary to move the price of a security or an index by 1%) .
- Bundesbank considers implied risk premium, one of the four factors contributing to stock price change,[5] as a risk indicator.

3. Exchange rates

The publishers monitor foreign exchange developments and implied volatilities.
- ECB considers net long positions on the euro (USD/EUR positions) as speculative foreign exchange positions.
- ECB uses foreign exchange purchases by the Bank of Japan (FX interventions) and custody holdings with the US Federal Reserve as indicators of foreign inflows into the US bond market.
- BOE monitors foreign purchases of US securities, which could influence foreign exchange rates. Likewise, MAS monitors foreign purchases of Asian stocks. ECB uses the share of indirect bidders in US Treasury auctions to monitor foreign involvement in the US Treasury market.
- Banque de France (BdF) monitors foreign exchange reserves held by emerging countries.

4. Others

Some of the publishers use sovereign credit ratings, commodity indices, etc.
- BOE considers the sum of long and short non-commercial positions in the commodity futures exchanges (i.e. positions unrelated to commercial hedging activities) as speculative positions.

5 *The remaining factors are: real interest rate, current dividends, and earnings expectations.*

- BdF uses three-month futures contracts on various commodities to assess economic developments in emerging countries.
- BdF monitors one-year stock market confidence index provided by Yale School of Management.

E. Financial infrastructures

All publishers (except for FED, HKMA, and BOJ) mention payment and settlement systems. ECB, BOE, Riksbank, and Bank of Canada (BOC) provide numerical data, such as values settled by domestic large-value payment and settlement systems and values settled by the CLS.
- BOC monitors liquidity ratio of the CLS (the value of funds required to settle transactions, relative to the value of the transactions themselves) as a measure of the liquidity savings provided by CLS settlement. Likewise, Riksbank monitors gross and net settlements through CLS.

Although almost all publishers express the view that payment and settlement systems are a key component of the financial system, there seems to be no quantitative analysis supporting this statement.

Satoshi Yamaguchi (Bank of Japan)

Issuer	ECB	U.K.	Sweden	Spain	France
		Bank of England	Sveriges Riksbank	Banco de España	Banque de France
Title	"EU Financial Stability Review"	"Financial Stability Review"	"The Financial Stability Report"	"Financial Stability Report"	"Financial Stability Review"
First issue	December 2004	October 1996	November 1997	November 2002	November 2002
Frequency	Annual	Semi-annual	Semi-annual	Semi-annual	Semi-annual
Number of pages (the latest issue)	December 2004: 178 pages	December 2004: 144 pages	December 2004: 96 pages	November 2004: 85 pages	November 2004: 123 pages
Purpose	To promote awareness in the financial industry and among the public at large of issues that are relevant for safeguarding the stability of the euro area financial system By providing an overview of sources of risk and vulnerability to financial stability, the review also seeks to help preventing financial tensions	To encourage informed debate on financial stability issues, domestically and internationally To survey potential risks to financial stability To analyse ways of promoting and maintaining a stable financial system	To identify conceivable risks in the financial system and assess the ability to withstand shocks To contribute to a well-informed debate concerning Sweden's financial system To demonstrate how the Riksbank works on the objective of promoting a safe and efficient payment system	The publication will help the Banco's function (promotion of financial stability) to be performed with the utmost efficiency and also transparently To convey to society as a whole, and to the financial sector in particular, the Banco de Espana's ongoing assessment of trends in financial stability and various factors that may be affecting the system	In a globalised and increasingly complex financial environment, assessing and fostering financial stability require strengthened co-operation between the various relevant authorities, governments, central banks, market regulators and supervisors. They also presuppose that a close dialogue be maintained with all financial sector professionals
Contents (the latest issue)	Overview of risks to financial stability (5%) Macro-financial environment (27%) ● The external environment ● The euro area environment The euro area financial system (38%) ● Euro area financial markets ● The euro area banking sector	Overview (10%) Credit risk (24%) ● UK household and corporate sectors ● US ● Europe ● Japan ● Emerging market economies	Foreword + summary (15%) PART I: Stability assessment Financial markets and real estate prices (11%) The Swedish banks' borrowers (15%)	Introduction (16%) Chapter 1: Banking risks (35%) ● Credit risk ● Liquidity risk ● Market risk Chapter 2: Profitability (14%)	Summary 3 International environment and markets (15%) ● Macroeconomic and financial imbalances in developed countries ● Financial market developments ● Emerging market risks

Financial stability reports (continued)

Issuer	ECB	U.K.	Sweden	Spain	France
		Bank of England	Sveriges Riksbank	Banco de España	Banque de France
% represent the share of pages used for each section to the total pages	● Other euro area financial institutions ● Strengthening euro area financial system infrastructure Special features (24%) ● Cross-border bank contagion risk in Europe ● Growth of the hedge fund industry ● The comprehensive approach of Basel II ● Aggregate EU household indebtedness	Risks in the international system (11%) ● International financial markets ● Hedge funds and leverage ● Major financial institutions ● Implications for the UK financial system UK financial sector resilience (6%) ● The large UK-owned banking sector ● UK non-bank financial sector ● Links between financial institutions Strengthening financial infrastructure (8%) Articles (40%) (ex. CLS, Securities Settlement System, CACs, Financial Instrument Accounting)	Developments in the banks (11%) The financial infrastructure (14%) PART II: Articles (34%)	Chapter 3: Solvency (12%) Explanatory notes and glossary (22%)	Financial Sector (20%) ● The banking system ● European financial integration ● Market and post-market infrastructures Articles (55%) (ex. Assessment of “stress tests” conducted on the French banking system, insurance and financial stability)

Financial stability reports (continued)

Issuer	Germany	Netherlands	Canada	Hong Kong	Singapore
	Deutsche Bundesbank	De Nederlandsche Bank	Bank of Canada	Hong Kong Monetary Authority	Monetary Authority of Singapore
Title	"Report on the stability of the German financial system"	"Overview of Financial Stability in Netherlands"	"Financial System Review"	"Half-Yearly Monetary and Financial Stability Report"	"Financial Stability Review"
First issue	December 2003	December 2004	December 2002	December 2003	December 2004
Frequency	Annual	n.a.	Semi-annual	Semi-annual	Semi-annual
Number of pages (the latest issue)	October 2004: 69 pages	December 2004: 15 pages	December 2004: 78 pages	December 2004: 60 pages	December 2004: 63 pages
Purpose	–	To analyze the main developments and risks for the financial system	To share with financial system participants and the Canadian public the Bank's research, analyses, and judgments on various issues and developments concerning the financial system	Provides detailed description and analysis of the main factors, both external and domestic, that have a bearing on Hong Kong's monetary and financial stability. The report presents the HKMA's view of the main forces acting upon the Hong Kong economy, paying particular attention to the implications for the monetary and financial systems Analyses in detail external and domestic influences on Hong Kong's monetary and financial systems	To contribute to a greater understanding and exchange of views among market participants, analysts, and the public on issued affecting Singapore's financial system
Contents (the latest issue)	Overview 5 Macroeconomic outlook and risk factors (9%) ● Global environment ● United States ● Japan ● Euro area ● Germany	Developments in the macro-financial environment (20%) Limited downside risks in base scenario (20%) Potential risks in stress scenarios (20%)	Developments and trends ● Overview + highlighted issues (20%) ● The macrofinancial environment (8%) ● The financial system (13%)	Summary (7%) 1. Global and regional setting (30%) ● External demand ● Mainland China ● Monetary and financial conditions 2. Domestic economy (25%) ● Demand ● Output and supply	Forward Overview I. Macro environment (24%) ● Macroeconomic conditions ● Financial market developments II. Non-financial sector (11%) ● Corporate sector ● Household sector

Financial stability reports (continued)

Issuer	Germany	Netherlands	Canada	Hong Kong	Singapore
	Deutsche Bundesbank	De Nederlandsche Bank	Bank of Canada	Hong Kong Monetary Authority	Monetary Authority of Singapore
% represents the share of pages used for each section to the total pages	International financial system (25%) Financial intermediaries in Germany (42%) Legal framework and financial infrastructure (13%) Annex (6%)	Importance of infrastructure and crisis management (7%) Transfer of risks deserves attention (20%) Conclusion (3%)	Reports (15%) Policy and infrastructure developments (15%) ● Introduction ● Bank of Canada lender-of-last resort policies Research summaries (23%) (ex.) Basel II and required bank capital, Pre-bid run-ups ahead of Canadian takeovers, monetary policy, private information, and international stock markets	● Prices ● Asset markets ● Public finances 3. Monetary and financial sector (20%) ● Exchange rate, interest rates and monetary developments ● Banking sector performance 4. Outlook, risks and uncertainties (16%)	III. Financial institutions (19%) ● Banking sector ● Insurance sector IV. Financial infrastructure (6%) ● Payment systems ● Securities clearing and settlement systems V. Statistical appendices (24%)

Financial stability reports (continued)

Issuer	U.S.	Japan
	Federal Reserve Board	Bank of Japan
Title	"Profits and Balance Sheet Developments at U.S. Commercial Banks in 2003"	"Overview of Japanese Banks Observations from Financial Statements for fiscal 2003"
Frequency	Annual	Annual
Number of pages (the latest issue)	Spring 2004: 30 pages	July 2004: 57 pages
Purpose	–	–
Contents (the latest issue) % represents the share of pages used for each section to the total pages	Overview (7%) Balance sheet developments (28%) ● Loans to businesses, households, other loans and leases ● Securities ● Liabilities ● Capital ● Derivatives Trends in profitability (21%) ● Interest income and expense ● Non-interest income and expense ● Loan performance and loss-provisioning International operations of US Commercial Banks (0.5%) Recent developments (0.5%) Appendix (43%)	Summary I. Developments in profits and balance sheets of Japanese banks in fiscal 2003 (5%) II. Progress in NPL disposal and changes in banks' loan portfolios (14%) ● Decline in credit cost ratios ● Decline in NPLs outstanding ● Decline in risks associated with overall loan portfolios III. Risk assessment of securities portfolios (7%) ● Stocks ● Bonds IV. Profitability (9%) ● Net return on loss ● General and administrative expenses ● Non-interest income V. Issues for the future (4%)

Banking sector

Institutions	Category	Indicators
European Central Bank	Profitability	• ROE, ROA, net interest income, non-interest income (fees and commissions, trading and forex results) • Cost to income ratio, staff costs, administrative costs, etc.
	Solvency	• Capital adequacy ratio • Breakdown of regulatory capital • Tier 1 ratio • Frequency distribution of overall solvency ratios • Risk adjusted items (risk-weighted assets, risk-adjusted trading book)

	Balance-sheet items	• Banking sector assets-to-GDP ratio
		• Credit growth by sector
		  • Housing loans
		• Credit-to-GDP ratio
		• Growth of loans to non-financial corporations by maturities
		• Exposures of euro area banks to NMSs
		• Structure of funding (customers, credit institutions, debts, subordinated liabilities)
		• Deposit of non-financial corporate sector
		• Foreign currency-denominated assets, foreign claims on individual countries
		• Foreign currency-denominated asset and liabilities of NMS banks
		• Proportion of foreign currency-denominated loans in NMSs
		• International exposure (Latin America, Asia, NMSs)
		• Cross-border activity (non-bank securities, interbank, loans to non-bank)
		  • US household delinquency rates on loans

	Non-performing loans	• NPL ratio (euro area, Japan) • Provisioning
	Interest rates	• Lending margin (household, non-financial corporations) • Short-term loans to non-financial corporations and yield curve slope • Corporate bond and bank loan spreads (large and small loans) • Share of adjustable rate mortgages in new mortgages • Deposit margin
	Risk measures	• VaR (market risk, and interest rate risk as a component) • Loan to value ratio (euro area, NMSs) • Customer funding gap (loans minus deposits)
	Others	• Number of institutions and branches • Market share of the five largest domestic banks in local markets • Share of foreign-owned assets in the euro area banking sector • Asset shares of various financial institutions in the euro area • M&A in the euro area banking sector, and between euro area banks and insurance companies (domestic and cross-border, number and value)
Bank of England	Profitability	• Large UK-owned banks' dealing income as a percentage of operating income • Contributions to changes in large UK-owned banks' aggregate pre-tax profit margin (provisions, cost-income ratio) • Changes in selected components of large UK-owned banks' income (net interest, income, net fees dealing profits)
	Solvency	• Large UK-owned banks' capital ratios
	Balance-sheet items	• Large UK-owned banks' stock of lending to UK individuals (residential mortgages, credit card lending, other unsecured lending)

Banking sector (continued)

Institutions	Category	Indicators
		• Annual growth of large UK-owned banks' lending to non-financial companies • Large UK-owned banks' stock of lending to non-financial companies (other non-financial companies, transport, storage, communication, construction, manufacturing, real estate companies) • Large UK-owned banks' trading book assets relative to total assets • Annual net flows of loan transfers and securitisations by nature of underlying loan, as a percentage of total assets (lending to non-financial companies, unsecured lending to individuals, secured lending to individuals)
	Non-performing loans	• Large UK-owned banks' new provisions for bad and doubtful debts • Breakdown of UK-owned banks' write-offs on lending to UK individuals (mortgages, credit cards, other unsecured) • UK-owned banks' annualised write-off rates on lending to UK individuals • UK-resident banks' annualised write-off rates on domestic lending (private non-financial companies, individuals, other financial companies)
	Interest rates	• The large UK-owned banking sector's effective interest rate spread over Libor (credit cards, overdrafts, personal loans, mortgages) • Large UK-owned banks' net interest margin
	Risk measures	• UK-resident banks' participation in the unsecured interbank market • Large UK-owned banks' "large exposures" to financial firms • Large UK-owned banks' share of new worldwide syndicated lending • Average trading VaR as a percentage of average quarterly operating income • Mismatches between the maturities and interest terms of the deposits and lending • Large UK-owned banks' funding gaps, by type of funding (customers, interbank debt, securities, other) • Large UK-owned banks' asset and funding (banks, customers) • Large UK-owned banks' sterling stock liquidity ratios • Large UK-owned banks' "liquid assets" as a ratio of "vulnerable liabilities" • Large UK-owned banks' interbank exposures to UK-resident banks relative to Tier 1 capital (total loans and advances to banks, total deposits by banks, gross OTC derivative exposure net OTC derivative exposure) • Large UK-owned banks' stock of lending to UK-resident non-bank financial sectors (insurers and pension funds, securities dealers, asset managers mortgage credit companies, factoring companies, credit grantors, leasing corporations)
Sveriges Riksbank	Profitability	• Profit before loan losses and net loan losses in the major banks • Post-tax return on equity in the major banks and the market's required rate of return • Profitability in the major banks (core profit, net financial transactions, other operations, capital gains and pension provisions) • Net securities-related commission income in the major banks and stock-market turnover and prices • Payments-related commission income in the major banks and card transactions

Banking sector (continued)

Institutions	Category	Indicators
		● Payments-related commission income ● Ratios of costs and income to assets and of costs to income
	Solvency	● Tier 1 capital ratios (individual banks)
	Balance-sheet items	● Lending to households by credit institutions ● Lending by the four major banks to the general public in Sweden and abroad ● Lending to households by banks, mortgage institutions and finance companies (individual banks) ● Lending to companies by banks, mortgage institutions and finance companies (individual banks)
	Non-performing loans	● Impaired loans ● Provisions for incurred and probable loan losses ● Loan losses, net
	Interest rates	● Net interest margin for the major banks and spreads for deposits and lending
	Risk measures	● Scenario analysis (the effects of the interest rate rise + stock-market to banks' income and loan losses) ● Tier 1 capital ratio in the four major Swedish banks after a default of their largest counterparty ● Tier 1 capital ratio in the four major Swedish banks after the default of a major Swedish bank ● Market funding by the four major banks (individual banks) ● Market funding by the major banks' (interbank, bonds, cerificates) ● Market funding by the major banks' Swedish credit institutions, currency breakdown (SEK, euro, other EU currencies, other currencies)
	Others	● Bank managers survey on the conditions of lending

Banco de Espana	Profitability	● ROE (deposit institutions, commercial banks, saving banks)
		  ● Breakdown of rates of change of ROE into 6 elements: Group net income divided by net operating income (NOI), 1 minus the efficiency ratio (equivalent to net operating income divided by gross income, NOI/GI), the productivity of risk-weighted assets (GI/RWA), the risk profile of assets (RWA/A), gearing (A/(Tier 1+Tier 2)), and the quality of own funds ((Tier 1+Tier 2)/equity)
		  ● Distribution of: ROE, ATA (average total asset) and number of institutions according to ROE
		● Gross income
		● Net income of group transactions
		● Net interest income
		  ● Breakdown of rates of change of net interest income: asset volume effect, asset spread effect, liabilities volume effect, liabilities spread effect, euribor effect
		● Commissions
		  ● Breakdown of rate of change of commissions: collections and payment, sale of non-bank financial products, currency exchange, securities services, contingent liabilities, other
		● Trading book profits (trading book, results of financial transactions)
		● Extraordinary income
		● Efficiency ratio
		  ● rate of change of operating expenses, and gross income
		● Average cost (by sector, by instrument)
		● Cost of bank liabilities (percentage structure)

Banking sector (continued)

Institutions	Category	Indicators

	Solvency	• Solvency ratio
		  • Spanish and Basel rules
		• Spanish Tier 1 ratio
		• Contribution to rate of change of:
		  • Total capital (Tier 1 capital, Tier 2 capital, deductions)
		  • Tier 1 capital (capital, reserves, reserves at CCs <consolidated companies>, intangible assets, losses at CCs)
		  • Tier 2 capital (excess over 50%, subordinated debt, welfare funds, revaluation reserves)
		  • Total requirements (credit risk, trading book, exchange rate, additional)
		• Contribution of risk groups to rate of change of balance-sheet assets
		• Requirements for credit risk of balance-sheet assets (contribution of risk groups)
		• Contribution to rate of change of:
		  • Preference shares (saving banks, commercial banks)
		  • Subordinated debt (saving banks, commercial banks)
		• Preference shares as a proportion of Tier 1 capital
		• Distribution of the solvency ratio by bracket (ATA, number of institutions)

	Balance-sheet items	• Total assets
		  • The total assets of business in Spain, and foreign business (relative weight)
		• Equity portfolio, goodwill
		• Financial assets abroad
		  • Evolution by geographical areas (developed countries, Latin America, other areas, Spain)
		  • Sector breakdown in Latin America
		  • Amount in 16 countries
		• Financing:
		  • To private sector
		  • To resident private sector
		  • For house purchase
		  • To property developers
		  • To productive activities
		  • To government
		  • Breakdown by instrument
		  • By country in Latin America
		  • Secured credit
		• Securitised assets and covered bonds (cédulas hipotecarias)
		• Net liabilities vis-a-vis the various sectors in Spain Resident's deposit, Foreign interbank financing, subordinated debt, a marketable debt securities

	Non-performing loans	• Doubtful assets ratio
		  • By sector
		  • Business in Spain, and foreign business
		• Resident private sector (breakdown by industries, distribution)
		• Distribution of the doubtful bank debt of non-financial firms by debt-burden percentiles
		• Write-offs
		• Provisions for bad debt as a percentage of credit risk

	Interest rates	• Average cost by instrument (saving accounts, current accounts, time deposits, marketable debt securities, subordinated debts)
	Risk measures	• Risk profile (shares of risk groups) • Secured loans

Banking sector (continued)

Institutions	Category	Indicators
		● Residual maturities of assets and liabilities ● Difference between assets and liabilities classified by residual maturities (amount, as percentage of total assets) ● International risk exposure – breakdown into 16 countries – (amount, as a proportion of capital) ● Risk profile indicator (total, sovereign probability of default, other sectors)
	Others	● Electronic banking (institutions specialising in electronic banking) ● Profit and loss account (net interest income, gross income, operating expenses, net operating expenses, profit before tax) ● Structure of operating expenses (personal costs, advertising expenditure, IT expenditure, depreciation, other overhead expense) ● Share in relation to total deposit institutions (total assets, creditors from other resident sectors, credit to other resident sectors) ● Asset management ● By geographical area ● Share of commercial banks and saving banks ● By type of institution or fund (commercial banks, saving banks)
Banque de France	Profitability	● ROE ● Earnings of the main French banks (net banking income, operating costs, cost of credit risk, gross operating income, operating income, group net income) ● Earnings of the main banks by country ● Cost-to-income ratios of the main European banks operating cost/net banking income ● Net banking income by sector (retail banking, asset management, investment banking) ● Group net income of the main European banks
	Solvency	● Tier 1 solvency ratios (individual banks)
	Non-performing loans	● Cost of credit risk of the main European banks as of net banking income
	Risk meaures	● Average Value-at-Risk (VaR) (individual banks)
Deutsche Bundesbank	Profitability	● Profit before tax, net interest income, net commissions received, trading result, operating income, general administrative spending, etc. ● Net charges from the valuation of assets
	Solvency	● Core capital ratio ● Share of regulatory capital for market price risk in the trading book
	Balance-sheet items	● B/S total, claims on non-banks, risk-weighted assets and its ratio to B/S total ● Cross-border claims on NMSs ● Foreign currency claims of banks, and loans in NMSs ● Foreign currency claims of banks and volume of foreign currency loans ● Loans: ● By sector ● Real estate, housing ● To selected countries ● Share and volume of all housing loans ● Households and commercial borrowers for residential construction, commercial construction, to private contractors, secured by mortgages

Banking sector (continued)

Institutions	Category	Indicators
	Non-performing loans	• Risk provisions • Amount outstanding (Japan, Poland) • Write-downs and cover fund • Ratio of risk provisions to loans to non-banks
	Interest rates	• Correlation between yield differential of Federal securities and net interest income
	Risk measures	• VaR (market risk) • Ratio of large exposure to liable capital
	Others	• Rate of contributions to the mutual insurance scheme • Rating upgrades and downgrades of selected banks • Relative rating frequencies of selected banks (European banks (excluding Germany), German banks (with state guarantees), German banks (without state guarantees))
De Nederlandsche Bank	Interest rates	• Interest rate period of mortgages
	Others	• Banks' corporation lending conditions (survey)
Bank of Canada	Profitability	• Bank profits (return on equity, net income)
	Solvency	• Bank capital ratios
	Non-performing loans	• Gross impaired loans to total loans (all loans, major banks, non-mortgage business loans) • Bank loan-loss provisions
FRB	Profitability	• Return on equity • Return on assets • Net interest margin, for all banks • Income items as a share of revenue (non-interest income, other non-interest income, fiduciary income + trading income, deposit fees) • Ratio of deposit fee income to total domestic deposits • Non-interest expense as a proportion of revenue (salaries and benefits, premises and fixed assets)
	Solvency	• Regulatory capital ratios (total (Tier 1 + Tier 2) ratio, Tier 1 ratio, leverage ratio) • Assets and regulatory capital at well-capitalized banks (share of industry assets at well-capitalized banks, average margin by which banks were well capitalized)
	Balance-sheet items	• Bank holdings of securities as a share of total bank assets • Selected domestic liabilities at banks as a share of their total domestic liabilities (savings deposits, small time deposits, transaction deposits)
	Non-performing loans	• Delinquency and charge-off rates for loans to businesses, by type of loan (commercial real estate, C&I) • Delinquency and charge-off rates for loans to households, by type of loan (credit card loans, residential real estate loans, other consumer loans) • Credit card delinquency rate and household bankruptcy filings • Provisioning for loan and lease losses as a percentage of total revenue • Reserves for loan and lease losses
	Interest rates	• Commercial mortgage yields
	Others	• Number of banks and share of assets at the largest banks • Supply and demand conditions for C&I loans at selected banks, large and medium-sized borrowers • Supply and demand conditions for commercial real estate loans at selected banks

Banking sector (continued)

Institutions	Category	Indicators
		● Index of home mortgage refinancing activity ● Net percentage of selected banks reporting stronger demand for residential mortgages ● Net percentage of selected banks tightening standards for consumer lending (consumer loans other than credit cards, credit card loans)
Hong kong Monetary Authority	Profitability	● Pre-tax operating profit ● Net interest income, general and administrative expenses, non-interest income
	Solvency	● Capital adequacy ratio ● Core capital

	Balance-sheet items	● Loans
		  ● For use in Hong Kong by industries, Mainland China
		  ● Outstanding and new mortgages loans
		● HK dollar loan-to-deposit ratio

	Non-performing loans	● Asset quality measures (overdue and rescheduled, and classified) ● Net charges for provisions
	Interest rates	● Lending rate (Mainland China) ● Mortgage rate ● Deposit rate (Mainland China) ● Intermediation spreads (best lending rate minus effective deposit rate), net interest margin ● Spreads between HIBOR and deposit rate
	Risk measures	● Liquidity ratio ● Overall foreign currency position (incl. both spot and forward)
Monetary Authority of Singapore	Profitability	● Total profit ● Financial services value added ● Income (gross, interest, fee and commission, other) ● Income from overseas operation
	Solvency	● Capital adequacy ratio

	Balance-sheet items	● Loans
		  ● Domestic non-bank (housing, other household, all firms)
		  ● Offshore (interbank, non-bank) in the offshore Asian dollar market
		● Interbank lending
		  ● To foreign banks (head offices and branches overseas)
		  ● By country (Switzerland, Hong Kong, UK, Japan, rest of world, offshore interbank)
		● Residential housing loans in negative housing equity (number of accounts, value, unsecured)
		● Share of exposure to the more oil-dependent and technology-related industries
		● Loan growth (China)
		● Loans to household (in 7 Asian countries)
		● Deposit growth
		● Loan-to-deposit ratio

	Non-performing loans	● NPL ratio ● Provisioning
	Interest rates	● Prime lending rate ● Housing loan rates ● Net interest margin
	Risk measures	● Liquid asset ratio (defined as liquid assets in excess of required Minimum Cash Balance (MCB) to Domestic Banking Unit (DBU) liabilities base) ● SGD net cashflow by maturity

Banking sector (continued)

Institutions	Category	Indicators

Bank of Japan	Profitability	• ROA, net income/loss
		• Operating profits from core business
		• Number of Japanese banks recorded net losses
		• Net realized stock-related gains/losses (A)
		• Net bond-related gains/losses (B)
		• Changes in the asset value (A+B minus loan-loss provisions)
		• Comparison of banks' profitability in 30 countries
		• Net interest income, net fees and commissions
		• Ratio of non-interest income to total income
		• Fee income from new financial services
		• Expense ratio
		  • International comparison of expense ratio
		• General and administrative expenses
		  • Contribution of personal expenses, premises and equipment expenses

	Solvency	• Capital adequacy ratio • Net deferred tax assets (outstanding, ratio to Tier 1 capital)
	Balance-sheet items	• Loans to individuals • Breakdown of loans to "normal borrowers" • Banks' stockholdings and its ratio to Tier 1 capital • Changes in bond holdings by remaining maturity
	Non-performing loans	• NPLs disclosed under the FRL • Decomposition of the change in NPLs • Distribution of NPL ratios • Total losses on disposal of NPLs • Expected and unexpected losses from loan portfolio • Credit cost (ratio, breakdown, distribution of ratios) • Credit score and credit cost ratio • Banks' sales of NPLs • Prices of NPLs purchased by RCC
	Interest rates	• Lending rate • Net return on loans (by components: interest margin, general and administrative expense ratio, credit cost ratio)
	Risk measures	• Exposure to stock and bond market volatility • Ratio of VaR to Tier 1 capital
	Others	• Net upgrade/downgrade of borrower categories

Non-bank financial institutions

Institutions	Category		Indicators
European Central Bank	Insurance companies	Profitability	● The average return on equity "ROE" of non-life insurance companies ● ROE of reinsurance companies ● Frequency distribution of return on equity of euro area life insurance companies <ISIS> ● The share of companies with an ROE of less than 5% ● Net investment income ● Income from underwriting ● Net average premium income ● Real insured losses from disasters and catastrophes <Swiss Re>
		Solvency, reserves	● The solvency ratio (=the ratio of surplus to total liabilities)
		Balance-sheet items	● Asset portfolios of euro area insurance companies <ISIS> ● Linked and non-linked products and the share of linked products in total assets of euro area insurance companies <ISIS>
		Others	● Expected default frequencies (EDF, Moody's KMV)
	Hedge funds		● Investors (individuals, FOFHs, Corporate/institutions, pension funds/ERISA, endowments & foundations) ● Inflows by strategy ● Capital structure by strategy ● Leverage by strategy, size and vintage year ● Correlation between hedge fund returns and stock prices volatility (S&P 500, Euro Stoxx)
Bank of England	Life insurers	Profitability	● Aggregate profits of the five largest UK-owned life insurers
		Others	● Life insurers' UK sales of long-term savings products <Association of British Insurers>
	Links between financial institutions ● Funding and trading exposures	Others	● Large UK-owned banks' stock of lending to UK resident non-bank financial sectors, as at June 2004 <BOE and published accounts>
	Hedge funds		● Cumulative flows of capital into hedge funds ● Performance of hedge fund strategies ● Bank lending to entities domiciled in the Cayman Islands
Banco de Espana	Insurance companies	Profitability	● ROE, ROA (total, controlled by deposit institutions) by business (life, mixed, non-life) in % <DGSFP and BE calculation>
		Solvency, reserves	● Uncommitted assets divided by requirements (total, controlled by deposit institutions) by business (life, mixed, non-life) in % <DGSFP and BE calculation>
		Balance-sheet items	● Total assets (controlled by deposit institutions, others) by business (life, mixed, non-life) in EURm <DGSFP and BE calculation>

Non-bank financial institutions (continued)

Institutions	Category		Indicators
Banque de France	Hedge funds		● Number and assets under management

Deutsche Bundesbank	Insurance companies	Profitability	● Return on equity
			● Net investment income of all insurance companies
			● Hidden losses in life insurers' equity portfolio fixed assets
			● Gross premiums written <BaFin>
			● Volume of gross premiums written
			● Increase in the profit
			● Data on the 50 largest German life insurance companies <Bundesbank>
			  ● Net investment income
			  ● Operating costs
			  ● Statutory minimum rate of return
			● Earnings situation of the 50 largest German non-life insurance companies <Moody's>
			  ● Combined ratio (=ratio of claims incurred in the financial year and operating expenses to gross premiums earned)
			  ● Net investment income
			  ● Gross premiums written
			● Earnings situation of German reinsurance companies <BaFin + companies own data>

		Solvency, reserves	● Solvency ratio (=the ratio of an insurance company's own funds to certain insurance technical reserves, insured sums and premiums)
			● Solvency of the 50 largest German life insurance companies <Moody's>
			  ● Solvency margins
			  ● Connection between the size of an insurer and its solvency
			● Data on the 50 largest German life insurance companies <Bundesbank>
			  ● Claims incurred and change in insurance reserves
			  ● Transfer to the reserve for premium refunds
			  ● Hidden reserves

		Balance-sheet items	● Ratio of equities to total investments ● Share of fixed-income assets ● Investments of German life insurance companies, total volume <BaFin>
		Others	● Number of companies <BaFin> ● Data on the 50 largest German life insurance companies <Bundesbank> ● Bonus interest rate (=interest rate on policyholders' credit balances for the following year)
	Hedge funds		● Number and assets under management of hedge funds
De Nederlandsche Bank	Pensions funds + Insurers	Solvency, reserves	● Cover ratio pension funds and insurers <DNB>

Non-bank financial institutions (continued)

Institutions	Category		Indicators
		Balance-sheet items	• Changes in investment portfolios insurers <CBS> • Changes in investment portfolios pension funds <CBS>
	Hedge funds		• Numbers; managed funds in USD billions
Bank of Canada	Life insurance industry	Profitability	• Return on equity of insurance industry <OSFI and Bank of Canada calculations>
	Property and casualty insurance industry	Profitability	• Return on equity • Average nominal premiums written: private passenger vehicles <Insurance Bureau of Canada>
Monetary Authority of Singapore	Insurance sector	Profitability	• Incurred loss ratio (= claims incurred relative to premiums earned)
	• Singapore life insurance	Profitability	• Premiums growth (annual, single, total premiums: yoy %) <MAS> • Total new business premiums (annual, single premiums: SGD mil.) <MAS>
		Balance-sheet items	• Assets distribution of Singapore Insurance Fund (non-linked assets) <MAS>
	• Singapore general insurance	Profitability	• Gross premiums (Offshore Insurance Fund, Singapore Insurance Fund: yoy % growth) <MAS> • Profitability of the SIF and OIF (underwriting profit/loss, investment income: SGD mil.) <MAS> • Incurred loss ratios (Motor (SIF), Workmen's Compensation (SIF), Total: %) <MAS> • Composition of Net Premiums of Singapore Insurance Fund <MAS>

Financial markets

Institutions	Category	Indicators
European Central Bank	Interest bearing instruments	• US six-month TED spread • US ten-year treasury yields and FED funds target rates • Net non-commercial positions in the 10-year treasury futures • Net secured financing of US primary dealers • US BBB corporate bond spreads • Frequency distributions of emerging economy bond spreads • Implied bond market volatility in the euro area • Option-implied skewness coefficient for ten-year bond yields in Germany • Euro area large corporations' bond spreads • BBB rated corporate bond spreads in the US and the euro area • Bond issuance in the euro area • Subordinated bond spreads for the euro area insurance industry • Spreads on US high-yield corporate bonds • Emerging market bond spreads
	Equity	• 12-month-ahead expected EPS growth, actual EPS growth • Gross equity issuance and pipeline deals in the euro area • Equity issuance in the euro area • US risk aversion index (Goldman Sachs) • Price-earnings (P/E) ratio for the US stock market • Option implied probability distribution function for the S&P 500 index • US stock market leverage: debit balances in New York Stock Exchange margin accounts (NYSE) • Open interest in options contracts on the S&P 500 index • Gross equity issuance in the US
	Exchange rate	• Chinese RMB/USD spot and forward rate • Foreign exchange purchases by the Bank of Japan and custody holdings with the US Federal reserve • Share of indirect bidders in US treasury auctions • Issuance of and changes in foreign holdings of US bonds • Speculative USD/EUR positions (net long positions on euro) • Nominal broad USD effective exchange rate index • Implied volatility for USD/EUR and JPY/USD
	Others	• US mutual fund flows
Bank of England	Interest bearing instruments	• CDS premia for selected European banks (individual banks) • Ten-year nominal government bond yields (US dollar, Euro) • Volatility (Money markets, realised, implied) • Six-month volatilities implied from at-the-money options on three-month interest rate futures (Sterling, Euro,US dollar)

Financial markets (continued)

Institutions	Category	Indicators
		• CDS premia for large insurers • Sovereign credit rating and bond spreads for selected EMEs • Changes in regional and sectoral bond yield spreads • Twelve-month issuer-weighted speculative-grade default rate • Proportion of B- and below rated US domestic bond issues out of total sub-investment-grade issues • Leveraged loan issuance • Spreads over libor on BBB-rated tranches of collateralised debt obligations (CDOs) with a variety of underlying assets • Spreads over swaps for BBB-rated corporate bonds (CDS premia generally trade higher than bond or loan spreads) • Credit default swap premia for large UK-owned banks and non-bank companies
	Equity	• Equity markets • Regional equity index performance (EMEs, Japan, Euro area, United Kingdom, United States, world) • Implied equity index skews • Implied volatilities for large UK-owned banks and non-bank companies
	Exchange rate	• US dollar money market yield curves • Foreign exchange markets • Term structure of implied volatility for the US dollar/yen bilateral exchange rate • Foreign net purchases of long-term US securities (US corporate bonds, US equities, US government agency bonds, US treasury bonds and notes, Foreign direct investment) • Chinese yuan non-deliverable forwards
	Others	• Average sovereign credit ratings for selected EMEs • Volatility of commodity markets, oil (realised, implied) • Speculative positions in commodity futures (oil, copper, gold, silver)
Sveriges Riksbank	Interest bearing instruments	• Credit spreads for companies with high and low ratings and for high-yield bond • Credit spreads for bonds issued by emerging market countries (Europe, Asia, EMBI+)
	Equity	• Equity prices in selected countries • Implied stock-market volatility in selected countries • Implied volatility of bank equity (individual banks)
	Others	• Up- and down-grading of companies in Western Europe
Banco de Espana	Interest bearing instruments	• EMBI-US Bond spreads (EMBI: Emerging Market Bond Index, Brazil, Mexico, Chile, Latin America) • Ten-year bond rates
	Equity	• Kyle lambda (a parameter determined by the average amount of cash necessary to move the price of a security or an index by 1%) • Stock-market indices and PERs

Financial markets (continued)

Institutions	Category	Indicators
	Exchange rate	● Spot dollar /euro and yen/dollar exchange rates ● Exchange rates in Latin America
Banque de France	Interest bearing instruments	● 10-year government securities ● Spreads of emerging economies (EMBI+ index, Global, Asia, Europe, Latin America) ● United States: the federal funds target rate and long-term interest rates implied volatility ● United States: yield spreads between US 2-year and 10-year government securities and the federal funds target rate ● Break-even inflation rate derived from the French 10-year index-linked bond and WTI futures prices ● Risk premia on corporate bonds ● Euro area net corporate bond issuance ● BBB corporate spreads ● Five-year CDS premia on senior debt of European and French banks
	Equity	● Stock market indices (Euro Stoxx 600, Nikkei, SP 500) ● Implied volatility (Euro Stoxx 50, DAX) ● SP 500: equity risk premia ● Share prices of the main French banks (individual banks)
	Exchange rate	● EUR/USD exchange rate ● Total foreign exchange reserves (for emerging economies)
	Others	● Defaults on corporate bonds rated by Standard and Poor's ● One-year stock market confidence index (Yale School of Management) ● Three-month futures contracts on commodities
Deutsche Bundesbank	Interest bearing instruments	● 10-year government bond yield (Euro area, USA) ● Implied volatilities in the bond market (US Treasury future, Eurex Bund future) ● USA: Interest rate differential between (10-year government bonds and three-month repo rates) ● Yield differential of German government bonds (vis-à-vis US Treasury bonds) ● Credit spreads of corporate bonds over government bonds (investment-grade, speculative-grade, euro area USA) ● Risk premiums on government bonds from emerging-market countries ● Credit default swap premiums of German big banks (individual banks)
	Equity	● Price-earnings ratio of major stock indices (S&P 500, Euro Stoxx, DAX) ● Decomposition of the Euro Stoxx price index (implied risk premium, real interest rate, current dividends, earning expectations) ● Implied volatility in the US stock market ● Stock indices of the US banking sector (commercial banks, investment banks)
	Others	● Balance of bond volume affected by rating changes ● Defaults on bonds (rest of the world, USA)

Financial markets (continued)

Institutions	Category	Indicators
De Nederlandsche Bank	Interest bearing instruments Exchange rate Others	• Corporate bond yields and spreads • Market expectations on yield curve (Euro, US) • Eurodollar exchange rate (net position (number of contracts), exchange rate) • Number of changes of credit ratings per annum
Bank of Canada	Interest bearing instruments Equity Exchange rate	• Default rates on speculative-grade bonds (Global, United States, European Union) • Volatility of yields on 2-year and 10-year US notes (10-day annualized historic volatility) • Yield on US and Canadian 10-year notes/bonds • Emerging-Market Bond Index (EMBI+) Spread over US treasuries • Return on equity (automotive manufacturing, wood and paper manufacturing, electronics and computer manufacturing) • North American stock market indexes (TSX, S&P 500) • Return on equity of insurance industry (life and health, property and casualty) • Canadian dollar exchange rate
FRB	Interest bearing instruments Equity	• Interest rates (10-year Treasury security, intended federal funds rate, high-yield bonds, Moody's Baa corporate bond, 30-year fixed mortgage) • Indexes of bank stock prices (Top 50 banks, Top 225 banks) and the S&P 500
Hong kong Monetary Authority	Interest bearing instruments Equity Exchange rate	• Official spot and forward interest rates in major economies (US, Euro area, UK, Japan) • US Treasury yield curve • Hong Kong dollar interbank interest rates • Interest rate differentials between Hong Kong dollar and US dollar • Selected major equity indices • Hong Kong equity prices • Implied volatility of the Hang Seng Index • US dollar: bilateral exchange rates • Renminbi non-deliverable forward rates • Hong Kong dollar exchange rate • Hong Kong dollar forward points
Monetary Authority of Singapore	Interest bearing instruments Equity Exchange rate	• US Government bond yields • US Fed Fund futures • US corporate bond spreads • Short term interest rates in Asia • Interest rates (USD SIBOR, SGD SIBOR) • Exchange rate (SGD vis-à-vis selected currencies) • Global Equity markets • Net foreign purchases of Asian equities • Asian equity markets • Equity Prices in Singapore • Swiss Re & Munch Re equity prices • Exchange rate (USD/JPY, EUR/USD, USD/CHF) • US capital flows and net foreign purchases of USD assets • Asian currencies vis-à-vis USD

Non-financial sector

Institutions	Category	Indicators
European Central Bank	External environment	● World real GDP excluding the euro area
	US	● Current account deficit ● Net lending/borrowing of the US economy ● Financing of the US current account deficit ● Foreign purchases of official assets in the US ● US ten-year bond yield and consensus ten-year nominal GDP growth expectations
	Corporate sector balances	● US non-financial corporate and business debt-to-GDP ratios ● US non-farm, non-financial corporate sector financing gap ● Debt structure of the US non-farm, non-financial corporate sector ● Growth of US corporate profits and shares of interest payments and retained earnings in profit ● US corporate liabilities-to-asset ratio ● US corporate sector rating downgrades, upgrades and balance
	Household balances	● Debt-to-disposable income ratio ● House prices ● Liabilities to assets ratio ● Ratio of net worth – assets less liabilities – to household disposable income ● Delinquency rates on loans
	Fiscal balances	● Fiscal accounts balance ● Government debt-to-GDP ratio ● Net increase in liabilities of the US public sector
	Non-euro area EU countries (non-financial sectors)	● Household debt-to-GDP ratios in the new member states of the EU household income gearing ● Household borrowing growth
	Emerging market economies	● Selected financial vulnerability indicators – current account balance (% of GDP), external debt (% of GDP), short-term external debt (% of reserves), foreign reserves (in months of imports) ● China's trade balance
	Euro area Non-financial corporate sector	● Frequency distribution of expectations for euro area GDP ● Corporate debt-to-GDP ratio ● Costs, sales and profits of Dow Jones EURO STOXX 50 companies ● Annual growth of euro area corporate earnings per share (EPS) ● Total amount outstanding of MFI deposits ● Total debt to total financial assets ratio

Non-financial sector (continued)

Institutions	Category	Indicators
		• European non-financial corporate sector downgrades, upgrades and balance • Annual GDP growth and corporate insolvencies • Expected default frequency distributions for large and small firms (Moody's KMV) • Correlation of monthly expected default frequencies and oil price changes • Annual office price changes
	Household sector	• Housing market dynamics and loans – house prices, loans for house purchase • Household debt-to-GDP ratios in the EU15 • Composition of financial assets • Residential property price changes • Gross and net savings ratio • Total debt servicing burden as a ratio of disposable income • Debt/financial assets ratio • Residential property prices and nominal household disposable income • House price-to-rent ratios • Owner-occupied dwelling stock
Bank of England	UK, US, and Euro area	• Real GDP growth
	UK	• Whole-economy earnings
	Household sector	• Secured and unsecured borrowing • Ratio of debt to income • Income gearing • Unemployment: level and inflows • Personal insolvencies and bankruptcies • Bankruptcy petitions
	Corporate sector (mainly private non-financial companies)	• Net rate of return on capital • External finance • Distribution of weighted profit margins • Percentage of companies making a loss • Capital gearing • Capital expenditure • Pension fund deficits

Non-financial sector (continued)

Institutions	Category	Indicators
		• Income gearing • Indicators of corporate liquidity • Corporate insolvencies • Administrator appointments, company voluntary arrangements (CVAs) and receiverships • Commercial property companies' total borrowing from all UK banks • Commercial property yields
	US	• Household debt-to-income ratio • Household debt service and financial obligation ratios • Capital and income gearing of the non-financial corporate sector • Change in capital gearing of non-financial corporate sectors • Commercial property vacancy rates
	Europe	• Household debt-to-income ratios • Household income gearing • German non-business insolvencies • Private non-financial corporations' capital gearing at market value • Number of European corporate ratings changes • Sub-investment-grade corporate bond default rates (Europe & Global)
	Japan	• Consensus GDP forecasts • Net profits and profit forecasts of listed firms • Sources of corporate finance • Ratio of corporate debt to operating cashflow • Corporate bankruptcies
	Emerging market economies	• Net private sector financial flows to EMEs by region • Regional consensus GDP forecasts • The price of brent crude oil • Exports of metals for selected EMEs • Impact on annual oil trade balance of a $50 per barrel oil price for selected EMEs • Gross external financing requirement as a percentage of foreign currency reserves • Government primary balance and GDP growth for selected EMEs • Average sovereign credit ratings for selected EMEs • Chinese economic indicators • China's consumer price inflation and goods inflation • China's imports of raw materials and fuels • Hong Kong's real GDP • Investment in EME securities

Non-financial sector (continued)

Institutions	Category	Indicators
Sveriges Riksbank	Global	• Up- and down-grading of companies in Western Europe & US • Oil prices
	Sweden	• House prices (Sweden, Norway, Denmark, Finland, UK, USA, Australia) • Real prices of office premises in central locations • Real rents for office premises in central locations • Vacancy rates for office premises in central locations • The domestic buyers' share of transaction on the Stockholm property market

	Corporate sector	• Corporate borrowing and borrowing ratio
		• Interest and debt ratios for small and large companies
		• Interest and debt ratios for new companies
		• Corporate sector bankruptcy rate and number of employees affected
		• Number of defaulting companies broken down by size
		• The shares of the listed companies which report improved profit, and which report better earnings as well as higher profits
		• Bankruptcies broken down by industry
		• Expected default frequency (EDF) by industry for listed non-financial companies
		• Interest and debt ratios for property companies
		• Expected default frequency (EDF) in Nordic countries (Sweden, Norway, Denmark, Finland) and Germany
		  • Listed non-financial companies
		  • Listed property companies
		• Retail premises of their property holdings

	Household sector	• Household borrowing by type of credit institution (total, banks, mortgage institutions, other credit market companies) • Prices of single-family dwellings and lending to households by credit institutions • Households' real and financial assets and ratio of debts to total assets • Ratios of household debt and post-tax interest expenditure to disposable income • The shares of fixed rates and variable rates of house mortgage loans

Non-financial sector (continued)

Institutions	Category	Indicators
		• Duration of interest terms for total household borrowing • Breakdown of households' housing expenditure
	Germany	• The share of firms with less than five employees of all defaults
	Nordic area	• Bankruptcy rate
	Baltic states	• Household sector debt • The debt to GDP ratio
Banco de Espana	Euro area	• GDP
	Spain	• GDP • The inflation differential vis-à-vis the euro area
	Non-financial corporations	• Gross operating profit, ordinary net profit, net profit • Ordinary returns on investment and on equity • The spread between the ordinary return on investment and the average cost of borrowed funds • The total financing • Distribution of the total and doubtful bank debt by debt-burden percentiles
	Households	• Borrowing • Debt, debt burden arising from interest
	Rest of the world	• GDP
	US	• GDP • Business investment • Current account deficit • Budget deficit
	Japan	• GDP
	China	• GDP • CPI
	Latin America	• GDP (Mexico, Chile, Brazil, Latin America, Argentina, Venezuela, Uruguay) • Inflation for the area as a whole • Sovereign credit ratings (Chile, Peru, Dominican Repubic's, Brazil, Venezuela, Uruguay) • Foreign direct investment (Brazil, Mexico)
Banque de France	Global environment	• Brent crude oil price

Non-financial sector (continued)

Institutions	Category	Indicators

	Developed countries	• GDP (US, Japan, Euro area)
		• Consumer prices (US, Japan, Euro area)
		• General government deficit (US, Japan, Euro area)
		  • Public debt (Japan)
		• Household debt (US, Japan, Euro area)
		  • Household debt servicing ratio (US)
		  • Share of variable-rate households loans (US)
		• Ratio of debt financing of non-financial corporations to GDP (US, Japan, Euro area)
		• Downgrade/upgrade ratio
		• Defaults on corporate bonds (outstanding amounts affected by defaults, overall default rate)

	US	• Current account balance and net savings (public and private) • Household debt servicing ratio • Share of variable-rate households loans

	Emerging market	• GDP
		  • Emerging Europe (Czech Republic, Hungary, Poland)
		  • CIS (Russia)
		  • Emerging Asia (China, India)
		  • Latin America (Argentina, Brazil, Chile, Mexico)
		• External financing of emerging countries: gross primary issuance (Asia, Europe, Latin America, others)
		• Total foreign exchange reserves (Central and Eastern Europe, Latin America, Emerging Asia, CIS)
		• Terms of trade of emerging countries (Europe, Asia excluding China and India, CIS, Latin America, Asia)
		• Credit rating of long-term foreign currency sovereign debt (Chile, China, India, Peru, Philippines, Russia, Thailand, Turkey, Venezuela)
		• The share of Southeast Asian consumption of crude oil

Deutsche Bundesbank	Global environment	• World output • The average growth rate of consumer prices in the industrial countries (IMF forecast) • The impact of a lasting increase in the price of oil of 5 US dollars per barrel on global growth (IMF simulations) • The long-term inflation expectations (breakeven inflation) in the financial markets in US and in the euro area – as measured by inflation-indexed bonds • Real estate prices in relation to nominal GDP (US, UK, France, Italy, Spain, Netherlands) • The net inflows of private capital to the emerging market economies
	US	• Output growth • The increase in employment • Debt service burden (interest payments and capital repayments) of their disposable income

Non-financial sector (continued)

Institutions	Category	Indicators
		• Households' liabilities of their disposable income • Pre-tax profits of non-financial corporations • The interest expenditure ratio of non-financial corporations • The current account deficit
	Japan	• GDP • The impact of a decline in China's import growth on Japan's GDP growth (IMF)
	Euro area	• GDP • The contribution to growth from domestic demand and real foreign trade • Harmonised Index of Consumer Prices (HICP) • The debt ratio of non-financial corporations • Households' indebtedness in relation to GDP
	Germany	• GDP • Simulation on the effect of permanently high oil prices to consumer prices and GDP • Insolvencies and affected claims (total, consumer, corporate) • Real estate prices (new dwellings, resales) • Peak rents (in five selected urban centres) • Vacancy rate (excluding sub-let agreements) in two of the five cities • Foreclosure sales of houses and flats
	Enterprises	• Degree of indebtedness (as a percentage of gross value added) • (Net) interest burden (net interest expenditure as a percentage of the operating surplus) • Financing via bank loans (financing via domestic bank loans as a percentage of the total cash flow) • Size structure of the insolvencies in the corporate sector • Upgrades as % of all rating changes • Probability of default of listed enterprises
	Households	• Debt ratio (as a percentage of disposal income) • Interest burden ratio (as a percentage of disposal income)
De Nederlandsche Bank	Netherlands	• Cyclical conditions – private consumption, gross corporate investment (excl. dwellings), exports of goods and services

Non-financial sector (continued)

Institutions	Category	Indicators
	Non-financial corporations	● Credit worthiness (number of changes of credit ratings, change in number of bankruptcies) ● Debt-to-asset ratio ● Office premises – supply and demand
	Household	● Wealth of Dutch households (ratio to GDP, breakdown by assets) ● Debt-to-disposal income ratio ● The number of households with payment difficulties on mortgage loans ● Valuation of housing market – house prices as a percentage of disposable income (Netherlands, UK, US, Euro area)
	US	● Oil prices and US interest rate ● US current-account deficit
	Emerging market economies	● Fundamentals – Growth real GDP, Current account, reserve cover (Latin America, Asia, East and Central Europe)
Bank of Canada	Canada	● Real GDP growth ● Canadian business confidence
	Non-financial corporate sector	● Debt-to-equity ratio ● Debt capacity: debt-service costs to cash flow ● Financing (breakdown by instruments) ● Short-term credit ● Financial position (return on equity, debt-to-equity ratio) ● Return on equity: automotive manufacturing ● Return on equity: wood and paper manufacturing ● Return on equity: electronics and computer manufacturing
	Household sector	● Credit (consumer credit, residential mortgage credit) ● Debt ratios (debt to total assets: market values, debt to disposable income) ● Debt (debt-service ratio, real disposable income per family) ● Financial indicators – credit card delinquency rate (90+ days), personal bankruptcies, residential mortgage loans in arrears 3 months or more ● Projections of the debt-service ratio based on different paths for the overnight rate ● International levels for house prices (Canada, UK, UK, Australia) ● Housing market indicators – unoccupied dwellings (apt. and row; single and duplex), Accommodation ratio (rented/owned) ● Housing starts and new MLS listings

Non-financial sector (continued)

Institutions	Category	Indicators
	Global environment	● Oil prices ● Evolution of consensus estimates for annual growth of industrialized economies (North America, Europe, Japan) ● Default rates on speculative-grade bonds (Global, US, EU) ● Corporate debt-to-equity ratios (US, UK, Japan) ● Corporate profits (US, UK, Japan) ● Household debt (US, UK, Japan)
FRB	Non-financial corporations	● Financing gap at non-farm, non-financial corporations ● Debt burdens for nonfinancial corporations
	Household	● Financial obligations ratio for households ● Household bankruptcy filings with credit card delinquency rate

Monetary Authority of Singapore	Macro environment	● GDP
		  ● Industrialised countries (US, Japan, Euro-zone)
		  ● Southeast Asia (Malaysia, Indonesia, Philippines, Thailand)
		  ● Northeast Asia (China, Hong Kong, Taiwan, Korea)
		● Global commodity prices (WTI oil, metal)
		● Electronics Industry (semiconductor book-to-bill ratio, electronics inventories, the growth of the global semiconductor industry)

	East Asia	● Non-financial corporate ratios
		  ● Debt to equity ratio (Malaysia, Indonesia, Philippines, Thailand, China, Hong Kong, Taiwan, Korea)
		  ● Return on assets (Malaysia, Indonesia, Philippines, Thailand, China, Hong Kong, Taiwan, Korea)
		● Household indebtedness (default rate of housing loan)

	Singapore	● GDP, sectoral contribution to GDP growth ● Labour market indicators (employment changes, nominal earnings, unemployment rate) ● CPI inflation

Non-financial sector (continued)

Institutions	Category	Indicators
	Non-financial corporate sector	● Earnings growth ● Return on assets (property, manufacturing, commerce, multi-industry, tpt, storage & comm) ● Current ratio (property, manufacturing, commerce, multi-industry, tpt, storage & comm) ● Leverage ratio (debt/equity) (property, manufacturing, commerce, multi-industry, tpt, storage & comm) ● Firms with interest cover below 1.0 ● Number of firms wound-up ● Corporate sector indicators – leverage ratio, debt ratio, current ratio- (Singapore, Malaysia, Thailand, Hong Kong, Korea, US, UK)

	Household sector	● Household net wealth
		● Household assets and liabilities, liabilities/asset ratio
		● Residential property prices (value of residential properties)
		● Household savings
		● Household investment assets
		● Survey results on negative housing equity
		  ● Total number of account (accounts in delinquency, outstanding value in delinquency, outstanding value unsecured)
		  ● Total outstanding value of residential housing loans

Bank of Japan	Non-financial corporations	● Distribution of firms' credit scores ● Credit score and credit cost ratio ● Expected and unexpected losses from loan portfolios ● Break-even interest rates for loans

Institutions	Category		Indicators
European Central Bank	Strengthening euro area financial system infrastructures ● Payment systems ● Securities clearing and settlement systems	International	● Large-value payments processed via TARGET (% of total value of EUR transactions) ● Large-value payments processed via TARGET (% of the NCBs/ECB's share in terms of value and volume) ● Volumes and values of FX trades settled via CLS in USD billion equivalent ● CSDs* in the euro area ● Euro area CCPs** for financial instruments
Bank of England	Links between financial institutions ● Payment and settlement system exposures	Domestic international	● Monthly daily average domestic payments by value ● Daily volumes and values settled in CLS (ten-day moving average)[a] ● Initial margin required by LCH for its largest cleared markets at end-month

	Strengthening financial infrastructure
	Tiering in infrastructures
	● CHAPS Sterling
	● CREST Sterling
	● Other systems (LCH, CLS)
		Domestic	● Number of direct participants in large-value payment systems
			● Sterling interbank payment flows (by value, in percentage)
			  ● Correspondent payments via CHAPS
			  ● Non-correspondent CHAPS payments
			  ● Internalized correspondent payments
			● The highest recorded intraday peak exposure to a single second-tier customer bank (averaged across the sample period of the survey)
			● Average fees per transaction across eighteen large-value payment systems[b]

Sveriges Riksbank	The financial infrastructure	International	● Turnover global foreign exchange trade USD billion
			● Total settlement through CLS, daily average per month (USD billion and percent)
			  ● Gross, net before inside/outside swaps, net after inside/outside swaps
			● SEK settled in CLS, daily average per month (SEK billion and percent)
			  ● Gross, net payments (percent)
			● CLS' market share for settlement of Swedish krona
			● Contribution of netting and swaps by CLS to save liquidity compared with payments made on a gross basis
			● Size of liquidity lock-in measured as the balance on the CLS account in the central bank in relation to the total payments made into this account during the day

Banque de France	Post-market infrastructure	–	–

Financial Infrastructures (continued)

Institutions	Category		Indicators
Deutsche Bundesbank	Infrastructure of payment and securities settlement	–	–
De Nederlandsche Bank	Importance of infrastructure and crisis management	–	–
Bank of Canada	Clearing and settlement systems	Domestic	● Volume of payments processed by the LVTS <Large Value Transfer System> (average daily amount per month) ● Value payments processed by the ACSS <Automated Clearing Settlement System> (average daily amount per month)

		International	● Canadian-dollar foreign exchange trades settled by the CLS Bank (average daily amount per month)
			  ● Liquidity ratio (the value of funds required to settle these transactions, relative to the value of the transactions themselves = a measure of the liquidity savings provided by CLS settlement)
			  ● Daily average value of trades
			  ● Daily average value of pay-ins

Monetary Authority of Singapore	Financial infrastructure ● Payment systems ● Securities clearing and ● Settlement systems	–	–

Notes:
* *CSD: central securities depositories.*
** *CCP: central counterparties.*
a *Volume figures report the number of sides before splitting (the process of breaking down into smaller parts transactions of high value in order to improve settlement efficiency.)*
b *Four types of fee are included: entry fees (assumed to be spread over a ten-year period); periodic fees; transaction fees; account fees. Messaging costs are not included.*

Macro prudential analysis and statistics: are available figures up to the job?

Stefano Borgioli (ECB)

Introduction

In recent years the interest in monitoring financial stability at the level of the overall system has grown substantially. The number of financial stability reviews currently published by Central Banks and Supervisory Authorities clearly shows the increasing interest in this area of analysis. The ECB publishes a report on EU Banking Sector Stability on an annual basis, and the first public issue of the ECB Financial Stability Report was published in December 2004.

This paper deals with some of the issues arising from the derivation of the statistical basis for financial stability analysis and in particular for macro-prudential analysis, focusing in particular on a subset of the financial system, i.e. the banking sector. Two main sets of balance sheet data on the euro area banking system are currently available at the ECB for the purpose of macro-prudential and stability analysis: i) macroeconomic statistics on banks' balance sheet items, collected and compiled for monetary policy purposes, and ii) consolidated banking data compiled on the basis of aggregated micro-prudential supervisory returns.

This contribution assesses these two sets of data against the requirements of macro-prudential analysis. It examines issues such as the comprehensiveness of the data, the methodology, the alignment with international statistical standards and the timeliness.

We will argue that the monetary statistics fare very well in terms of harmonisation, accuracy and frequency. By contrast, the consolidated banking data are available at much lower frequency, on a far less timely basis and are characterised by a lower degree of harmonization. The crucial strength of the latter dataset is, however, its consolidation scope.

The paper is organised as follows. Section 2 presents a quick overview of stability analysis and the connected data needs, with a particular focus on the aggregate banking system. Sections 3 and 4 describe the monetary statistics and the consolidated banking data respectively. The final section puts forward some concluding remarks.

Conceptual background

Financial instability generates uncertainty and leads to resource misallocation. Distress in the financial sector may create strong turbulences in the economies and financial crises can be extremely costly[1].

High-quality statistics are needed for the conduct of monetary policy and for targeting financial stability. Referring to monetary policy, its ultimate goal is price stability, which can be measured in terms of inflation indicators. Conversely, there is no easy and universally accepted definition of financial stability. A long catalogue of possible definitions has been put forward[2]. According to Tommaso Padoa-Schioppa, financial stability is "*A condition whereby the financial system is able to withstand shocks without giving way to cumulative processes, which impair the allocation of savings to investment opportunities and the processing of payments in the economy*"[3]. As is clear from this, the concept of financial stability is not confined to the

1 *On the estimated costs of banking crises see IMF (1998), Davis (1999), Hoggart and Saporta (2001).*
2 *Houben A., Kakes J. and Schinasi G. (2004) present several definitions of financial stability.*
3 *Padoa-Schioppa, T. (2003).*

banking system, but is a much broader concept, which comprises all of the relevant components of the financial system: markets, institutions, infrastructures.

Irrespective of the exact definition used for financial stability, it is rather easy to agree with the view that "*There is no unequivocal unit of measurement for financial stability. This reflects the multifaceted nature of financial stability, as it relates to both the stability and resilience of financial institutions, and to the smooth functioning of financial markets and settlement systems over time. Moreover, these diverse factors need to be weighed in terms of their potential ultimate influence on real economic activity*"[4].

In the end, stability analysis encompasses an assessment of the whole economic environment, and hinges on the need for a multidimensional framework, that exploits a very large set of data. Within the broad framework of stability analysis, macro-prudential analysis is carried out to assess the stability of the financial system as a whole and to describe the threats to it that could result either from common shocks, which affect many or all financial institutions at the same time, or from shocks that could spread from one institution to another[5]. The framework of macro-prudential analysis makes use of a set of macro-prudential indicators (MPIs), which permit to assess and regularly monitor the strengths and vulnerabilities of the system.

The framework for the macro-prudential analysis used at the ECB provides examples of the conceptual, operational and statistical complexity of this type of analysis. Since the establishment of the ECB, the Banking Supervision Committee (BSC) of the European System of Central Banks (ESCB) has undertaken a regular monitoring of the sources of potential vulnerability in the European Union (EU) banking sector. The set of the indicators used in the ECB macro-prudential analysis comprises "data that gauge macroeconomic developments and forecasts, the financial conditions of households and firms, the conditions of other financial institutions, general financial market developments and the current financial condition of the banking sector. In addition, it includes a number of forward-looking indicators"[6].

Also the IMF Financial Soundness Indicators (FSIs) provide an indication on the comprehensiveness of the conceptual architecture backing macro-prudential analysis and, accordingly, the large array of requested statistical data. The FSIs are partitioned into two sub-sets of indicators: a core set and an encouraged set. The core set focuses on the banking sector and covers the main categories of bank risks. The encouraged set of indicators comprises additional indicators for the banking sector, as well as indicators for the non-bank financial sector, the corporate and households sector and the real estate market.

In July 2004, the IMF released the final draft of its Compilation Guide on Financial Soundness Indicators (the Guide)[7]. The primary purpose of the Guide is to provide guidance to the compilers and users of FSIs on the concepts and definitions, as well as data sources compilation and dissemination, for the core and extended set of FSIs. The Guide is intended to encourage compilation of FSIs and promote cross-country comparability of these data, as well as to assist compilers and users of FSI data.

We will now focus on the banking system and the connected macro-prudential indicators. Whatever the conceptual framework behind the indicators, these indicators must provide a consolidated and global view of the condition of the banking sector. Balance sheet and exposures data, profitability and solvency data are used in the analysis. Income statements are needed to monitor income generation, efficiency, profitability. Balance sheet items are used for instance to assess liquidity conditions and asset quality (in terms of composition, exposures, non performing assets). Solvency data provide information on the size of capital buffers and therefore on the capacity of the system to withstand shocks.

In order to properly gauge relevant developments impacting on financial stability, the statistical basis used for the indicators should comply with certain key requirements.

In terms of coverage, the indicators should in principle cover all the relevant financial institutions. Moreover, data should be as harmonised as possible at conceptual and operational level to ensure proper aggregation. A sound legal basis backing the data collection, compilation and dissemination is also desirable.

A comprehensive assessment of profitability, solvency and concentration of risks would require fully consolidated data, implying domestically controlled cross border consolidation

4 *Houben A., Kakes J. and Schinasi G. (2004).*

5 *See also ECB (2004b).*

6 *ECB (2004b), p. 81. A detailed list of the macro-prudential indicators regularly monitored by the ECB is provided in Mörttinen L. et al. (2005).*

7 *Cfr. the IMF website at the page http://www.imf.org/external/np/sta/fsi/eng/2004/guide/index.htm. See also Krueger (2004) and Sundararajan, V. et al. (2002).*

(foreign subsidiaries and branches reported by home country of the parent company) and also industry consolidation (the so-called cross-sector cross-border approach).

The analysis of stability at macro-level is conducted on the economic system as a whole. However, a high level of aggregation may hide potentially relevant information. To tackle this issue, detailed data, by size and industry, on exposures at risk would be needed, as well as a sufficiently detailed instrument breakdown. Indicators can be presented for different subsets of institutions (peer groups) of banks. This permits to identify potential problems affecting a particular set of institutions that can actually be hidden in the aggregate data but can nevertheless be relevant from the stability perspective. Moreover, aggregated data on the whole system are usefully complemented with measures of dispersion. In fact, the distribution of many indicators may not be symmetric around the central tendency indicators. This skewness could be relevant from a stability point of view.

Two types of statistics related to the banking system are currently collected and compiled by the E(S)CB: the data collected for monetary policy purposes, such as balance sheet statistics and interest rate statistics, and the aggregate data derived from supervisory returns. Of course, the E(S)CB uses many other data sources for the conduct of macro-prudential analysis. This paper will nevertheless focus on those sources where the ECB acts as data compiler and on how they can fit the needs of macro-prudential analysis, bearing in mind that none of these sources was explicitly designed for this purpose.

Monetary statistics

The ECB compiles and disseminates data on the balance sheet items (BSI) of the euro area Monetary Financial Institutions (MFIs)[8]. These data are reported to the ECB via the national central banks of the ESCB. Regulation ECB/2001/13[9] imposes the necessary reporting requirements for this purpose on the reporting institutions. The largest part of the data is, since January 2003, available at monthly frequency and is published by the end of the month following the reference month. Monthly data are generally available broken down by currency, by maturity, by residency and by SNA 93 counterparty sector. Some additional breakdowns are available at quarterly frequency and published by the end of the second month following the reference quarter.

The main purpose of these datasets is to provide the ECB with a comprehensive statistical picture of monetary developments in the euro area, viewed as one economic territory. These data are also used to calculate the minimum reserve requirements. Eventually, the balance sheet items of the MFIs and the derived transactions are a building block of the euro area financial accounts.

BSI statistics are compiled in line with international statistical standards (ESA 95, SNA93) and are based on a fully harmonised set of concepts and definitions. They are built on a sound legal framework, set out in ECB regulations and guidelines. They are available at high frequency and their reporting is compulsory. For the main aggregates long time series are available. Finally, the data are of very high quality, given the extensive checking which they regularly undergo, first at the national central banks and then at the ECB.

However, the international statistical standards that underlie the conceptual definition of BSI data, besides providing the advantage of a harmonised framework for statistics, impacts rather substantially on some definitions that are relevant for stability analysis. As a matter of fact, the design of the MBS data has been tailored on the specific needs of monetary policy and does not always meets the requirements of financial stability analysis.

The consolidation and the residency criteria used in BSI statistics are particularly relevant in this connection.

8 *The notion of banking system is close to, but differs from the MFI sector. In addition to credit institutions (a concept close to the traditional concept of banks), the latter also includes the central bank (system) and the money market funds (besides a few residual "other institutions"). The ECB also receives every quarter a subset of data on credit institutions only. The assets side of the aggregate balance sheet of the euro area credit institutions is published in the ECB web site, https://stats.ecb.int/stats/download/bsi_ci/bsi_ci/bsi_ci.pdf*

9 *The regulatory powers of the ECB are laid down in the Treaty establishing the European Community (the "Treaty") and in the Statute of the European System of Central Banks and of the European Central Bank (the "Statute"). The ECB has the competence to adopt legal acts and other ECB legal instruments. In line with the principle of conferral of powers – by application of which the European System of Central Banks (ESCB) and the ECB act within the limits of the powers conferred upon them by the Treaty and the Statute – the regulatory power of the ECB is restricted to the objective of carrying out the tasks entrusted to the ESCB/Eurosystem. Among such legal acts, the ECB makes Regulations to the extent that this is necessary to implement its designated tasks and, in specific cases, as determined by the Council of the European Union (EU Council).*

MFIs report BSI statistics on solo (non-consolidated) basis and following the host country residence approach. Moreover, in case banking branches and subsidiaries are located in another euro area country, the balance sheet of the branch or subsidiary is reported within the aggregated balance sheet of the host country and not within the aggregate data of the home-country of the parent institution. Finally, and relevant, if the branch or subsidiary of an euro area credit institution (CI) is located outside the euro area, the balance sheet data of this subsidiary are not recorded in the system. Data referring to branches of extra euro area CIs, located in the euro area, are reported on solo basis within the host country data.

This non-consolidated reporting raises some complications when focusing the analysis on financial stability issues. Indeed, an exhaustive representation of the global exposure to a given counterpart sector (for instance, non-financial corporations[10]) should entail a consolidated balance sheet considering all the exposures of related entities, branches and subsidiaries. Hazards to the stability of the banking system can materialize from any part of the balance sheet, regardless of the geographical (and sectoral, see below on cross-sector consolidation) (al-)location of assets and liabilities[11]. In many respects it is irrelevant whether bank exposures originate from the bank's head office or from a controlled institution located abroad. Any losses will be borne by the capital of the controlling banking group and, in the end, potentially impact on the stability of the system.

As a result, the analysis and the conclusions drawn on the basis of solo data may not be sufficiently accurate and disregard potential threats to stability. This is not only true at single institution level, but also at aggregate level: a description of the banking exposures based on solo data may not be fully adequate.

However, some qualifications are needed. If the analysis is confined to the assessment of potential risks to the euro area banking system stemming from euro area non-financial counterparties, BSI statistics can provide quite adequate evidence. Indeed, it is rather unlikely that a subsidiary of a euro area CI located outside the area would lend to euro area residents on any significant scale. This is in particular the case with respect to lending to households and to small and medium enterprises, since retail banking markets in the European Union remain strongly segmented along national lines. However, this does not apply to other types of exposures. For instance, BSI statistics cover exposures of a euro area CI vis-à-vis non-financial corporations resident for example in Asia, but they do not comprise the exposures of Asian subsidiaries to the same borrowers[12]. This may clearly result in an underestimation of the risks potentially faced by the euro area banking system.

In quantitative terms, the exclusion of the balance sheet of foreign subsidiaries, due to solo reporting, may matter, at least in certain cases. For instance Debbage (2002) found that:

> "*This 'missing part' of the consolidated balance sheet is not insignificant. By comparing UK-resident and consolidated data, the assets of non-UK located subsidiaries can be estimated at around 45% of the total consolidated balance sheet of the large UK-owned commercial banks*".

The percentage presented above clearly highlights the relevance of foreign subsidiaries for large UK financial intermediaries. It could be the case, however, that at euro area level this percentage would be lower, taking also into account the intra-bank control relationships within the euro area itself. Anyway it cannot be assumed to be irrelevant.

With reference to the 15 countries of the European Union up to May 2004, the share of total assets of foreign controlled subsidiaries and branches was, at end-2003, around 13% of the total assets of the banking system[13].

As seen, the current BSI data do not include all the banking exposures and, accordingly, all the potential threats to stability of the system. BSI statistics, besides to not being consolidated within the banking system, are not consolidated cross-sector. This means that they do not comprise possible risks stemming from other types of intermediaries (for instance insurance corporations or securities firms), belonging to a banking group[14]. In a financial environment

10 *The detail of counterparty breakdown in BSI statistics will be touched upon in the following.*

11 *This problem is exacerbated by the fact that, as mentioned above, exposures of extra euro area branches and subsidiaries are not captured in the BSI data.*

12 *On the other hand, BSI statistics do not comprise assets and liabilities of euro area residents vis-à-vis banks located outside the euro area.*

13 *Own calculations on the basis of the data reported in the Statistical Annex of ECB (2004a).*

14 En passant *it could be also noted that the, according to Council Regulation (EU) No. 2533/98 concerning the collection of statistical information by the ECB, the ECB is not even allowed to collect data directly from Insurance Corporations and Pension Funds, ICPF, (ESA sub-sector S-125).*

characterised by growing integration and consolidation and by the blurring of fences between the activities of different intermediaries, this limitation has obvious bearings on the stability analysis.

A potentially incomplete mapping of all the risks facing the banking system, due to non-consolidated reporting, is not the only issue worth to be highlighted when assessing BSI data for the needs of financial stability analysis. In the following we will briefly touch upon two other issues: available breakdowns and valuation rules.

The monthly reporting scheme for MFI data is presented in Annex 1 to this paper. The main assets/liabilities are broken down by (original) maturity/currency of denomination/residency and sector of the counterparty. For instance, MFI exposures are broken down by National Accounts sub-sectors. However some breakdowns that could be of interest for stability analysis are not available, especially with reference to the assets side of the balance sheet. The most relevant are listed in the following, together with a short rationale of their relevance to stability analysis.

- Breakdown of available data by type of bank. Different types of banks react differently to external shocks, due to the different structure of their balance sheet.
- Breakdown of exposures to the non-financial corporation sector by industry. A further breakdown of bank's assets by industry (TLC, manufacturing, real estate etc.) would improve the assessment of vulnerabilities stemming from risk exposure. When available, the breakdown of lending by industry branch would help identifying potential risks that may be concealed by aggregate data, for instance distinguishing exposures to cyclically sensitive sectors or industries in difficulties, and loan concentration.
- Breakdown by size of the exposures and/or size of the borrowers. The availability of this breakdown would allow the analysis of different patterns in the soundness and profitability of small and medium sized firms in comparison to large firms.
- Loans to the private sector broken down by secured/unsecured loans. This breakdown is relevant for the analysis of the risk taken by financial intermediaries and also for the analysis of the impact of asset price changes on the balance sheet of banks (for instance, via the refinancing of mortgages following changes in the prices of residential properties).
- Loans to the private sector broken down by fixed/floating interest rates. The availability of this detail would allow analysing the relative sensitivity of different economic sectors to changes in interest rates. A change in the interest rate climate could imply risk for debt sustainability and thus the exposure of the banking sector.

Also, definitions of assets/liabilities and valuation rules applied in the BSI data are not necessarily in line with the need of financial stability analysis. For instance, the definition of "capital and reserves" and the applied valuation criteria may be different from those adopted in stability analysis. Again, non-traded assets/liabilities are recorded in the system at nominal value, instead of market value. This is rather neutral for deposits, whose market value and nominal value would anyway coincide in the major part of cases, but it is more problematic for loans, whose market value is sometimes rather different from the nominal one. Analysing assets quality is clearly affected by this fact.

Eventually it must be reminded that, in terms of coverage, the MFI data have their main focus on the euro area while the stability analysis conducted at the ECB covers both the euro area and the EU.

Consolidated banking data (aggregated micro-prudential data)

The macro-prudential analysis carried out by the BSC is based on a set of consolidated banking data reported by the member organisations of the BSC[15]. To some extent, these data, which are compiled on the basis of national supervisory reporting forms, have complementary strengths and weaknesses in comparison to the BSI data described in the previous section.

The consolidated data cover the following areas: bank profitability, balance sheets and solvency. In addition to aggregates, data on dispersion across banks are reported. Data comprise nearly 100% of the EU banking sector and provide separate information also on foreign controlled institutions active in EU countries. Data are broken down by size groups of reporting

15 *Part of the results of the macro-prudential analysis carried out at the ECB are regularly published in the ECB Stability Report and in the ECB Financial Stability Review.*

institutions and are reported to the BSC on an annual basis, with a 6–7 month lag. These aggregate macro-prudential data are based on the supervisory data collected by the national supervisory authorities and follow the accounting framework set out in several EU Accounts Directives. Solvency ratios follow the standards set out by the Basel Committee, introduced in the relevant EU directives.

As already mentioned, the first significant difference vis-à-vis the MFI statistics is the consolidation scope of the reporting population. In order to provide a comprehensive view of risks, data are reported on a cross-border and cross-sector consolidated basis. Due to cross-border consolidation, data on branches and subsidiaries located outside the domestic market (from the reporting country's point of view) are included in the data reported for the parent institution. Moreover, cross sector consolidation includes other financial intermediaries belonging to banking groups. This is relevant when complex groups of financial conglomerates are an important feature of a given financial system. Potential risks incurred in one sector of the financial industry could pose threats to other sectors of the conglomerate or to the whole financial group. Insurance companies are however currently excluded from the consolidation perimeter of these data.

Accordingly, and contrary to the MFI statistics, this data set covers the entire balance sheet of the banking sector, irrespective of the location of single assets and liabilities.

Data for "foreign banks", i.e. the institutions that are subsidiaries and branches controlled by a parent resident either outside the EU or in the EU but "foreign" from the reporting country's point of view, are not included in the EU aggregates. However, a separate analysis on foreign controlled subsidiaries and branches is conducted due to their potential relevance for the domestic banking sector. As a matter of fact, in some EU countries foreign controlled entities represent a major share of the banking sector assets.

Statistical information provided within the framework of the consolidated banking data fare well in terms of coverage and consistency across countries. However, data are still not perfectly harmonised in some areas like non-performing and doubtful loans and provisions, owing to underlying differences in national definitions and business practices. This may hamper cross-country comparisons and the construction of EU aggregates[16].

Moreover, given the supervisory background of this data set, a rather reduced breakdown of assets and liabilities is available, in terms of instruments, counterparties sector and residency, currency of denomination, maturity. The provision of further breakdowns by instruments and counterparts (also for the off-balance sheet activities) is definitely an area for future relevant developments.

Also only rather short time series are available.

As a more general issue, at EU level a fully harmonised reporting framework of consolidated balance sheet and profit and loss data as well as capital adequacy data is still not available. In this respect, it must be flagged that the Committee of European Banking Supervisors (CEBS) has been mandated to develop a framework of a standardised consolidated financial reporting package compliant with international accounting standards (IAS/IFRS) to be used by supervisory authorities within the European Union when they request financial information from banks. A public consultation on the draft reporting scheme has started in April 2004. However, the CEBS reporting framework is not intended to be mandatory, and national authorities will decide how extensively this framework will be implemented.

Conclusions

This paper focuses on the availability, at macro level, of balance sheet data for the euro area banking sector and their "fitness" for financial stability analysis. It is sufficient to focus on the banking system to proof that reliable statistical data for financial stability analysis are yet incomplete. The main drawback is that the data come from a range of different sources that are not explicitly designed for a stability analysis.

As shown, there are systematic differences between macroeconomic statistics and aggregated micro-prudential data. It is therefore almost impossible to build a bridge between these two sets of data and they must be analyzed separately. The BSI data are fully harmonized across countries but they are not designed with a stability analysis in mind; aggregated prudential data

16 *The aggregation of regulatory data is a more general issue. In general, national supervisory reporting forms are tailored on the needs of supervising single institutions and are not originally designed for aggregation. On this see Debbage (2002) and Gracie and Logan (2002).*

are conceptually much closer to the needs of this analysis but they suffer from a lack of harmonization, at least in some areas like for instance non-performing loans.

A further expansion and refinement of the statistical basis for financial stability analysis faces substantial difficulties.

A first natural option would be the enlargement of the set of harmonized statistics compiled by the ECB by inserting harmonized statistical requirements for financial stability under this umbrella. This would lead in the medium term to a strong increase in the quality and scope of data for the financial stability analysis. Yet statistics do not come for free. They are costly, both to reporting institutions and to compilers. Additional requirements increase the reporting burden on banks. Reporting institutions are already confronted with a wide range of relevant changes: changes in accounting and valuation rules, a new regulatory framework, and new requirements in the field of monetary statistics.

There are cases in which new data requirements can be met from existing statistics, or from the adaptation or re-compilation of existing data sources. One and the same data source might sometimes serve different analytical purposes. However, this seems not to be always the case in statistics for financial stability. In any case, even with full awareness of the related conceptual and operational difficulties, moving towards a growing integration between supervisory and statistical data frameworks could produce relevant efficiency gains at every level, from reporting institutions to data compilers and users.

Ideally a conceptual integration should precede the integration of the data frameworks. This convergence may not always be possible but there could be areas of improvements. For instance, statistical concepts of sectors and financial instruments may be applied to micro-prudential data, or financial macro-statistics may be extended with additional breakdowns such as, for example, non performing loans or syndicated loans. The introduction of the international accounting standards (IAS/IFRS) might be a first step towards a more intensive integration between statistical and supervisory reports, because in principle the same harmonised accounting rules would be applied to both sets of data. This would contribute to extend the areas of overlapping, the minimum common denominator, between the two set of statistics, contributing also to ease the reporting burden on institutions. In general, an appropriate combination of data requirements and a better co-ordination and harmonization of data requirements among all the relevant players, at national (central banks and supervisory authorities) and international level (ECB, IMF, BIS) would be expected to smooth the process of data collection and compilation. Co-operation and mutual involvement of supervisors and statisticians could bring forward relevant synergies and economies of scope, in terms of technical infrastructures, collection and compilation work, data check and validation. There is room to be exploited in this direction.

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Selected indicators of financial stability

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1. Introduction

Financial instability can impede economic activity, reduce economic welfare, and potentially require a monetary policy response. Conversely, economic and monetary policy surprises can trigger financial instability. Monitoring financial markets and appropriately assessing their stability are therefore tasks of great importance to policymakers. One reasonable working definition of financial stability is a situation where key institutions are operating without significant difficulty, financial markets are functioning well, and asset prices are not significantly removed from fundamental values. Normal fluctuations in asset prices that result from dynamic demand and supply conditions, and even some increase in uncertainty, do not usually generate financial instability and are not a threat to either monetary policy or the real economy. Generally, it is the sudden seizing up of financial markets and the inability or unwillingness of financial institutions to lend that prevents capital from flowing to worthy investments, thereby curtailing economic growth.

To assess the overall health of the financial system and, when financial disturbances occur, to judge the implications of those disturbances for the nonfinancial sector, the Federal Reserve monitors a broad range of financial indicators. Many of these indicators are measures of financial strength, that is, measures of the ability of households or businesses to weather shocks without greatly contracting their spending. Other measures focus on market participants' assessments of, and appetite for, risk. Individual indicators can also be combined into aggregate measures that give a synthetic picture of overall financial conditions and summarize the overall stability of the financial system. Importantly, neither the individual nor the aggregate measures are used as "black boxes" to determine policy actions; they are rather used as instruments to inform policy makers of the current state of financial markets.

The individual measures of financial stability used by the Federal Reserve are taken from a variety of sources, and are available at a wide range of frequencies. Some, such as asset prices, are market-based and can be calculated daily, if not even more frequently. Others, such as financial stocks and flows, are aggregated from individual institutions at a weekly, monthly, or quarterly basis. Finally, some measures are based on surveys, both formal and informal, of market participants, and are gathered on an ongoing basis. The Board of Governors is provided updates about financial market developments regularly (at least weekly and sometimes more frequently). The Federal Open Market Committee, which sets the overnight interbank (federal funds) rate in the United States, is provided with information on financial conditions before each FOMC meeting, although many measures are provided to Committee members on a more frequent basis. Reports on the functioning of U.S. financial markets are prepared at regular intervals in advance of international meetings on financial stability. Several Divisions at the Federal Reserve Board, including the Divisions of Monetary Affairs, Research and Statistics, International Finance, Bank Supervision and Regulation, and Reserve Bank Operations and Payment Systems, contribute to the compilation and interpretation of this information. The next sections of this paper summarize some of the individual and aggregate indicators that are monitored by the authors and other members of the Board's staff.[1] The last section briefly discusses how some of those indicators were

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1 *The authors are part of the Monetary and Financial Stability section (MFST) of the Division of Monetary Affairs (MA). MFST is responsible for analyzing a variety of issues related to financial stability and the operation of financial institutions and markets. Key areas of specialization include the collection and evaluation of information on financial institutions, methods for assessing stress in financial markets, and assisting in the formulation and implementation of policies regarding Reserve Banks' credit and risk management. Section economists analyze financial developments for the Board of Governors and the FOMC and engage in a broad range of longer-term research projects. Not all the measures discussed in this paper are produced by MFST or MA.*

used to assess the impact of the turmoil in the credit markets in the spring of 2005 that was induced by the credit quality deterioration of two large U.S. automobile manufacturers.

2. Measures based on interest rates and asset prices

Asset prices and interest rates are determined by the supplies and demands of forward-looking investors and savers; as such, they react nearly instantaneously to investors' judgments about financial conditions. Because many prices and rates are available virtually instantaneously and continuously, Board staff members monitor a broad range of them for prompt information on market liquidity and market participants' attitudes toward risk.[2]

Measures of market liquidity provide information on the ability of financial markets to absorb large transactions without large changes in prices, and on the premiums investors are willing to pay to hold more liquid assets. The Board's staff assesses the liquidity of the market for U.S. Treasury securities, in part, by looking at bid-ask spreads and volumes. As an example, the top two panels of exhibit 1 plot these measures for the ten-year on-the-run Treasury security in April and early May, 2005.[3] The Treasury market is an over-the-counter (OTC) market, and consequently bid-ask spreads and volume data for Treasury securities are more difficult to obtain than for exchange-traded securities, such as stocks or most futures. The Board's staff currently relies on intraday data collected by electronic brokers, such as BrokerTec for the inter-dealer market and TradeWeb for the dealer-to-customer market. While those electronic brokers do not represent the whole market, they appear to account for substantial and growing percentages of the total daily trading volumes in Treasury securities.

Members of the Board's staff also follow liquidity premiums, defined as the yield on a less liquid security minus the yield on a highly liquid but otherwise similar security. Highly liquid securities, generally, can be sold rapidly and at a known price. The amount investors are willing to pay for that comfort, in the form of higher prices or lower yields with respect to less liquid securities, may rise rapidly during periods of financial market difficulties, particularly when the source of such difficulties is heightened investor uncertainty. Because these spreads may react rapidly to financial difficulties, and are available at high frequencies, the Board's staff reviews them often. The middle-left panel of exhibit 1 plots the liquidity premium for the two- and ten-year on-the-run Treasury securities relative to the corresponding first-off-the-run securities in recent months, adjusted for the auction cycle. Yield data on Treasury securities are readily available from a variety of sources.

As suggested by economic theory, expected yields on risky debt instruments and equities relative to those on riskless assets vary with investors' assessments of risk and willingness to bear risk. The spreads between the yields on riskier and less risky securities widen when investors judge their relative risks to have increased, and also when investors demand a higher premium for a given amount of risk. Thus, these spreads will increase when investor uncertainty increases or financial conditions worsen; a sharp widening of these spreads has often been a component of financial turmoil. Examples of such spreads are the differences between investment-grade and speculative-grade corporate yields and comparable-maturity Treasury yields, plotted in the middle-right panel of exhibit 1. The Federal Reserve Board receives yields on several thousand outstanding corporate bonds every day; those data are then used to compute a variety of indexes, such as those shown in the exhibit. Other spreads over Treasury securities that are regularly monitored are swap spreads, which can provide information on the credit quality of the banking sector as well as market liquidity conditions; agency spreads (also relative to swaps and high-grade corporate debt), which are proxies for the housing government-sponsored enterprises' (or GSEs) cost of funds; and money market spreads, such as commercial paper spreads (an indicator of the costs of short-term corporate funding).

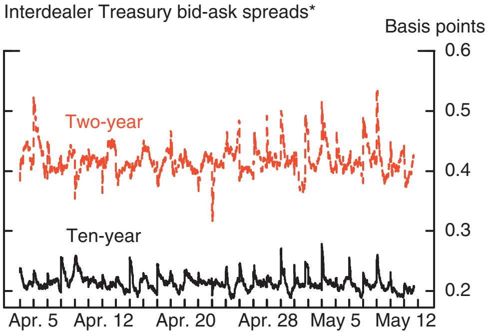
Equity prices vary with changes in investors' appetite for risk; in investors' expectations for, and uncertainty about, future macroeconomic and firm-specific outcomes; and in the clarity of information available to investors. To invest in equities, investors demand a premium over bond yields because the return on bonds is generally more predictable. The Board's staff assesses

2 *This paper draws, in part, from "Pragmatic Monitoring of Financial Stability," by William R. Nelson and Wayne Passmore, in* Marrying the Macro- and Micro-Prudential Dimensions of Financial Stability*, BIS Papers, No.1, March 2001. That paper contains, among other things, a more detailed description of some of the individual indicators of financial stability in use at the time at the Federal Reserve Board.*

3 *Corporate credit markets were under stress at that time because of the problems at Ford and General Motors. The Treasury market, however, was functioning properly, as evidenced by the minimal bid-ask spreads and the substantial volumes.*

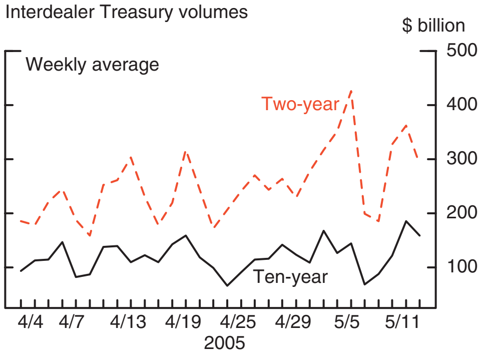
Exhibit 1 – Measures based on interest rates and asset prices

Interdealer Treasury bid-ask spreads*



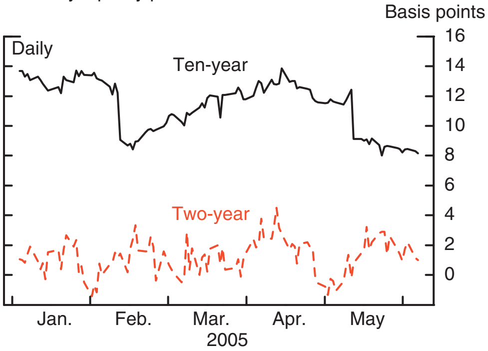
*Intraday four-hour moving average.
Source: BrokerTec.

Interdealer Treasury volumes



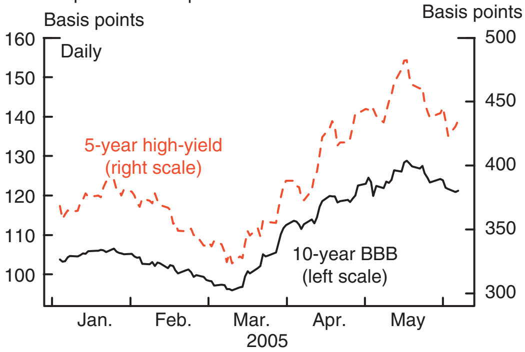
Source: BrokerTec.

Treasury liquidity premiums*



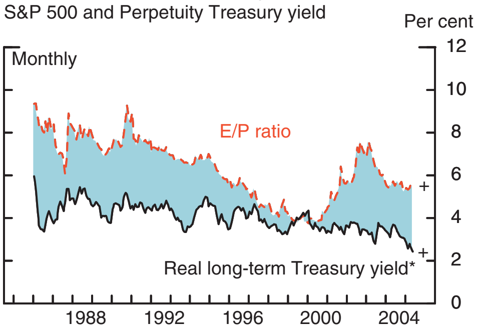
*Computed as the spread of the yield read from an estimated off-the-run yield curve over the on-the-run Treasury yield.

Corporate bond spreads*



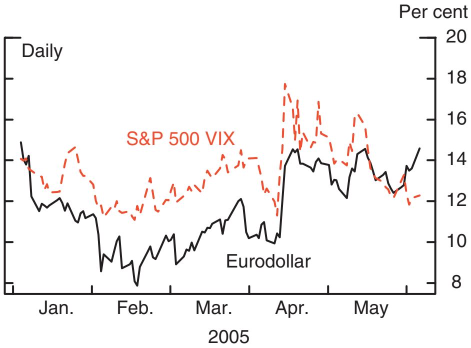
*Based on yield curves estimated using Merrill Lynch bond data.

12-month forward trend earnings-price ratio for S&P 500 and Perpetuity Treasury yield



Notes: + Denotes the latest observation using daily interest rates and stock prices and latest earnings data from I/B/E/S.
*Perpetuity Treasury yield minus Philadelphia Fed 10-year expected inflation.

Implied volatilities*



*Calculated from options on the underlying contract.

the equity premium in a number of ways, including by comparing the earnings-price ratio of the S&P 500 to the real level of the ten-year Treasury rate – the lower-left panel in exhibit 1. The earnings-price ratio is calculated using analysts' expectations for earnings during the upcoming year and is adjusted to remove the effect of cyclical changes in earnings. For this purpose, the real ten-year interest rate is calculated by subtracting a survey-based measure of long-term inflation expectations from a nominal long-run Treasury rate. Unfortunately, interpreting changes in this measure of the equity premium is difficult. For example, a decline in the earnings-price ratio relative to the real interest rate may reflect new economic information that raises investors' expectations of future earnings growth; or it may indicate that investors have better information or greater certainty about economic outcomes, or an enhanced appetite for risk. Comparisons of analysts' expectations about longer-term earnings growth to the staff's forecast of earnings permit some judgments about reasons for changes in the earnings-price ratio, but such analysis embodies a great degree of uncertainty.

The Board's staff uses option prices to measure investors' assessment of the likely volatility of interest rates and equity prices. These measures have proven to be useful and timely indicators of investor uncertainty and can also be used to construct the probability distribution of underlying economic outcomes. For example, options on Eurodollar futures provide a measure of the expected volatility of very short-term rates, which rises when investors become more uncertain about the future path of near-term monetary policy (the black line in the lower-right panel of exhibit 1). Equity options (the red line) provide information on investors' uncertainty about equity prices. Those options can also be used to construct the risk-neutral probability distribution of the returns on underlying contract (such as the S&P 500 index): A distribution with a long left tail would presumably indicate elevated market participants' concerns about, or aversion to the possibility of, large losses before the options' expiration.

Those described above are but a small sample of the indicators based on interest rates and asset prices that members of the Board's staff regularly monitor. A rough count of the number of the basic, individual indicators in daily (or more frequent) production easily exceeds one hundred. Large amounts of data are necessary to construct those indicators and use them in daily reports. In addition, the data, which are provided by a large number of different sources, in different formats, and often at different frequencies, need to be stored in a convenient and easily-accessible database. Significant resources are devoted to the maintenance of such a database, in terms of software, storage space, network accessibility, and personnel.

3. A financial fragility indicator

The information contained in an array of financial variables such as those described above can be condensed into a financial fragility indicator which estimates the probability that the U.S. financial system is currently under severe stress. In our view, two episodes in recent U.S. financial history can unambiguously be called financial crises – the weeks surrounding the Russian default and the recapitalization of Long Term Capital Management in the fall of 1998, and the aftermath of September 11, 2001. While the causes of those crises were entirely different, several key financial variables behaved in a very similar way during both of those episodes. In particular, risk, liquidity, and term spreads and implied volatilities all moved significantly higher at those times; moreover, they did so at a rapid pace and largely at the same time. Based on these observations, the construction of the indicator follows a two-step process. First, the information contained in the twelve individual variables listed in the top panel of exhibit 2 is reduced to three summary statistics that capture their level, their rate of change, and their correlation.[4] And second, a logit model is estimated to obtain the probability that, at any given time and based on the three summary statistics, the behavior of financial markets is analogous to that of the fall of 1998, and the aftermath of the terrorist attacks of 2001.

Perhaps the most straightforward summary statistics, plotted in the middle-left panel, is an arithmetic average of the values of the individual indicators, normalized by their standard deviations, over the entire sample period from 1994 to the present. As noted by the gray-shaded regions, the index is quite elevated during times of acute stress.[5] As shown in the middle-center panel, the percentage change in the level indicator computed over rolling eight-week intervals gives a sense of the speed of the movements in the underlying financial market variables. One might expect that financial markets would be more "fragile" during episodes when risk spreads, liquidity premiums, and volatility indicators are moving sharply higher. Conversely, even when the level of those indicators remains high, sharp declines in many or all of them might signal the end of a period of acute financial distress. This rate-of-change indicator again singles out the fall of 1998, the weeks following the terrorist attacks, and the late summer of 2002 as particularly noteworthy periods.

As shown in the middle-right panel, a time-varying measure of the co-movement in the individual stress variables can be defined as the percentage of the total variation of the individual variables that can be explained by a single, common factor. This measure was highest at the time of the global financial crisis of 1998, but the months in the run-up to Y2K and following the September 11th attacks were also characterized by elevated correlation among the key financial variables. The shaded region corresponding to the late summer and fall of 2002 does not stand out as a period of high co-movement. Even though risk spreads widened dramatically at that time, changes in other measures of market stress were mixed.

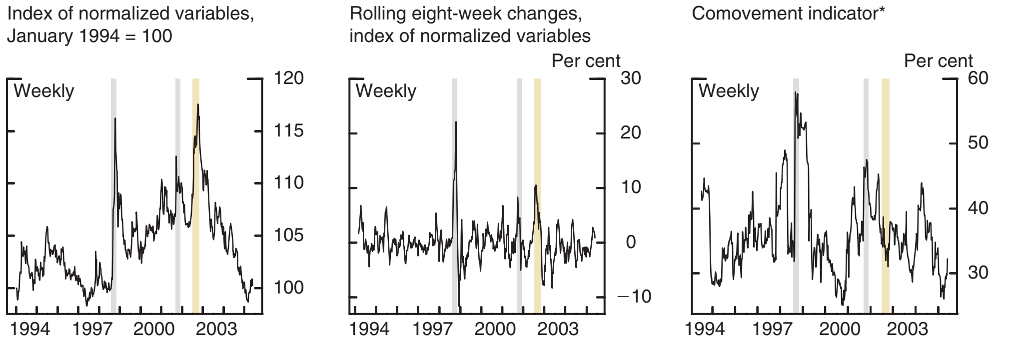
4 *Those indicators are quoted so that higher values would be associated with greater market strains.*

5 *A third episode during which financial markets where under heavy strain, in addition to the two noted earlier, was the summer and fall of 2002, when risk spreads widened sharply in response to corporate scandals and credit quality problems at several large institutions.*

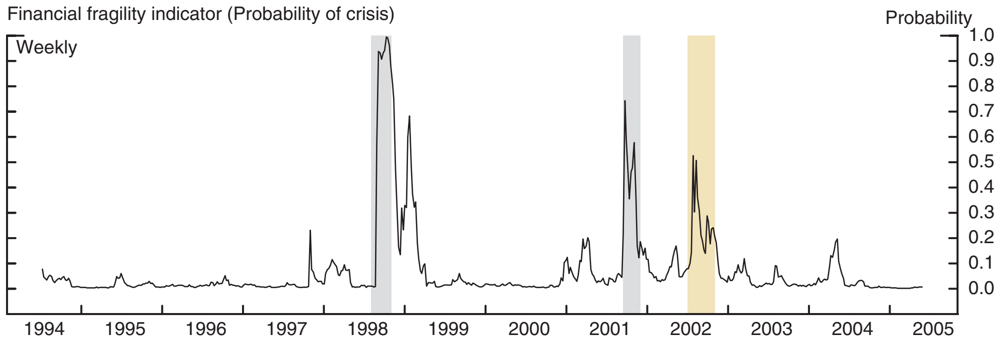
Exhibit 2 – Financial fragility indicators

List of financial variables summarized

- 2-year liquidity premium
- 10-year liquidity premium
- BBB risk spreads
- AA risk spreads
- High-yield risk spreads (7-year)
- 3-month Eurodollar confidence interval 1-year ahead
- Long bond implied volatility
- Eurodollar implied volatility
- 10-year Treasury implied volatility
- SP100 implied volatility (VXO)
- Federal funds target − 2-year Treasury
- (12-month ahead earnings/SP500) − (10-year Treasury)



**Per cent of total variation in individual stress variables explained by the first factor in a rolling 26-week window.*



The three summary statistics discussed above can be combined into a single measure of financial fragility and used to model the probability that, at any given time, the U.S. financial system is in a situation similar to that of the periods identified as crises. This can be accomplished by fitting a logit model with the three statistics as explanatory variables and a binary variable which identifies crises on the left-hand-side:

$$p_t = L(\beta_0 + \beta_1\lambda_t + \beta_2\delta_t + \beta_3\rho_t)$$

In the formula above λ denotes the level indicator, δ represents the rate-of-change indicator, and ρ is the co-movement indicator.

The model is estimated using weekly data from June 1994 to June 2002, with the episodes of 1998 and 2001 defined as crises, and then extended "out-of-sample" until the present.[6] The fitted probability of being in a crisis at each date in the sample is shown in the bottom panel of exhibit 2. As expected, the period of August to October 1998 emerges as the most severe episode of financial

6 *The summer and fall of 2002 seems to have been, in retrospect, a time of less virulent strain in U.S. markets, and thus was not classified as a crisis period and was not included in the estimation. A robustness check showed that results would be qualitatively similar if it had been defined as a period of crisis and if the estimation period had been extended to the end of 2002.*

fragility in the recent past. The model does show an increase in the probability of crisis or financial fragility at other points in time that were not defined as crises. For example, there is a notable uptick in early 1999 coincident with market concerns about developments in Brazil. The summer and fall of 2002 also stand out, although not at levels as high as the two major crises. The last notable – but minor – peak occurred in the spring of 2004, when there was some unease in financial markets about the onset of monetary policy tightening and uncertainty about the pace at which it would proceed after it was started. The measure has remained at quite low levels in the spring of 2005, suggesting that the turmoil in credit markets that was sparked by credit problems at the large automobile manufacturers has not affected other markets to a significant extent.

4. Mortgage market indicators

In recent years, the U.S. mortgage market has grown rapidly. At the end of 2004, the total value of mortgages outstanding exceeded $10 trillion, of which $8 trillion was concentrated on single-family residential mortgages; of those mortgages, about $4.5 trillion were pooled into MBS, or mortgage-backed securities. The MBS market is larger than the Treasury market, the nonfinancial corporate bond market, and the agency market. Virtually all mortgages pooled into U.S. MBS can be prepaid with no penalty; the prepayment option induces what is known as "negative convexity," which implies that duration decreases when yields decrease and increases when yields increase. Because of the size of the market, MBS investors who desire to hedge the prepayment risk of those securities are now, in the aggregate, required to buy or sell substantial amounts of other financial instruments; the volumes involved have the potential to reinforce existing market trends. Such effects can arise under a variety of hedging strategies, but they are perhaps best understood in a simple example of dynamic hedging. A decline in market interest rates, say, causes an increase in prepayment risk that reduces the duration of outstanding MBS. Holders of those securities who wish to maintain the duration of their portfolios at a constant target would then have to purchase other longer-term fixed-income securities to add duration, potentially causing yields to fall further. Similar effects tend to amplify increases in market interest rates as well. Thus, mortgage-related hedging flows have the potential, at least for a while, to push interest rates significantly above or below the level that would be justified by economic fundamentals and, ultimately, to destabilize fixed-income markets.

Several indicators are useful to monitor the impact that mortgage market conditions have on long-term interest rates. One is the average duration of all fixed-rate mortgages included in outstanding MBS securities, plotted in the top-left panel of exhibit 3. Periods of time when duration is increasing or decreasing rapidly could be associated with large hedging flows, as investors buy or sell other fixed-income securities in order to maintain an approximately constant duration target for their portfolios. A rough estimate of the size of those flows can be obtained by assuming that investors have a duration target of 4.5 years and that all MBS investors hedge in the same way.[7] The amount of ten-year equivalent securities that investors would need to hold in their portfolio to achieve their hypothetical target is plotted in the top-right panel of the exhibit. A rapid increase or decrease in the amount plotted indicates a corresponding potential increase in the demand or the supply of ten-year equivalent securities. For example, in July and early August of 2003, when long-term rates rose rapidly as investors sensed that the Federal Reserve's easing cycle had ended, up to $2 trillion of ten-year equivalent securities may have been sold in the market.[8] Flows of even half that magnitude clearly could have amplified the upward move in rates that was already taking place, and likely did so.

Perhaps more interesting than duration is convexity (which can be interpreted roughly as the amount by which duration would change following a 100 basis points change in yields). MBS convexity depends mostly on how likely mortgage holders are to prepay their mortgage; that likelihood, in turn, depends on the distance between the current mortgage rate and the rates of outstanding mortgages. The middle-left panel of exhibit 3 shows the percentage of mortgages in outstanding MBS that are economically refinanceable at a given mortgage rate.[9] The steeper the cumulative distribution is at the current mortgage rate, the higher (more negative) is the

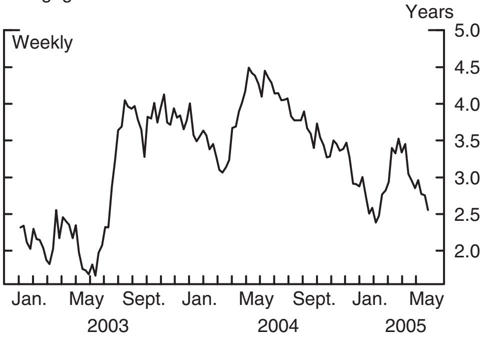
7 *The hypothetical 4.5 years target matches the historical average duration of MBS at times when little refinancing activity was taking place.*

8 *That estimate is conditional on all mortgage investors fully hedging their portfolios, and as such it provides an upper limit to the actual flows.*

9 *We assume that the current mortgage rate should be 50 basis points below the existing rate to make it worthwhile to refinance a mortgage due to the various fees associated with extinguishing an old mortgage and starting a new one. The data in the chart are as of the end of May 2005.*

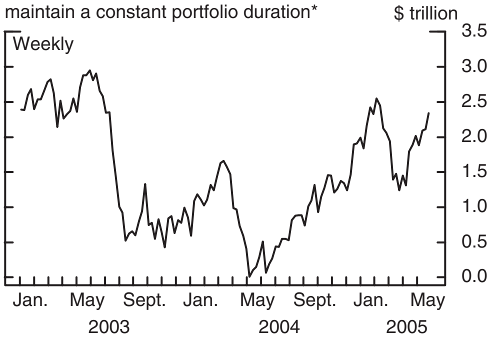
Exhibit 3 – Mortgage market indicators

Mortgage duration*



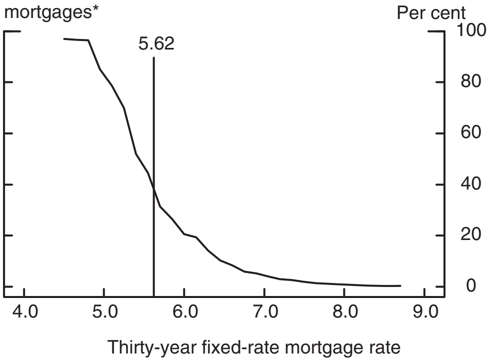
**Based on a large pool of fixed-rate mortgages included in outstanding mortgage-backed securities.*
Source: Merrill Lynch.

Amount of 10-year equivalent securities needed to maintain a constant portfolio duration*



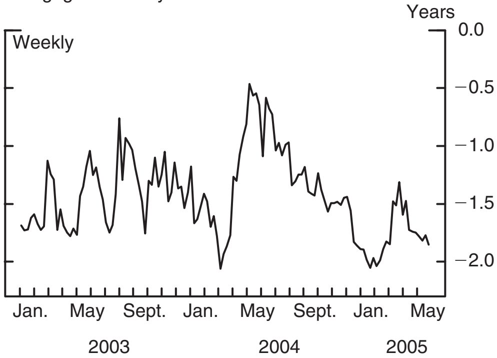
**Staff estimate based on a duration target of 4.5 years.*

Percentage of economically refinanceable mortgages*



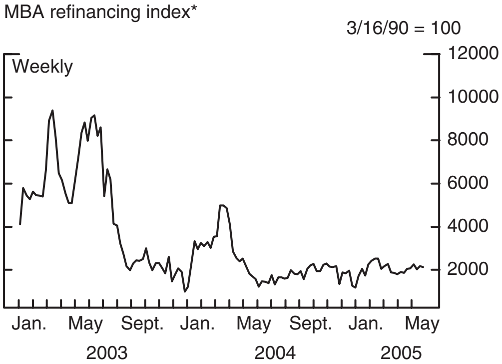
**Cumulative percentage of fixed-rate mortgages included in Fannie Mae's, Freddie Mac's, and Ginnie Mae's outstanding MBS that would be economically refinanceable for any given mortgage rate.*
Source: Bloomberg.

Mortgage convexity*



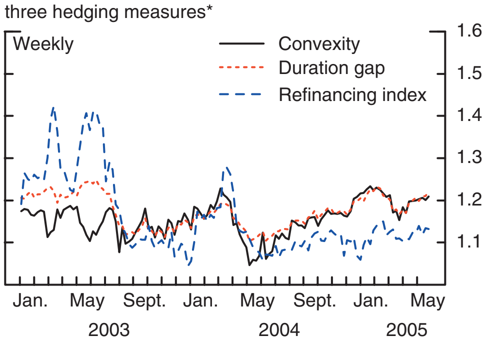
**Based on a large pool of fixed-rate mortgages included in outstanding mortgage-backed securities.*
Source: Merrill Lynch.

MBA refinancing index*



Source: MBA.

Amplification of interest rate shocks according to three hedging measures*



**Based on Perli and Sack (2003).*

convexity of the MBS market. A time series of convexity itself is plotted at the right; for example, in mid 2005, convexity was as negative as it had been in recent years, suggesting that the potential risk of increased volatility in the Treasury and related markets was high.[10]

The information contained in MBS duration and convexity can be used to estimate by how much long-term interest rates shocks are likely to be amplified by mortgage-related hedging flows. Following Perli and Sack (2003), the amplification factor can be obtained by fitting a GARCH model to the volatility of interest rates, under the assumption that hedging flows are determined by either the duration, or the convexity, or the actual amount of refinancing activity

10 *Duration and convexity help inform judgments of the likelihood that substantial mortgage prepayments will take place. It is also useful to monitor the actual pace of refinancing activity; that measure is shown in the bottom-left panel of exhibit 3.*

currently taking place in the market.[11] The amplification factor is plotted in the last panel of the exhibit: According to our estimates, up to 20 per cent of the downward move in ten-year yields that took place earlier in 2005 can be attributed to hedging-related flows. While the confidence interval around that point estimate is fairly wide, it is clear that mortgage hedging could have significant effects on the fixed-income markets that should be monitored carefully. It is important to note that hedging activities, at least in our framework, are never the factor that set off moves in interest rates; they can only amplify, albeit substantially, moves that are already in place.

5. Measures of conditions of individual institutions

Banks can act as transmission mechanisms of crises because they may sharply contract credit in response to depositor demands for early and quick redemption of funds. Or, with deposit insurance, depository institution liabilities may rise with heightened demand for safety and liquidity. The Federal Reserve collects weekly data on bank credit and the monetary aggregates which, to some extent, can be used to monitor financial problems. For example, rapid growth in bank business loans may indicate substitution away from unreceptive capital markets. Similarly, the monetary aggregates may grow more rapidly when investors shift funds out of bond and stock mutual funds and into safer and more liquid bank deposits or money funds.

In the past, both aggressive lending practices and the contraction of lending at banks have been cited as the transmission mechanism of financial problems to nonfinancial businesses and households. The Board collects information from commercial banks four times per year – before every other FOMC meeting – on the standards and terms on, and demand for, loans to businesses and households in its Senior Loan Officer Survey on Bank Lending Practices. The Senior Loan Officer Survey poses a broad range of questions to loan officers at approximately sixty large domestic banks and twenty-four U.S. branches of foreign banks. On the topic of banks' tolerance for risk, the survey asks about changes in risk premiums on business loans, and about changes in business loan standards. Although these surveys are not frequent enough to use for monitoring a quickly unfolding financial crisis, the Federal Reserve has authority to conduct up to six surveys a year, and has done special surveys when warranted by financial conditions, most recently in March of 2001.

The Federal Reserve is the umbrella regulator for financial services holding companies, the primary regulator of bank holding companies, U.S. branches of foreign banks, and state-chartered banks that are members of the Federal Reserve System; other institutions have other primary regulators, with whom Federal Reserve regulatory staff maintains close contacts. Through its supervisory role, the Federal Reserve learns about the condition and behavior of commercial banks, and acts to maintain the soundness of these institutions. During periods of financial turmoil, the familiarity with these intermediaries deepens the Federal Reserve's understanding of developing conditions. Communication between the regulatory and policy functions occurs regularly and is institutionalized at various levels.

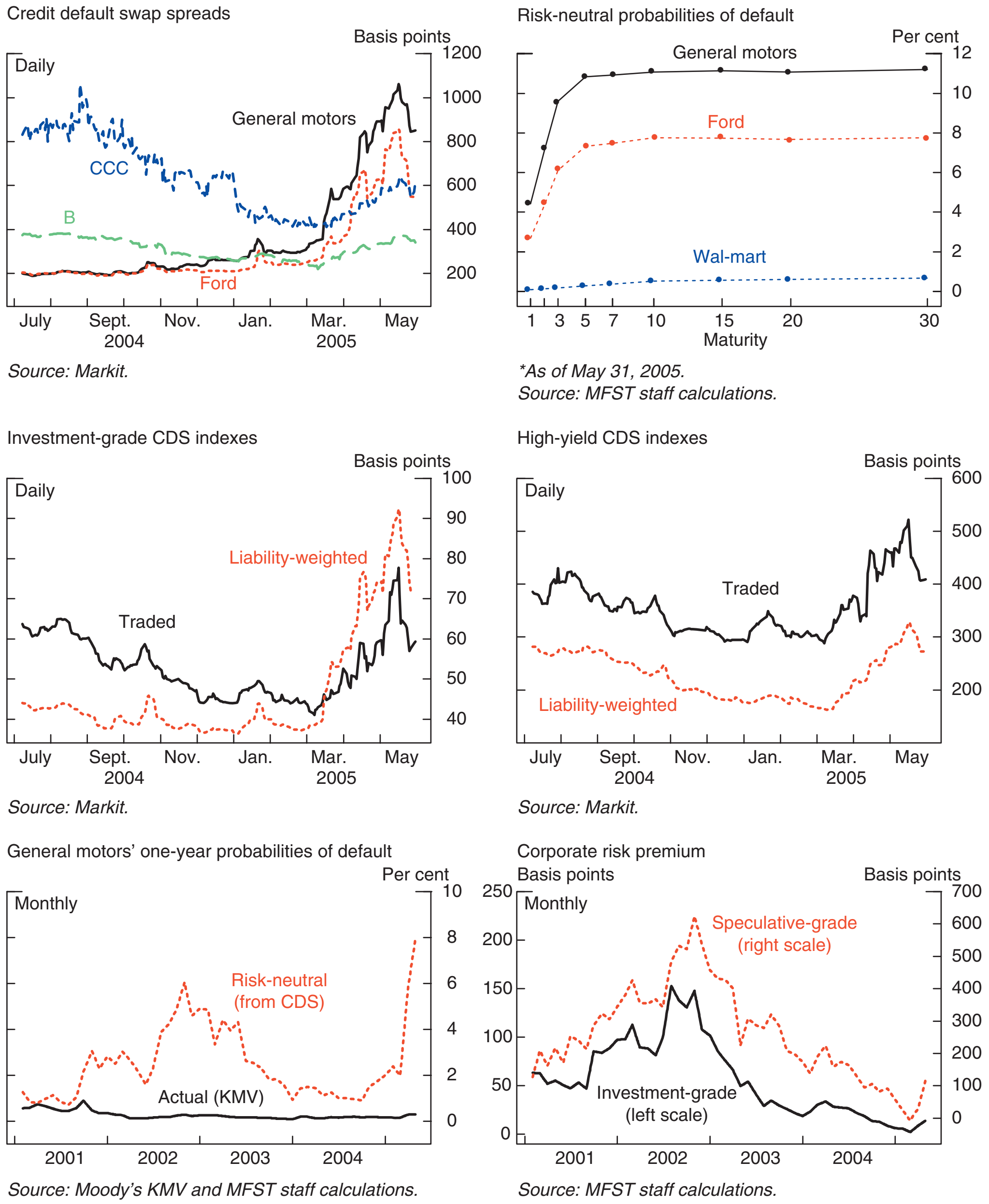
Not all financial institutions are depositories; indeed many large ones, such as insurance companies, the financial subsidiaries of large non-financial corporations, the housing GSEs, etc., are not. In addition, many non-financial corporations are heavy participants in financial markets – through their commercial paper and bond issuance programs – and often have large lines of credit with banks. While the Federal Reserve does not regulate most nondepository financial and non-financial institutions, the Board's staff does monitor information that bears on financial conditions to be able to assess the impact of difficulties at one or more of those institutions on the financial system. The monitoring takes place primarily through market-based indicators, such as commercial paper, corporate bond, and credit default swap (CDS) spreads.

An example of non-financial institutions monitoring is presented in the top two panels of exhibit 4. Ford and General Motors have experienced some difficulties in the spring of 2005; the top-left panel of the exhibit plots five-year CDS spreads for the two institutions, as well as the average spread for CCC-rated institutions.[12] While the rating agencies downgraded the obligations of one or both automakers to junk status beginning in early May, it is clear from the chart that market participants anticipated the rating action by many months. The chart at the top-right shows the term structure of default probabilities for Ford and GM obtained from CDS spreads as of the end of May 2005. The term structure for another large non-financial institution is shown for comparison purposes.

11 *See Perli, R. and Sack, B., "Does Mortgage Hedging Amplify Movements in Long-Term Interest Rates?,"* The Journal of Fixed Income*, vol. 13, December 2003, pp. 7–17.*

12 *Our data source, Markit, does not report CDS quotes for firms rated below CCC.*

Exhibit 4 – Measures of conditions of individual institutions



The Board's staff monitors CDS on a large number of institutions, both financial and non-financial. As of this writing, CDS data is available on 814 U.S. firms, of which 532 are rated investment-grade and 282 are rated speculative-grade. With such a large amount of data, it is useful and convenient to calculate indexes. The investment-grade and speculative-grade indexes computed by weighting each individual CDS spread by the outstanding liabilities of the corresponding firm are plotted in the middle panels of exhibit 4. The panels also show the corresponding market-traded indexes, which are constructed as equally-weighted averages of the CDS spreads of the component firms. Those indexes can serve as an alternative to the corporate bond spreads shown in exhibit 1. For several firms CDS are reported to be more liquid than corporate bonds, so CDS indexes may actually be more representative of current market conditions than corporate bond spread indexes.[13]

13 *This is especially true at times when individual institutions are experiencing difficulties. At those times many investors would want to sell short the trouble institutions' bonds, but those bonds may be hard to obtain in the repo market. Many corporate bonds are typically held by money-managing firms, such as pension funds or mutual funds, that already have plenty of cash and don't need to finance the purchase of the bonds. Those institutions, thus, may not make the bonds available in the repo market, since by doing so they would effectively pay to obtain even more cash.*

Credit default swaps give an idea of investors' perception of the riskiness of an institution, but the probabilities of default derived from those instruments are risk-neutral probabilities, i.e., they incorporate investors' attitude toward risk. Obtaining good measures of actual default probabilities is not easy. One option is to use KMV Corp.'s expected default frequencies (EDF). Those are derived by first computing distances to default for all publicly traded firms in the U.S. based on Merton's model, and then by mapping those distances to default into actual defaults using a large historical database.[14] Actual default probabilities are typically lower than risk-neutral probabilities since the latter include a risk premium. Indeed, as shown in the bottom-left panel of exhibit 4, the EDF for General Motors, as estimated by KMV, has been substantially lower than the corresponding risk-neutral default probability since 2002; the risk-neutral probability has surged in March and April of 2005 following the much-publicized problems and the consequent credit rating downgrades, while the EDF has only edged up. The difference between the two provides a rough estimate of the risk premium that investors demand to provide credit protection on General Motors obligations.

Before backing up in coincidence with the problems at Ford and General Motors, credit spreads declined to levels near or below those that prevailed before the crisis of 1998, and some observers have expressed concern that investors' are not pricing risk properly. The difference between risk-neutral probabilities and the EDFs can be taken for all firms for which data are available, and the average or median of that difference across all firms can be considered a measure of the corporate risk premium.[15] This measure is plotted in the bottom-right panel of exhibit 4 for both investment-grade and speculative-grade reference entities. While it is true that the risk premium fell to very low levels (virtually zero, indeed) in the early part of 2005, it backed up noticeably in March and April, especially for speculative-grade credits.

6. Probabilities of multiple defaults

Corporate spreads or credit default swap spreads and KMV's EDF can be used to assess the probability that an individual institution will default within a given time interval. However, from a systemic risk perspective, the likelihood that more than one institution will default within a short time period is arguably more interesting than the probability of an individual default. An estimate of that likelihood can be computed using a Merton/KMV methodology, modified to take into account the correlation among a group of financial institutions. According to Merton's work, an institution's probability of default is a function of three major factors: the market value of the firm's assets (a measure of the present value of the future free cash flows produced by the firm's assets); the asset risk, or asset volatility (which measures the uncertainty surrounding the market value of the firm's assets); and the degree of implied leverage (i.e., the ratio of the book value of liabilities to the market value of assets). A firm's probability of default increases as the value of assets approaches (from above) the value of liabilities; in theory, when the two cross, the firm should be assumed to be in default, as future incoming cash flows will not be sufficient to cover the firm's commitments. At any given time, the probability of multiple simultaneous defaults can be assessed by simulating the market value of assets of a number of firms in a certain sample, based on the volatility of those assets and their correlation. Since market value of assets, asset volatility, and asset correlation are not directly observable, they first have to be estimated from available information.

Estimates of the market value of assets and its volatility can be obtained by using the Black-Scholes methodology and interpreting a firm's market value of equity as a call option on the firm's asset value struck at the book value of liabilities. The asset correlation matrix, which is assumed to be time-varying, can be estimated by using rolling windows or by way of an exponentially-weighted moving average model (EWMA).

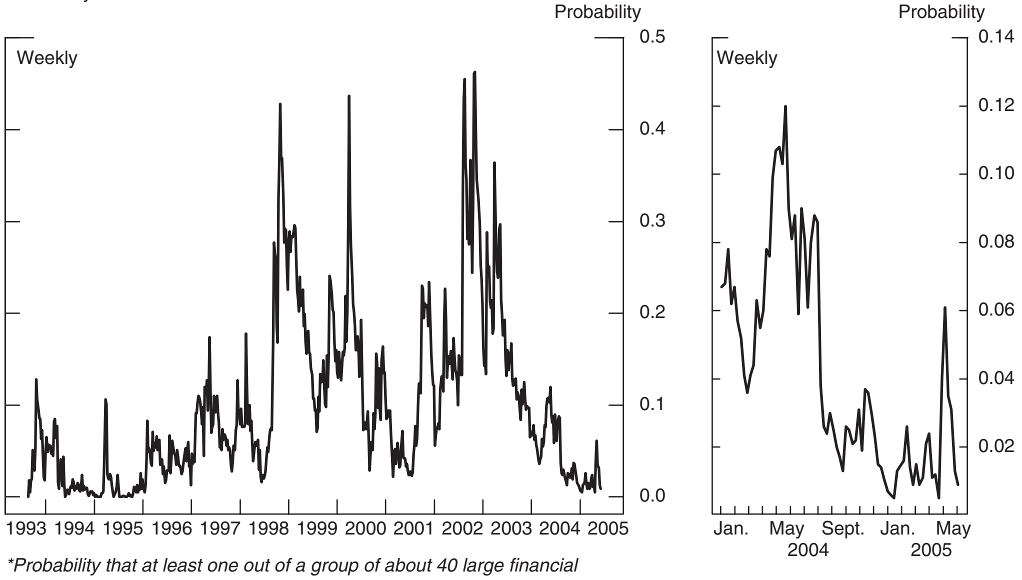
Given current estimates for the market value of assets, asset volatility, and asset correlation for a sample of firms, the market value of assets of each firm can be simulated a large number of times for a period of, say, one year, according to a standard Brownian motion model. The probability of multiple defaults among the institutions in the sample can be computed as the

14 *For the details see R.C. Merton (1973), "A Rational Theory of Option Pricing,"* Bell Journal of Economics and Management Science*, 4, pp. 141–183 and KMV Corp., "Modeling Default Risk," January 2002, available at www.moodyskmv.com*

15 *See also Berndt, A., Douglas, R., Duffie, D., Ferguson, M., and Schranz, D. (2004), "Measuring Default Risk Premia from Default Swap Rates and EDFs," available at www.orie.cornell.edu/aberndt/papers.html. The authors take the ratio of the two probabilities as a measure of the corporate risk premium.*

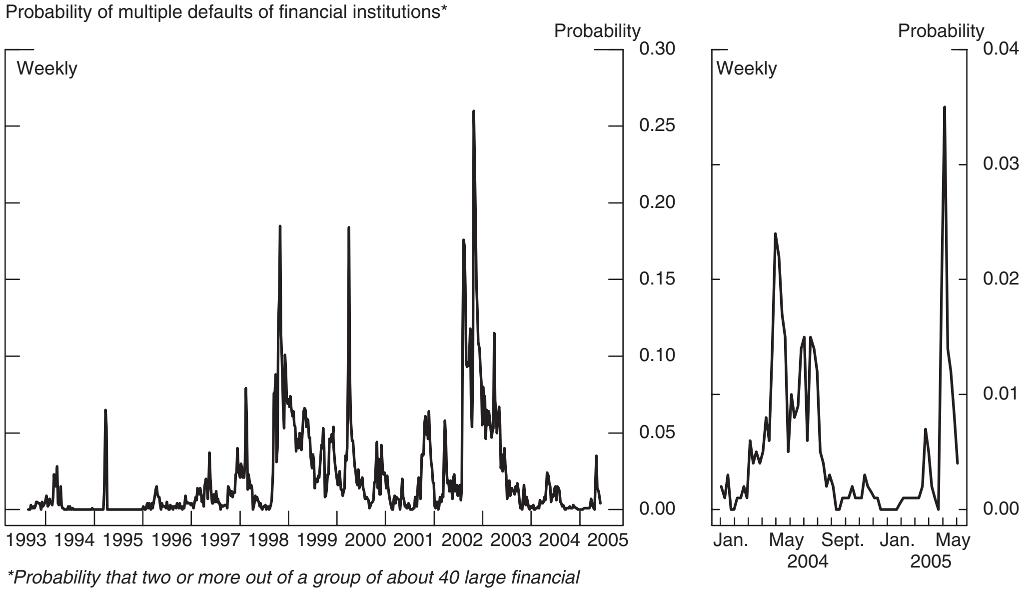
Exhibit 5 – Probabilities of default of financial institutions

Probability of at least one default of financial institutions*



**Probability that at least one out of a group of about 40 large financial institutions will default within one year.*
Source: MFST staff calculations.

Probability of multiple defaults of financial institutions*



**Probability that two or more out of a group of about 40 large financial institutions will default within one year.*
Source: MFST staff calculations.

relative frequency of the event that the market value of assets will fall below the book value of liabilities for at least two institutions.

That probability, and the probability of at least one default (which is computed similarly), are plotted in exhibit 5 for a group of about 50 large financial institutions that includes banks, broker-dealers, and other financial institutions. Over the time period considered – August 1993 to May 2005 – the most stressful periods for the institutions in our sample were, according to those measures, the fall of 1998 and the summer and fall of 2002. The spring of 2000, when the equity bubble began to burst, also stands out prominently, although concerns about the viability of financial institutions at that time appear to have been short-lived. Interestingly, the probabilities of default in the aftermath of September 11, 2001 were not as high as those in the other periods. Evidently, while financial markets were under substantial stress, investors did not perceive that the solvency of large financial institutions was threatened at the time. The credit problems at large automobile manufacturers in the spring of 2005 generated only a minor uptick in both probabilities, indicating that investors perceived those problems as well contained.

The probabilities of defaults plotted in exhibit 5 may seem somewhat high, given that there were relatively few actual defaults of financial institutions since 1994. Several factors, though, should be taken into account when interpreting those probabilities:

- The default probabilities obtained from Merton's model are risk-neutral probabilities, since it is assumed that the expected return on any firm's asset is the risk-free rate. Risk-neutral probabilities are typically higher than actual default probabilities, and possibly much higher at times of intense risk aversion. No attempt is made to empirically map the risk-neutral default probabilities into actual defaults, as KMV does.
- Actual defaults may not occur as soon as the market value of assets equals the book value of liabilities; indeed, KMV found empirically that the market value of assets dips further below that theoretical threshold before a default actually occurs. If a lower default threshold had been used, the probabilities would have been correspondingly lower.
- The probability of multiple defaults depends on the sample of institutions that is considered, and it may well be larger than the probability that any given institution will default individually. For example, for a sample of 100 firms all independent of each other and with probability of default of 1 per cent within a given time period, the probability that two or more of them will default within the same period is 26 per cent. For a sample of ten firms, that same probability is just 0.4 per cent.

These observations suggest that the probabilities shown in exhibit 5 may be most informative when looked at in relation to their own values at different points in time. For example, while it could be useful to know that the estimated probability of multiple defaults was about 5 per cent after the terrorist attacks of 2001, it may be preferable to focus on the fact that at that time it was about four times smaller than in the fall of 1998.

7. An example of market monitoring: hedge fund losses induced by difficulties at Ford and General Motors

News reports surfaced in early May 2005 indicating that some hedge funds may have incurred significant losses as a result of the widening of corporate credit spreads that started in mid-March on the heels of the difficulties reported by the two largest U.S. automobile manufacturers. This section presents some data on hedge fund performance over that period and describes two of the trades that allegedly resulted in significant losses. While those trades have been quite unprofitable and several funds indeed reported substantial losses in April and May, the impact on financial markets appears to have been contained.

Several funds that were mentioned in press reports publicly denied experiencing particular difficulties. The available data, however, indicate unusually poor hedge fund returns for the month of April, as shown in the top panel of exhibit 6. Quite a few large funds reported losses between 5 and 8 per cent in that month, and many other smaller funds performed significantly worse.[16]

The known hedge fund losses, and fears of losses as yet unknown, sparked concerns that some banks and investment banks that have provided prime brokerage services to hedge funds may have large exposures to troubled funds.[17] Most of the major prime brokers stated publicly that most or all of their hedge fund exposures were fully collateralized and that their capital positions were strong; still, as shown in the bottom panels, these firms' stock prices dropped, and their credit spreads widened notably in mid May, although from low levels.

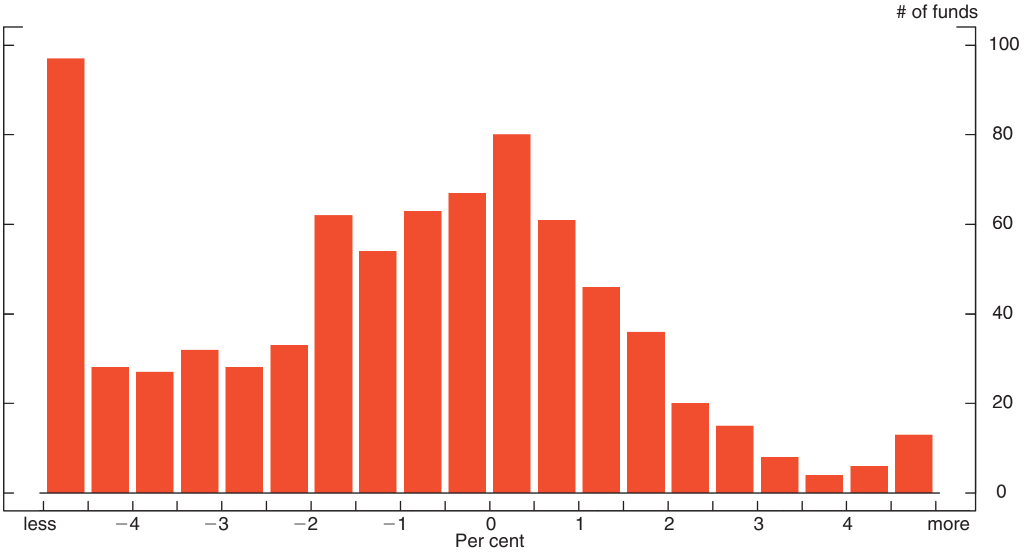
While the hedge fund losses that were reported were not dramatic, some of the funds that do not publicly report their performance may have fared significantly worse. To better understand the losses that some funds may have suffered as a consequence of the turmoil in the auto sector, we discuss two types of trades that reportedly have been popular among some funds in the months preceding the roiling of credit markets. One such trade involved simply selling protection on auto-sector reference entities in the CDS market. Some funds reportedly believed that Ford and GM spreads already discounted the possibility of a downgrade to junk back in

16 *While hedge funds are not required to publish their performance statistics, many voluntarily choose to do so. The source of our data is Bloomberg, which collects data for several thousands hedge funds and funds of hedge funds with a total of more than $800 billion of assets under management. However, the very largest funds, including some of those mentioned in press reports, are not well represented in the database.*

17 *Prime brokers provide a variety of services to hedge funds, including financing, trade execution, and performance reporting.*

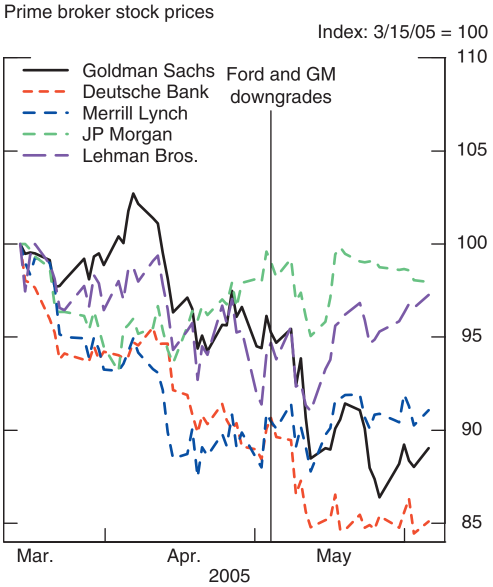
Exhibit 6 – Hedge fund performance

Distribution of hedge fund returns for April 2005*

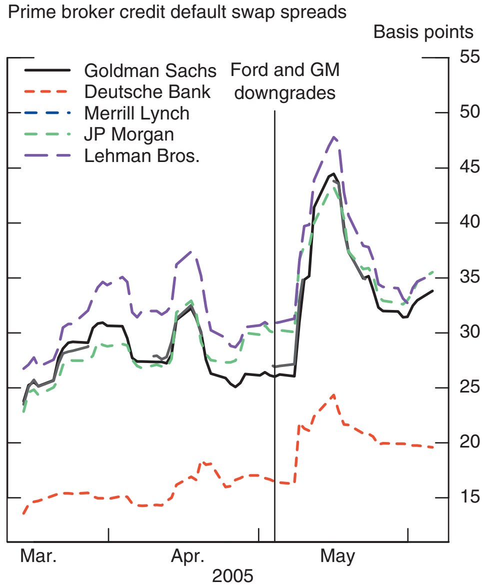


**Includes only funds with assets in excess of $50 million.*
Source: Bloomberg.

Prime broker stock prices



Prime broker credit default swap spreads



Source: Markit.

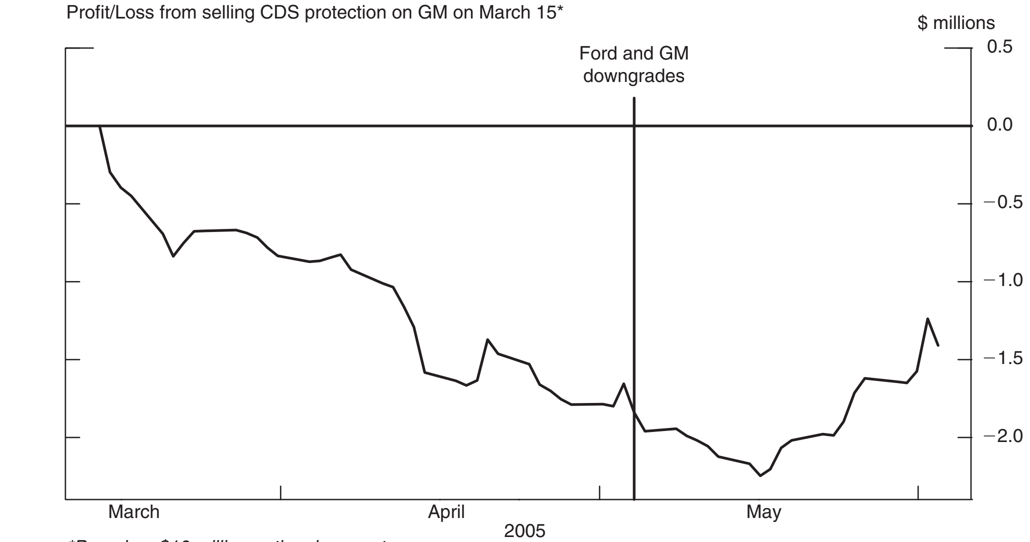
March, before the actual downgrade and even before GM warned about poor earnings on March 16. Indeed, both firms' CDS spreads were already comparable to those of low-quality speculative-grade issuers at that time. GM spreads, however, widened dramatically after its preannouncement and, as shown in the top panel of exhibit 7, a fund that sold five-year protection on a notional amount of $10 million of GM debt on March 15 would have sustained a mark-to-market loss of more than $2 million as of the market close on May 15, or more than 20 per cent of the notional exposure.[18] Losses would have been comparable if protection of Ford debt had been sold instead.[19] Hedge funds could, of course, have exited the trade earlier, but they still

18 *A trade size of $10 million is common among investors. Note that a notional exposure of $10 million does not imply an investment of $10 million: Usually the amount tied up in the trade, as margin or collateral, is much smaller.*

19 *Hedge funds would have performed marginally better if they had bought a $10 million GM bond, since bond spreads widened a bit less than those on CDS; however, funds would have had to finance the bond purchase. Press reports indicated that some funds may have hedged the CDS position by selling GM stock short or by purchasing equity put options. Given that GM's stock price declined only 8 per cent since mid-March, that hedge would have been largely ineffective. For example, investing the entire CDS premium in GM at-the-money put options would have reduced the net loss by less than $0.5 million as of c.o.b. May 15.*

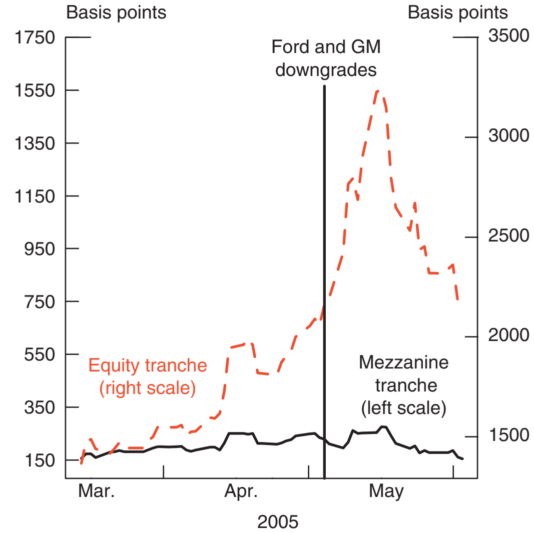
Exhibit 7 – Trade analysis

Profit/Loss from selling CDS protection on GM on March 15*



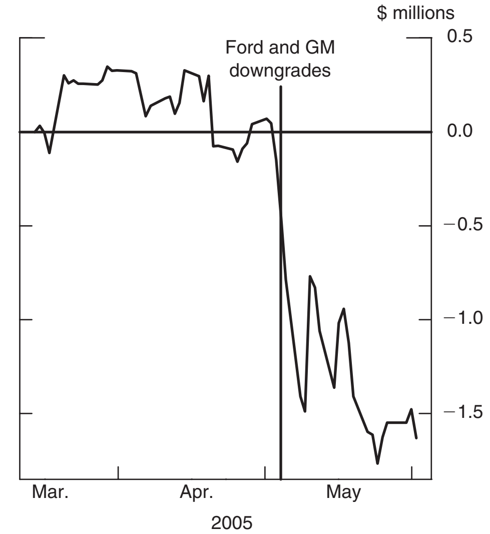
Based on $10 million notional amount.

Equity and mezzanine cds index tranche spreads*



Equity tranche spread converted from upfront payment to running spread.

Profit/Loss from "correlation trade" entered on March 15*



Based on selling equity tranche protection on $10 million notional amount and buying mezzanine tranche protection on $42.5 million notional amount (optimal hedge ratio).

would have suffered substantial losses, especially after taking transaction costs into account.[20] Those funds that held on to their position have seen a partial reversal of their losses, as GM spreads tightened significantly starting in June.

A second type of trade that is said to have been popular among hedge funds in the months leading to the credit market turmoil involved buying and selling protection in tranches of CDS indexes. Many funds have reportedly sold protection on the equity tranche of the benchmark investment-grade CDS index, and at the same time bought protection on an appropriately scaled notional amount of the mezzanine tranche of the same index.[21] This trade has been dubbed the "correlation trade" because its profitability depends on investors' assessment of the likelihood that defaults among the components of the index will be clustered in time – the default

20 *Bid-ask spreads on Ford and GM CDS reportedly widened in March and April.*

21 *The index is the average of the spreads of 125 CDS of equal notional amount written on large and liquid reference entities. The equity tranche is designed to absorb the first 3 per cent of losses generated by defaults of those reference entities, while the mezzanine tranche absorbs subsequent losses up to 7 per cent (further losses are absorbed by more senior tranches).*

correlation.[22] As shown in the bottom-left panel of exhibit 7, spreads on the index equity tranche surged in April and May – especially after Standard and Poor's downgraded Ford and General Motor debt to junk status – while those on the mezzanine tranche rose only moderately. As a consequence, a correlation trade on $10 million notional amount entered into on March 15 would have been somewhat profitable until early May – the bottom-right panel – but would have lost between $1 and $2 million after May 7.

The trades examined here were clearly unprofitable, but the magnitude of actual hedge fund losses depends on several factors, such as the extent of their involvement in these and similar trades and their degree of leverage. Importantly, there is no evidence that hedge fund losses, actual or presumed, have significantly impaired the functioning of markets. Trading volumes remained reportedly close to normal; some moderate strains could be noticed in the CDS index market, where spreads on the investment-grade index widened about 10 basis points in the second week of May, the largest one-week change since the inception of the index. Conditions in credit markets have since returned close to normal, with the exception that implied default correlation remains low; as a consequence, mark-to-market losses suffered in the correlation trade remain large as of this writing.

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22 *A high default correlation can be interpreted as a sign that investors perceive that the components of the index are vulnerable to systemic shocks. A low default correlation is instead an indication that investors are more concerned about idiosyncratic risk. Default correlation has been low and trending down since the inception of the CDS index in late 2003. The problems and consequent downgrades of Ford and GM evidently exacerbated investors' concern about idiosyncratic risk, and default correlation dropped sharply in early May. While the mezzanine tranche is relatively insensitive to changes in default correlation, the value of the equity tranche is directly proportional to it. Intuitively, if defaults are clustered together in time – or highly correlated – the likelihood of a few defaults is lower than if defaults are randomly distributed – or uncorrelated. Since a few defaults are all it takes for investors to lose 100 per cent of their investment in the equity tranche, the value of that tranche diminishes when default correlation declines.*

Financial stability analysis and data needs[1]

Walter Engert (Bank of Canada)

1. The financial system and the Bank of Canada

The financial system, which consists of financial institutions, financial markets, and clearing and settlement systems, plays an important role in the economy. Sound and efficient financial systems can make a significant contribution to economic growth, and can benefit the transmission of monetary policy actions. Moreover, as has been seen in various countries in recent years, a financial system that is not soundly based can make problems that originate elsewhere in the economy worse, and can itself be a source of serious problems for the broader economy. In addition, a financial system that generates inefficiencies in resource allocation can lead to an accumulation of welfare losses over time.

Most fundamentally, a well-functioning financial system is integral to a sound market economy, which, in turn, is the most effective means of allocating scarce goods among many competing demands. Thus, providing for financial stability (and monetary stability) contributes to addressing this fundamental problem in an effective and (relatively) civil manner.

The Bank of Canada is one of several public-policy agencies in Canada that promotes the safety and efficiency of the financial system. The Bank contributes a broad perspective that reflects the major activities in which it is engaged. As the monetary authority, the Bank brings a macroeconomic or systemwide point of view to issues concerning the financial sector, as well as extensive knowledge of the financial system. As the source of ultimate liquidity to the financial system and, thus, the lender of last resort, the Bank is acutely aware of stresses that can develop in the system during times of financial turbulence. And, as the overseer of clearing and settlement systems that could pose significant risk to the financial system, the Bank has developed expertise in the design and operation of arrangements to control this risk. Finally, as fiscal agent for the Government of Canada, the Bank has a particular interest in well-functioning government debt markets.

The Bank devotes considerable resources to assessing developments and trends in both domestic and international financial systems to inform its various roles, including monetary policy formulation. The Bank is also involved in the development of the broad policy framework that underpins the financial system, and is particularly closely involved in matters affecting major clearing and settlement systems. As well, Bank staff conduct research in these various areas, to improve understanding of ongoing developments and to contribute to good policy-making.[2]

This note discusses aspects of experience at the Bank of Canada with regard to financial system analysis, and the development of related policy advice, and points to some (tentative) lessons concerning information and data requirements, and some outstanding questions.

A long-standing focus of the Bank has been the collaborative development of sound financial policy frameworks to condition the behaviour of both private and public agents, and to contribute to a safe and efficient financial system. This work, while drawing on empirical analysis, has relied relatively less on data than recent elaborations and initiatives concerning financial stability. These more recent initiatives involve increased monitoring and analysis of financial-system vulnerabilities, along with related research, as well as research on improving understanding of financial "frictions" and their broader effects. Put differently, the production function for financial stability seems to be evolving toward one that is both less clearly defined, and more data-intensive; indeed, perhaps these are related considerations.

1 *Prepared for the joint Bank of Canada/Irving Fisher Workshop on "Data Requirements for Analyzing the Stability and Vulnerability of Mature Financial Systems", June 21, 22, Ottawa, Canada. Thanks are due to my colleagues at the Bank of Canada for their input, particularly Meyer Aaron, Celine Gauthier, Clyde Goodlet, Brian O'Reilly, Jack Selody, Pierre St-Amant and Carolyn Wilkins. The views expressed in this paper are those of the author. No responsibility for them should be attributed to the Bank of Canada.*

2 *Examples of such analyses are available in the Bank's* Financial System Review, *and in the* Bank of Canada Review, *as well as in the references of this paper.*

Given that the requisite data can be expensive, including for those taxed to provide the data, it continues to be important to link expenditures for data to a central bank's mandate and strategic interests. That is, defining the needed data depends importantly on the role set out for the central bank in promoting financial system stability and efficiency.

2. What information is needed to provide for "financial stability"?

This question – a central question of the workshop – is indeed a very difficult one, perhaps not answerable without considerable qualification. This difficulty arises in part due to the ambiguity of the question, and in part due to the related vast implicit scope.

Reflecting its multi-faceted nature, financial stability has been variously defined. Some interpretations relate to a financial system that promotes a robust and efficient allocation of resources contemporaneously and over time, by providing payments services, savings intermediation and redistribution of risk. Similarly, many definitions relate to a financial system that is unlikely to generate or propagate disturbances that would have significant real effects. Other notions focus on the reduction of frictions in the financial system that can impair the efficient allocation of resources, leading to welfare losses over time, and which can make the economy more sensitive to shocks.

Given the complexity and reach of a modern financial system, the possibly unavoidable ambiguity of "financial stability", along with the obvious inherent appeal of avoiding systemic shocks, one can readily imagine the possibility of generating a vast scope of associated data requirements. Also, the prospect of more data is seductive, especially to economists: in some respects, more information and more data are always better, for research, current analysis and policy advice. But, of course, information and data are not free: indeed, definition, generation, collection, management, storage, analysis and presentation can be expensive, including for those individuals and firms that might be taxed to provide the information and data.

Therefore, difficult questions of benefits versus costs arise in determining the information needed by policymakers to provide for a safe and efficient financial system. As a practical matter, how does one reasonably provide for an amorphous, ill-defined notion – financial stability? What are the associated relevant and reasonable data requirements? A traditional orientation at the Bank of Canada to these questions has been to take a functional approach: to focus on the collaborative development of particular policy frameworks to condition the behaviour of public-sector and private-sector agents, which is discussed in the next section.

3. Policy and infrastructure development

a. Conditioning behaviour

The Bank of Canada has had a long-standing interest in promoting a safe and efficient financial system. A hallmark of the Bank's approach is an emphasis on the establishment of sound policy frameworks that create incentives and constraints to condition public and private-sector behaviour. These frameworks – what we might call the infrastructure of the financial system – include

- lender of last resort policy and operations,
- payment, clearing and settlement systems policy, and related central-banking services,
- the broad policy framework governing the financial-institution sector and its regulation, including deposit insurance and supervision arrangements, and
- the policy framework governing financial markets and their regulation.

Just as in the case of macroeconomic and monetary policy, the key issues concern designing the regime that conditions the repeated decisions of public policymakers and private decision-makers. For instance, the importance of the underlying policy regime or framework in the context of monetary policy is a commonplace in the academic literature and among central bankers.[3] As a practical example, consider that the inflation-targeting framework at the Bank of Canada (and other central banks) is an enormous conditioning influence on both the conduct and consequence of monetary policy. (On these points, see for example, Longworth, 2002 and Dodge, 2005.)

As in the case of macro and monetary policy generally, these considerations also apply to financial-sector policy. That is, establishing the arrangements that systematically condition the behaviour of both public-sector agents and private-sector agents – the rules of the game – is

3 *For a general discussion of this insight, see Sargent (1986).*

critical to achieving a safe and efficient financial system. At the same time, developments in the financial system, including technological and demographic changes, evolving market practices and competitive pressures, influence the policy debate and framework.

Conceptually, we can consider the role of financial policy framework in the following way. Let Y = the operating characteristics of the financial system, which we seek to condition.

x = behaviour of both public-sector agents and private-sector agents; and
p = the policy frameworks (defined in the bullets above).

The operating characteristics of the financial system and system-wide outcomes (Y) are a function of public and private behaviour, so that we have

$$Y = f(x).$$

But behaviour, x, is conditioned by the incentives and constraints provided by the policy framework, p, so that we have

$$x = g(p).$$

And as a result, $Y = h(p)$.

That is, the safety and efficiency of the financial system are conditioned by the policy infrastructure that influences the repeated decisions of both public and private decision-makers.

As regards data, to conduct their work according to their mandates, the agents generated by the policy framework develop an information and data set (I), conditioned by the objectives set by policy design. Therefore,

$$I = k(p).$$

That is, the information needed for financial stability is related to that required to develop a well-ordered policy framework, and needed data are further generated in a diffuse fashion, conditioned by the framework design. (Of course, opposite tendencies can hold as well.) This analysis also suggests that it can be difficult to evaluate a set of data or information required by particular policymakers, without reference to their analytical and policy frameworks, and without reference to their understanding of "financial stability".

b. Principles and episodes

In the context of the orientation described above, a few fundamental principles have been central to financial-sector policy analysis at the Bank of Canada.

- Minimalism: Private decision-making is generally reliable and efficient. Public-policy involvement should be the minimum needed to achieve policy goals, and there should be reliance on market forces as much as possible.
- Incentive-compatibility: Frameworks should establish incentives consistent with policy goals, both for public-sector agencies and the private-sector. There should be a strong awareness of private-sector rent seeking and a strong regard for moral hazard.
- Collaboration: There should be collaboration with other relevant policy makers to benefit from economies of specialization and expertise in developing the policy framework. This has often meant collaboration among the Bank of Canada and the federal Department of Finance, the Office of the Superintendent of Financial Institutions, and the Canada Deposit Insurance Corporation. This can also imply collaboration with multi-lateral groups, and application of best practices emerging from various fora, such as the CPSS Core Principles for Systemically Important Payment Systems, and the CPSS/IOSCO Recommendations for Securities Settlement Systems.

As well, particular episodes have been influential in conditioning the design of policy frameworks. Notably, for example, the failures of several deposit-taking institutions in the mid-1980s and early 1990s set in motion a series of fundamental reforms to the prudential safety net (see below). Put differently, these episodes, while inexpensive in terms of financial instability, provided valuable insights and lessons for policy design. In addition, other general financial-system developments, such as changing market practices and technological innovation, also have influenced the design of the framework (see below).[4]

4 *One of the unique and very useful features of the Canadian financial policy context is that all major federal financial legislation expires every five years (through a sunset clause), compelling a collaborative review of the policy framework by the major public-policy financial agencies.*

c. Some recent experience

In the post-war period, there have been several changes to Canadian financial legislation in response to market-driven developments in the financial industry. In the second half of the 1980s and early 1990s, major legislative reforms were introduced to accommodate the financial restructuring that was taking place during this time. Generally speaking, this process of restructuring has been associated with reduced barriers to entry into the financial services industry, an expansion of the business powers of financial service providers, and has led to some consolidation within the industry. In addition, there have been significant policy developments affecting clearing and settlement systems, as well as deposit insurance and supervision arrangements in Canada.[5]

As an illustration, the rest of this section discusses briefly some key aspects of policy development in the last 15 years affecting clearing and settlement systems, and affecting deposit insurance and supervisory arrangements, and draws some lessons for data needs from this experience.

Clearing and settlement systems

Like other central banks, the Bank of Canada has been involved in both the design of major clearing and settlement systems, and subsequently, the oversight of systems judged to have the potential to create systemic risk. The Bank participated in the development of three major systems in the last 15 years, and currently oversees the LVTS (the large-value payments system) and CDSX (securities clearing and settlement). As well, the Bank collaborates with the Federal Reserve (the lead regulator) to oversee CLS Bank (foreign exchange settlement).[6]

It is important to note that the Bank of Canada's oversight authority with regard to clearing and settlement systems is provided for by law – the Payments, Clearing and Settlement Act (1996). In its oversight capacity, the Bank relies on a cooperative approach with system owners and operators to reach mutually agreeable solutions for the management of risk by designated systems. (The Bank of Canada does not own or operate any of the major systems in Canada.) However, the Bank has the authority to issue legally binding directives (and further to seek penalties) to enforce its views regarding the management of risk in these systems.

Broadly put, the Bank's oversight strategy is similar to that followed in the design phase. Essentially, the approach that the Bank follows is to set the parameters and constraints to condition the behaviour of designated systems, so as to appropriately address systemic risk.[7] Private-sector system operators, in turn, optimize to find the most efficient way of satisfying these constraints set by the Bank. The Bank confirms periodically that the parameters and constraints bind, and are operating as expected to mitigate systemic risk, through audits, for example. In addition, staff review design and rule changes proposed by system operators so that systemic risk continues to be well-managed. In sum, the Bank of Canada's oversight is procedure-based, and does not rely to any significant extent on the systematic collection of data to monitor or enforce compliance.

Prudential supervision

There have also been noteworthy changes in the arrangements governing deposit insurance and prudential supervision in Canada. The evolution of deposit insurance and supervision arrangements in Canada over the last 15 years can be interpreted as a series of fundamental changes to the incentive structure and powers of the regime which, in turn, have motivated improvements in the operating framework of the safety net.[8]

5 *On the general evolution of the Canadian financial system, see Daniel (2003), Engert et al. (1999), Freedman and Goodlet (1998), Freedman and Engert (2003), and Hendry and King (2004). On the development of clearing and settlement system policy in Canada, see Goodlet (1997, 2001), for example. The Bank of Canada website provides a variety of articles on the Bank's role regarding clearing and settlement systems (http://www.bankofcanada.ca/en/payments/payments.html). The Bank also recently completed a comprehensive review of its lender-of-last-resort policies, which is not discussed further in this paper; see Bank of Canada (2004), and Daniel, Engert and Maclean (2005) for more on those policies.*

6 *The application of the orientation described above (in Section 3) led the Bank to participate in the development of a netting-based payments system – the LVTS – during the 1990s. For analysis of risk management in netting-based systems, see Engert (1993), for example.*

7 *These constraints are set out in the* Guideline related to Bank of Canada Oversight Activities under the Payment, Clearing and Settlement Act *(available on the Bank of Canada website).*

8 *For an overview of this evolution, see Engert (2005).*

Among the key policy measures has been the establishment of a clear mandate for the supervisor, focused on protecting the interests of depositors and other creditors, and which recognizes that financial institution failures can occur.[9] In addition, policy changes created the authority and obligation for the supervisor to act promptly with regard to troubled institutions so as to achieve its mandate. This includes, notably, providing OSFI with the power to take control of a financial institution before it is insolvent, and the establishment of an appropriate range of instruments to act. Also, measures were established that provided the authority and means for other agencies in the safety net with potential exposure to troubled financial institutions to influence the supervisory process. This includes the Bank of Canada as lender of last resort, and particularly the Canada Deposit Insurance Corporation as deposit insurer.

These various measures have motivated an improved operating framework based on a program of structured, early intervention. As well, OSFI has established a procedural, risk-based supervisory framework that focuses on evaluating an institution's material risks and the quality of its risk-management practices and processes – in comparison to a focus on measurement and compliance with quantitative restrictions. Importantly, these changes, in turn, have sharpened financial institutions' incentives to manage risk appropriately, in part to avoid becoming subject to supervisory intervention.

d. Some lessons for information and data needs

- Fundamental principles have been important in guiding the Bank of Canada's analysis.
- Lessons from specific episodes also have been important in the development of the policy framework. Particularly influential were the failure of several deposit-taking institutions in the late 1980s and early 1990s, from which key insights were drawn, and applied to the Canadian financial-policy infrastructure.
- Historically, data requirements for the development of fundamental policy infrastructure have not been difficult or expensive. While data requirements were relatively low-cost, benefits from the evolution of the policy framework are judged to be high.
- In the conduct of clearing and settlement oversight, the Bank's practice is to rely on the establishment of incentives and constraints to condition the behaviour of the private operators of major clearing and settlement systems. The practice is process-oriented, as opposed to data-intensive. That is, oversight relies more on a procedure-based strategy to ensure that risk-control mechanisms operate as designed, and not to any significant extent on the systematic collection of data to monitor or enforce compliance.
- As demand for precision of policy advice and related research questions increase, so too are data needs. An example in this regard is recent work conducted at the Bank of Canada on measuring economies of scale of Canada's six largest banks and their cost efficiency over time, which relies on a unique panel data set providing relatively disaggregated data on bank activities and costs (Allen and Lui, 2005). However, interestingly, these data already existed within the Bank. Similarly, other work by Bank staff (for example, Freedman and Engert, 2003), also made more intensive use of existing data bases. Accordingly, recent policy questions have motivated more data needs, and more intensive use of existing data bases by Bank staff.
- Work related to modeling aspects of clearing and settlement systems (for example, on the behaviour of collateral under extreme events, and on queuing mechanisms in netting-based systems) also has motivated increased data needs. In these cases, system operators have been willing to provide data at reasonable cost, given their interest in the research.

4. Analyzing risks to financial stability: Developments and trends

a. System-wide disturbances and propagation

In addition to interest in the evolution of the policy frameworks conditioning financial-sector behaviour, Bank staff regularly examine current developments and trends in the Canadian financial system. A primary objective in this regard is to identify the factors and vulnerabilities that might

9 *The Canadian supervisor, the Office of the Superintendent of Financial Institutions (OSFI), is a consolidated supervisor that supervises all federally regulated financial institutions, including banks, trust companies, life insurers and pension funds.*

pose serious risks to the smooth functioning of the financial system. These factors can originate in the domestic economy or externally. In this context, staff also consider the various risks that are taken on by sectors of the financial system in their transactions with other groups of participants. However, because the Bank's concern is largely for the vulnerabilities of the financial system, and not about individual institutions, firms, or households, staff concentrate on developments and trends that could have system-wide repercussions. (Such analysis of developments and trends is published regularly in the Bank of Canada's *Financial System Review.*)

Important in this work are potential shocks to deposit-taking institutions, and their aggregate behaviour, because of the key role of such institutions in payments and their relationships with so many other participants in the financial system. This analysis also includes consideration of the risks related to the behaviour of other financial firms, and related to the balance sheets of borrowers such as households and non-financial firms.

Thus, from time to time, Bank staff prepare an assessment of, for example, the balance sheets of households, non-financial corporations and governments, or an assessment of global macroeconomic developments, regarding the likelihood that changes in these areas could have a serious adverse impact on the financial system.

Finally, Bank staff are developing a research program related to these considerations, and particularly to link and aggregate various micro characteristics of economic agents (such as firms or households), to generate better empirical predictions of sectoral default risk and systemwide implications. As well, staff are conducting research on the prediction of sectoral difficulties based on a parsimonious set of macro variables.

b. Lessons for information and data needs

- The Bank's evolving framework for monitoring financial-system stability has improved the quality of analysis and understanding, and has motivated more ambitious data needs.
- Data needs are diverse, wide-ranging and relatively expensive, given the expanse and complexity of the analytical challenge. These data can include micro data, such as the distribution of household wealth and debt, so as to assess the "vulnerable tails".
- Bank staff use multiple data sources, including commercial sources.
- A key difficulty is to link and aggregate various micro characteristics of economic agents (such as firms), to generate better empirical prediction of sectoral default risk and systemwide implications. This brings challenges related to the availability, timeliness and quality of data, the frequency of reporting and the integration of various sources of data. (For more on these and related points, see Aaron, 2005, and Gauthier, 2005.)
- It is important to keep in mind the system-wide focus of such exercises. Financial stability means a regard for the operating characteristics of the system as a whole, and for shocks that undermine its overall performance; that is, considerations of systemic or system-wide risk are invoked while greater use of micro data can be more informative with regard to potential default risk of particular cohorts, such default risk does not necessarily imply threats to financial stability. The aggregate or systemic effects of such particular risks need to be considered.
- Accordingly, Bank staff are exploring the identification of thresholds related to default risk that might suggest risks to the broader financial system, that is, to financial stability. For example, one of the goals related to development of a corporate micro-database is to assess sectoral changes in risk that might have broader effects.
- No comprehensive quantitative model currently exists to integrate the various elements of the analysis. Accordingly, analysis is almost unavoidably disaggregated and overall integration and assessment is provided qualitatively by Bank staff, as a product of analysis and debate.
- Bank staff also have developed a financial stability index to provide for a summary integration of various data in this context (Illing and Liu, 2003), to complement other analysis and assessment.

5. Other research directions

a. Frictions, system stability and efficiency

A well-functioning financial system acquires and uses information to allocate resources to the most productive investment projects, and manages and distributes risk to those most willing to bear it. The financial system adds to social welfare and economic growth because it improves the allocation of resources and reduces the volatility of consumption and investment. A well-functioning financial system is also able to better absorb adverse shocks, making the real economy less sensitive to them. As a consequence, economic growth would be less volatile.

"Frictions" in the financial system are sources of inefficiencies that impair the efficient allocation of resources and make the economy more sensitive to adverse shocks, with possibly significant welfare consequences (Haldane et al., 2004). Financial inefficiencies can arise for numerous reasons. For example, informational asymmetries in both financial markets and institutions can develop because borrowers typically have more information than lenders about the potential value and risk associated with the investment projects for which they are seeking funds. These asymmetries can be exacerbated by factors such as poor quality of financial information and poor corporate governance. Transactional inefficiencies, which increase the costs of financial transactions, can occur because of lack of competition in the provision of financial services, regulatory requirements, or the nature of the particular legal infrastructure. There is some empirical evidence that such frictions can be important from a macroeconomic point of view, since countries with fewer financial frictions (for example, better contract law, enforcement, and greater corporate transparency) tend to have stronger economic growth and lower output volatility (Dolar and Meh, 2002; La Porta et al., 1997; and Cooley, Marimon, and Quadrini, 2004).

Therefore, reducing financial inefficiencies can, in principle, lead to a better allocation of resources, as well as improved capacity to absorb shocks. As well, understanding better the role and importance of financial frictions (such as financial-accelerator mechanisms and those related to asset price behaviour) can inform understanding of business cycle dynamics and the conduct of monetary policy.

Given these considerations, there has been increased interest in improving understanding of the role of such frictions in the financial system, and in understanding the possible implications for public policy. Which frictions are important? How is price formation in financial markets affected? How can efficiency and stability be improved by better policy design?

b. Lessons for information and data needs

- This class of research generates data needs that are similar to the more detailed monitoring and current analysis which is discussed in the preceding section.
- This kind of research can require work grounded in the micro structure of banking and other financial organizations and markets, and grounded in the heterogeneity of agents, which requires disaggregated data and possibly relatively high-frequency data.
- These kinds of data are relatively difficult to obtain and are expensive.

6. Concluding remarks

This final section begins with a reiteration of the main lessons from the preceding overview of experience. It closes with observations related to the apparently changing nature of the production function of financial system analysis, and points to the role of strategic considerations in assessing data needs.

a. Lessons for information and data needs

1. The ambiguity of "financial stability" and "financial efficiency", their potential reach, the appeal of avoiding systemic shocks, and the inherent attractions of more data, can readily lead to a large expansion of data collection to support financial stability.
2. Data definition, generation, collection, management, analysis and presentation can be expensive, including for those taxed to provide the information and data.
3. The information set needed for financial stability is logically related to that used by policymakers to provide for an effective financial policy infrastructure. Additional data emerges diffusely and endogenously, conditioned by policy framework design.
4. It can be difficult to evaluate a set of data or information required by particular policymakers, without reference to their understanding of "financial stability" or "financial efficiency", and to their analytical and policy frameworks.

5. Fundamental principles have been very important in guiding the Bank of Canada's analysis and advice with regard to the development of the broad financial policy framework.
6. Lessons from specific episodes also have been important in the development of the policy framework. Particularly influential were the failure of several deposit-taking institutions from the late 1980s to the early 1990s from which key insights were drawn, and applied to the Canadian financial policy framework.
7. Historically, data requirements for the development of fundamental policy infrastructure have not been difficult or expensive. While data requirements were relatively low cost, benefits from the evolution of the policy framework are judged to be high. This experience implies that data requirements to provide for financial stability might not be onerous or substantial, other things equal.
8. In the conduct of clearing and settlement oversight, the Bank of Canada's practice is process-oriented, as opposed to data-intensive.
9. As demand for precision in policy-related research increases, so too are data needs. In some cases, this has led to more intensive use by Bank staff of existing data bases.
10. The evolving framework for monitoring financial-system stability has improved the quality of analysis and understanding, and has motivated more ambitious data requirements.
11. In that context, data needs are diverse, wide-ranging and potentially relatively expensive, given the expanse and complexity of the analytical challenge. Bank staff use multiple data sources, including commercial sources.
12. A key difficulty is to link various micro characteristics to generate better empirical prediction of default risk and systemic implications. This brings challenges related to the availability, timeliness and quality of data, the frequency of reporting and the integration of various sources of data.
13. It is important to keep in mind a system-wide focus in such exercise. While greater use of micro data can be more informative with regard to potential default risk of particular cohorts, such default risk does not necessarily imply threats to financial stability. This means that the aggregate or systemic effects of such particular risks should be considered. Accordingly, Bank staff are exploring the identification of thresholds related to default risk that might suggest risks to financial stability.
14. Research on the role of frictions in the financial system can require work grounded in micro structure of financial agents, and in the heterogeneity of economic agents. This requires disaggregated data and possibly relatively high-frequency data, which are relatively difficult to obtain and are expensive.

b. Production functions and returns on investment

The developments discussed in this paper suggest that the production function of financial stability analysis, research and advice seems to be evolving at the Bank of Canada. Traditionally, the role of data in the development of policy infrastructure advice at the Bank, and in the conduct of clearing and settlement oversight, has been relatively less than is emerging in the context of broader financial stability analysis, and in the context of research on financial frictions and efficiency. That is, much beneficial policy development in the past 15 to 20 years appears to have required considerably less data than seems relevant to recent elaborations and initiatives.

Put differently, it seems that the relative role or importance of data in the financial stability production function might be increasing. Given that the requisite data can be relatively scarce and perhaps expensive to produce and manage, central questions concern the net return from investing in new databases. Accordingly, especially given budget constraints, investment in new financial-system data should be linked to the central bank's mandate and strategic goals, and expected net benefit from such investments. And this depends importantly on the role set out for the central bank in promoting financial system stability and efficiency.

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Walter Engert (Bank of Canada)

A stylised framework for financial system analysis

Paul Van den Bergh (BIS)

A financial system basically consists of three basic building blocks: financial institutions which provide a wide range of services to their clients, financial infrastructures through which these institutions and their clients interact, and financial markets in which prices are determined for various financial assets. Linked to this system are the non-financial sectors in the real economy, including households, non-financial coorporations, the government and non-financial non-residents.

As financial systems evolve and mature, the diversity within the different blocks tends to become greater. In many countries financial institutions no longer only comprise traditional "banks"[1] but also securities firms, custodians, (re)insurance companies, pension funds, other fund managers, hedge funds, leasing companies or other specialised firms providing specific financial services. Financial infrastructures become more varied with, for instance, separate clearing and settlement systems for large-value and retail payments, securities depositories and securities settlement systems, various open outcry and electronic trading platforms, netting and collateral arrangements, and specialised service providers for communicating financial messages and prices.[2] Finally, the panoply of financial instruments, and their corresponding markets, continues to expand from traditional equity and securities markets to sophisticated markets for foreign exchange, derivatives, and credit risk transfers.

The interrelationships within and between these building blocks also tends to become more complex as financial systems develop. Banks, for instance, often provide non-traditional banking services, participate in different trading and payment and settlement systems and trade actively in a broad range of financial markets. Prices in these markets determine the value of the portfolios of the banks and their clients and affect the value of collateral pledged in clearing and settlement systems. Direct or proxy hedging takes place using instruments traded in different markets or market segments.

The complexity of the modern financial world increases further when observing the global international financial system that integrates the national systems of a large and growing number of jurisdictions. However, the three basic building blocks described above can also be identified at the international or cross-border level. Financial institutions operate in different jurisdictions and offer services to residents of a wide range of countries; there are specialised international trading, payment and settlement systems; and financial instruments are traded simultaneously across various jurisdictions and time zones. A number of very large financial institutions are active in many countries, many infrastructures and markets on a 24-hour basis.

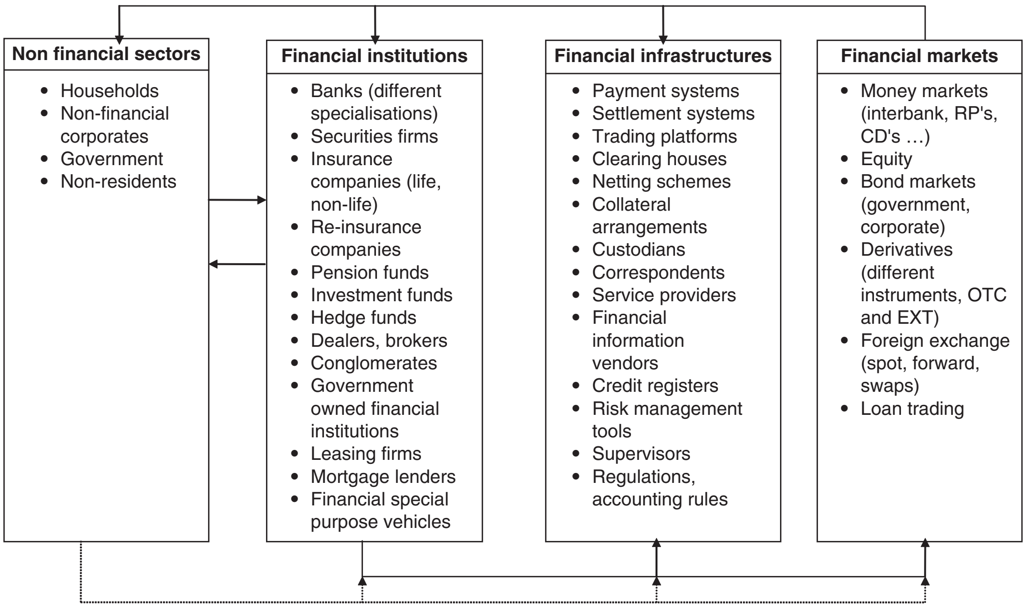
The attached chart provides an overview of the various elements of the (domestic) financial system and their broad interdependencies.

Paul Van den Bergh (BIS)

1 *There is no unique definition of a "bank". In most countries these institutions are either defined as deposit-taking (e.g. US) or as credit institutions (e.g. EU).*

2 *The financial infrastructure also includes the legal, accounting and regulatory frameworks that allow financial institutions and their clients to operate in the financial system.*

Elements of, and relationships in, financial systems



Assessing the financial system stability: the experience of Spain in launching the Financial Stability Review (FSR)

Cristina Luna (Bank of Spain)

I am going to describe our experience in launching the FSR in Spain. Institutionally, the Banco de España is not only the Central Bank, but also the Spanish Credit institution Supervisor, which gives us the advantages of being able to collect data from the regulated banks.

Our main task is the overview of the banking system, but during the last decade this overview has become more difficult, as the globalisation and internationalisation has arrived to the Spanish banking system, something which has also happened to banking systems of other countries represented at the workshop. Globalisation and internationalisation has brought the diversification and the expansion between financial services and geographical markets. For this reason, it is important to follow a consolidated perspective, and to analyze the links between the banking system and other financial institutions and to observe the claims made against different countries and sectors.

Our FSR is divided into three chapters: evolution of the banking risk, profitability and solvency, with these purposes our main sources of information are:

ACCOUNTING, we use indicators that follow CAMELS model, as the ones proposed for example by the IMF, and also we analyze in depth the balance sheet, earnings and efficiency in the profit and loss accounts, and the capital of our banking system. At the same time, we use structural indicators and peer groups in order to meet a macro and micro perspective.

CREDIT REGISTER

CREDIT PROFILE INDICATORS where we use the statistic provision and the foreign assets.

MARKET INFORMATION. Here we are more sceptic, because saving banks, cooperatives and small banks are not quoted. Only large banks

RESEARCH projects related to financial issues. This is an important point because the results of this research becomes a new indicator or subject in our FSR.

I. Banking risk

Regarding globalization and internationalization, we not only analyze the accounts of the banks, but also the ownership of the insurance sector and the management of assets that are recorded in the off balance sheet of banks; as well as the relationship between the banks and other sectors not only in Spain, but also in those countries where our banks have more exposure.

In order to follow the banking risk evolution we use all the sources of information where accounting, probably, is one of the main sources. For this purpose, we distinguish, in the consolidated balance sheet, the transactions in Spain from those in foreign countries. At an international level, this is similar to what the BIS consolidated banking statistics show, but the problem with the BIS statistics is that it does not collect the assets with that of the residents of the reporting country, and so it can not know the weights of the domestic and the foreign assets in the whole balance sheet of the reporting countries.

We also explore the ownership of the insurance sector by Spanish banks, in Spain and in other countries, and the evolution of this sector in order to know the strength or weaknesses of insurance and the probability of contaminating the banking sector.

Equally, we explore the share of the banking sector in the management of assets from mutual funds, pension funds, securitisation and other collective assets, regarding the Spanish markets and the rest of the world markets, because they are a source of commissions, where we analyze how stable this income is.

Credit risk

To analyze credit risk we study the impact of the macroeconomic background in Spain and the euro area, the non-financial sector and the household situation, and the rest of the world with special attention to Latin America.

Knowing the weights of the Spanish and rest of the world assets, we analyze first the credit growth and its distribution and evolution regarding the different sectors residents and non-residents, and we look from whom the credit is financed in order to know the dependence and stability of such a financing. Also we study the asset securitisation in relation with the credit growth.

Regarding Spain we follow very closely the non-financial corporations and the household sector.

For the non-financial corporations we follow accounting and profitability indicators derived from the Banco de España Central Balance Sheet Department as well as its debt burden and level of debt. Furthermore, regarding its debt we follow the "DEBT AT RISK" as an early warning indicator of the credit risk originated in the real sector, constructed by Ruano and Salas (2004), where accounting data has been taken from the Mercantile Register and the total bank debt and doubtful debt from the Central Credit Register from the Banco de España. This debt is equal to the probability that a corporation chosen at random is in an income situation, previously defined as entailing difficulty for it in meeting its obligations to creditors (business risk), multiplied by the average debt per corporation in this situation relative to the debt per corporation in the total sample.

The accounting variable used as a basis for constructing the random variable that serves to assess business risk is the return on the assets on the balance sheet at the end of the year (ROA), calculated as earnings before interest and tax (EBIT), divided by assets.

They also define:

a) the cost of capital, r, as the opportunity cost of equity and debt capital and, therefore, is equal to the average cost of debt of each corporation; and
b) banking debt as a percentage of total assets, b.

With the ROA, r and b, the following measures of business risk are defined (in increasing degrees of difficulty in meeting financial commitments by corporations):

The probability that a corporation chosen at random has an ROA below its cost of capital, r, that it is in a situation of economic loss;

The probability that its ROA is lower than needed to offset the cost of debt financing, rb, accounting loss with indebtedness;

The probability that its ROA is less than 0, accounting loss without indebtedness;

Finally, the probability that its level of loss is higher than the corporation's own funds, i.e. that the corporation is technically bankrupt.

For example, letting Pr (ROA < rb) be the probability that the corporation chosen at random has an accounting loss, the debt at risk for this situation will be equal to:

Debt at risk = Pr (ROA < rb) × (Debt per corporation that has a ROA < rb/ Debt per corporation for total sample).

The proposed method, links the situation of non-financial corporations to the credit exposure of banks and allows progress to be made in assessing the risks to financial stability posed by the potential difficulties of the real sector of the economy.

Also we explore the Banco de España Central Credit Register with data over 20 years, where all credit institutions declare the amounts of all its debt instruments for each individual by residence (for residents also their regional residence), to which economic group they belong, sector (that is central government, local government, financial corporations and non-financial corporations, public or private, households), economic activity, credit or debt securities by type of instrument, currency, maturity, guarantees and collaterals, and finally its situation (as normal, due but not doubtful, doubtful and the time in that situation).

On another point, regarding the claims in foreign countries, we analyze the "CREDIT RISK PROFILE INDICATOR (CRPI)" constructed by Lago and Saurina (2004), following Buckle and et al. (2000) system, but with some improvements. As regulators we have four sets of data for each country: cross border assets and local asset and, for each of them, in local currency and in non-local currency; each of them disclosed by sectors: general government, central banks and credit institutions, and other sectors. Also we have doubtful asset by country, with these, doubtful ratios are constructed for other sectors and total sectors. Usually the doubtful ratio of other sectors is more representative than the total doubtful ratio, because, usually, the doubtful ratio for the general government and the credit institutions is much lower.

Credit rating agencies give information about the credit rating of the sovereign debt and for private debt, based on their respective PD.

With this information, they obtain the PD of the claims with the general government regarding the correspondence, for each year, between the credit rating sovereign debt and its PD. They distinguish between the debt in local currency and in non-local currency, as usually the former has a better rating. Regarding the assets to central banks and credit institutions, they give the same PD as for sovereign debt.

For other sectors, the composition of the different business segments and activities are unknown, and therefore the same can be said for its credit rating and PD. With the purpose of obtaining the PD, they use the "Spanish credit register" using the links in Spain between the doubtful ratio and the PD for different activities during the period 1984–2002 (nearly two economic cycles with a deep recession in 1993).

They explore the link between the doubtful ratio and the PD and so, given a doubtful ratio for each country, assign a PD to their foreign assets, and given a doubtful ratio for the other sectors of each country obtain its PD. With this hypothesis, year by year and on average, they obtained the country's ranking, which is consistent with the economic development of the country, with its cycle movements and with the cyclical position of the economy at the moment it is analyzed.

Knowing the exposures of each country and with the PD obtained, they construct the exposure at risk as its product, where they distinguish different levels of PD for the general government, the credit institutions and the other sectors. Later they construct the credit risk profile indicator (CRPI) for each year as the weighted average of the PD of each country by its exposures, where the PD of each country is also the weighted average of each of these sectors. They also construct the credit risk profile indicator of the other sectors, excluding the general government and the central bank and credit institutions, which is higher than the CRPI as is to be expected, because usually the interbank and general government debt show a risk level lower than other sectors.

These two indicators present differences with that of Buckle et al. (2000) and not only in levels, which could be expected, as they assign to all the credits vis-à-vis a country the PD of its sovereign debt, but also in its temporal evolution which is more significant.

Moving on, for Spain we use individual data (unconsolidated, as we have more information on an individual basis than on consolidated data, because this is the source for financial accounts) where we analyze to which of the resident sectors and activities our systems are most exposed, as well as the doubtful assets, write–offs, provision policies and related issues.

Liquidity risk

Here we study the environment and the liquidity position of the Spanish deposit institutions.

Regarding the environment we analyze the volumes traded in the MTS and SENAF electronic systems; the Spanish stock market, its depth, its traded volumes and its capitalisation; and finally, the foreign exchange market and its wholesale market.

Regarding the liquidity position of the Spanish credit institutions, we study the remaining maturity structure of its assets and liabilities (maturity gaps).

Market risk

Regarding the environment we study the prices and its evolution in the US, Spain and the euro area, and Latin American markets, in relation to the interest rates, the foreign exchange and equities.

Regarding the credit institutions, by regulation we know the minimum capital requirements for the interest rate risk associated with the trading portfolio. Also the larger deposit institutions estimate and publicize their trading book VaRs. Furthermore, supervisors monitor and analyze the structural interest rate risk and CDS information.

But due to the lack of the duration of the assets and liabilities we can not make sensitive analysis, however, institutions carry out this type of analysis, but in most cases the results are not published.

II. Profitability

We explore the main indicators regarding the different sources of profitability in relation to the total average assets. We give especial attention to the different margins included in the operating margin, to the extraordinary items, as well as to the efficiency ratio and to the ROE.

Regarding ROE changes we look at its determinants, for the Spanish deposit institutions, following the breakdown proposed, albeit less detailed, in the Financial Stability Review of the Bank of England in December 2003. That is to say, the return on equity of a deposit institution summarises the final balance of the effects of a set of variables related to productive efficiency, competitiveness, risk exposure and the financial structure.

An increase in the ROE of deposit institutions will be differently interpreted, in terms of productive efficiency and wealth creation, depending on whether it results from an improvement in competitiveness or from an increased exposure to risk, owing to an increase in financial leverage. In the latter case, the increase in financial risk entails a higher cost of own funds, to offset the shareholders' greater exposure to risk, so that a higher ROE only implies greater wealth creation if the parallel increase in the cost of capital is more than offset by higher returns. The *algebraic breakdown of the ROE* of deposit institutions is designed to show how profitability is affected by changes in factors of different natures. This breakdown enables those factors whose association with increases in profitability is most clearly related to efficiency and wealth creation to be identified.

The ROE, which is group net income divided by the group's average own funds, can be expressed as the product of six terms as follows:

ROE = group net income/group equity = group net income/NOI × NOI/GI × GI/RWA × RWA/A × A/(tier 1+tier 2) × (tier 1 + tier 2)/group equity.

The first term is *group net income divided by net operating income (NOI).* An increase in this ratio indicates a smaller deduction from income to cover the different risks or for extraordinary losses. Accordingly, an increase in ROE attributable to this factor may be interpreted as a sign of the institution's greater economic and financial strength. However, an increase in this ratio may also stem from a one-off increase in extraordinary profits, in which case the increase in ROE will be temporary in nature and will not be associated with better management of the ordinary activities of the institution.

The second term is net operating income divided by gross income (GI). This ratio can also be expressed as 1− (operating expenses/GI) = 1− ER; i.e. as 1 minus the *efficiency ratio.* Consequently, an increase in the ROE driven by an improvement in the relationship between net operating income and gross income indicates progress in the positive direction of more efficiency in the management of primary funds.

The third term is gross income divided by risk-weighted assets (RWA). This ratio is an indicator of the *productivity of the assets adjusted for risk.* Consequently, an increase in the ROE attributable to this factor can be interpreted as evidence that the deposit institution is generating more value added for each euro of assets adjusted for the risk assumed.

The fourth term is risk-weighted assets divided by total assets (A). An increase in the ROE stemming from an increase in this ratio should be interpreted as the result of an investment strategy that changes the *risk profile of the assets* towards a balance-sheet structure with a greater presence of risky assets, so that the positive contribution to the increase in profitability also entails an increase in the risk assumed. This interpretation is obviously subject to the criticisms deriving from the scant correlation in the current regulation of own funds between RWA and effective risk, something that Basel II will help to mitigate.

The fifth term, total assets divided by the sum of core capital (tier 1) and supplementary capital (tier 2), is an indicator of the level of debt or *gearing* of the institutions. In consequence, increases in ROE stemming from increases in this ratio cannot be interpreted as increases in the wealth created using the capital resources invested because the consequent increase in the weighted cost of capital neutralises the positive effect of the higher profitability. Moreover, for a given economic risk, higher gearing entails a greater risk of insolvency, prejudicing the institution's stability.

Finally, the sixth term, regulatory capital (Tier 1+ Tier 2) divided by the group's equity (mainly capital and reserves), is an inverse indicator of the *quality of equity,* since the numerator includes subordinated financing and preference shares that are not in the denominator. A rise in the ratio tells us that the deposit institution is increasing its gearing within regulatory capital which, in turn, increases the cost of the risk capital provided by the shareholders until the effect on wealth creation of the higher profitability is neutralised. Thus, an increase in the ROE associated with a higher value for this ratio will indicate that the institution's (and its shareholders') risk exposure is higher (greater financial fragility).

The algebraic expression breaks down the ROE into a combination of six factors related to efficiency, competitiveness and risk and the annual change in the ROE, in a financial year, is expressed as the sum of changes (log differences) in each of the six factors considered.

Also we study the main indicators, the ROE and the efficiency ratio distribution based on individual institutions and peer groups. Finally we compare results of the Spanish deposit institutions with that of the European average.

III. Solvency

Here we study the main indicators, their evolution and composition, i.e. the solvency ratio, Tier 1, Tier 2, the deductions, capital requirements for credit and market risk, risk weighted assets, number of large exposures.

Regarding Tier 2, we do not include in its computability our statistical provision that gives our institutions a cushion for the unfavourable part of the cycle.

The "statistical provision for insolvency", will constitute, registering every year in the profit and loss account, an estimate of latent global losses in the different portfolios of homogenous risks. Institutions shall calculate the level of provisions: a) by means of calculation methods, approved by the Banco de España, based on their own experience of unpaid debts and on the expected losses in the homogeneous categories of bank credit exposure or b) by a standard method.

In the standard method the amounts to be transferred to the "statistical provision for insolvency" by institutions is calculated multiplying the six classifications of bank credit exposure and credit equivalents for contingent liabilities by its factors, where the classification and its factors are the following:

a) *No appreciable risk*: Risks with the Public Administrations of European Union Members States or to the Central Government of countries classified in group 1 for country-risk purposes, or guaranteed by them 0%
b) *Low risk*: Comprises those assets that serve as security in the Monetary Policy Operations of the European System of Central Banks, except those included in a) mortgages loans over houses fit for living in whose outstanding risk is below 80% of the property value and ordinary securitised mortgage bonds; operations whose holder is a company whose long-term debts have a credit rating of a least A given by a reputable credit rating agency; and securities issued in local currency by the Central Governments of countries not included in a) which are entered in the accounts of branches based in the issuer's country 0.1%
c) *Medium-low risk*: Comprises financial leases not included in other classes of risk and those risks which have collateral different from those indicated in the risks mentioned in the previous points, as long as the estimated value of the assets ceded in the financial leases and the collateral provide ample cover of the outstanding risk 0.4%
d) *Medium risk*: Risks of residents in Spain or in countries included in groups 1 and 2 for country-risk not mentioned in other points 0.6%
e) *Medium-high risk*: Comprises the loans and credits of individuals for the purchase of durable consumer goods and other current goods and services not related to a business activity, and the risks whose ultimate residents in countries included in groups 3 to 6 for country-risk excluded from coverage of country-risk that are not included in other classes 1%
f) *High risk*: Comprises credit card balances, current account overdrafts and credit account excesses, (regardless of who the holder is), except those included in points a) or b) and doubtful assets without compulsory coverage not included in point a) 1.5%

The "fund of statistical provision for insolvency" will be charged quarterly in the profit and loss account by the positive difference between a quarter of the estimate of latent global losses in the different portfolios of homogeneous risks (bank credit exposure multiplied by the corresponding factor), as minuend, and the "net charges for insolvencies" entered in the profit and loss account in the quarterly term, as the subtracted figure. If the said difference is negative, the amount will be written as income in the profit and loss account deducting the "fund of statistical provision for insolvency", so long as there is an available balance.

The "net charges for insolvencies" are the specific provisions for doubtful assets plus the write-off for insolvency expenses minus the recovery of specific insolvency provisions and minus the recovery of written-off assets.

The fund of statistical provision for insolvency will be, at most, equal to three times the amount resulting from the addition of the product of the values set for the different classes of credit risk multiplied by the corresponding factor.

Moving on, related to solvency Saurina and Trucharte (2003), based on the Spanish Credit Register, studied for the aggregate level of all credit institutions "The impact of Basel II on lending to small and medium-sized firms", however, it is possible that the impact will be different at the level of the individual institution.

The New Capital Accord defines SMEs as enterprises with an annual turnover of less than €50 million and establishes capital requirements calculated in a similar way to those for large

Chart I – Probabilities of default (PD) by type of firm (%)
Credit institutions

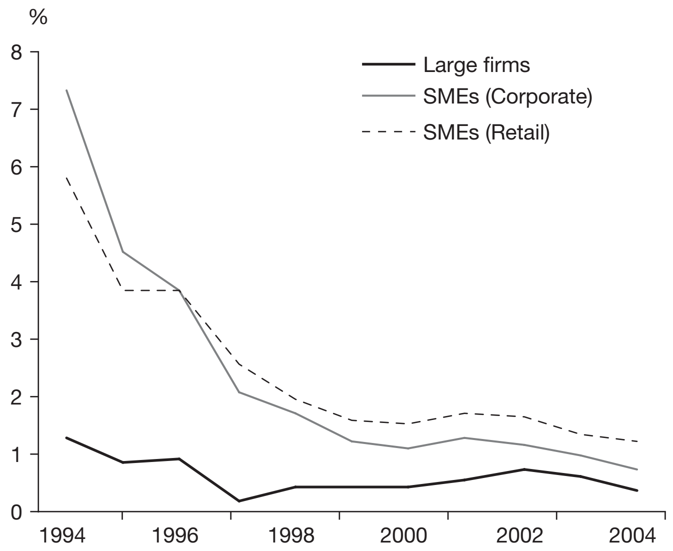
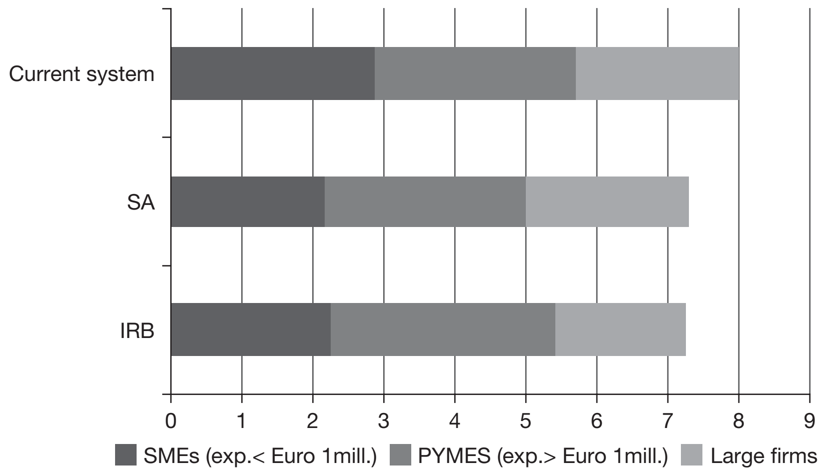


Chart II – Capital ratios and the contributions of various groups of firms (%)
Credit institutions



firms, but adjusted in accordance with the size of each firm. Alternatively, those institutions whose total exposure to an SME does not exceed €1 million may apply the requirements for the other retail portfolio.

Obviously, the impact of the new capital requirements for financing to firms will depend on the probability of default and the relative weight of the various segments considered. According to the paper the probability of default is seen to vary according to the type of firm and, to a lesser extent, time over (Chart I).

The data in Chart I show the difference in the level of credit risk between large firms and SMEs and, accordingly, the distortion that an identical capital requirement, as Basel I, for both types of exposure may generate. However, when there are a very large number of loans, as in the case of the portfolio of loans to SMEs, the risk is more diversified.

Given the distribution of loan exposure between large firms and SMEs (the latter being separated into those to whom the bank exposure is greater or less than one million euro), the average PD of the three groups and the associated capital requirements, it is possible to calculate the impact of Basel II on the financing of firms.

Chart II compares the contributions of these three groups of firms to the total capital ratio under the present system and under the two Basel II proposals, namely the standardised approach (SA) and the internal ratings-based (IRB) approach. It can be seen that under Basel II, without considering the additional requirements for operational risk or other risk-mitigating elements, the capital requirements for the total exposures of Spanish credit institutions would be moderately reduced (by somewhat less than 10%), the magnitude of the reduction being practically the same under both approaches.

The basic IRB approach would entail a reduction in capital requirements, both for loans to large firms and for loans to SMEs, especially when the exposure to the entity is less than one million euro. In short, and with the caveats that a study of this nature implicitly involves, the current proposals of the BCBS will not significantly affect the existing patterns of bank financing to firms in Spain.

Finally, also we look at the distribution of the solvency ratio between the individual institutions and we compare the Spanish banks situation with that of the European banks.

Cristina Luna (Bank of Spain)

SESSION 2

What is the usefulness of existing statistical frameworks and of new initiatives currently being taken?

Chair's summary:	Mr. Luigi Federico Signorini (Bank of Italy)
Papers:	**Financial and non-financial accounts for monitoring financial stability** Reimund Mink, Patrick Sandars and Nuno Silva (ECB)
	Usefulness of existing structures in the statistical system and new initiatives Mr. Art Ridgeway (Statistics Canada)
	Financial stability analysis – evaluation of existing data sources Ms. Leena Mörttinen (Bank of Finland)
	Financial stability: an overview of Bank of Italy statistics Riccardo de Bonis, Giuseppe Grande, Silvia Magri, Luigi Federico Signorini and Massimiliano Stacchini (Bank of Italy)
	Assessing financial stability at the Bank of Italy: data sources and methodologies Mr. Mario Quagliariello (Bank of Italy)

Chair's summary

Luigi Federico Signorini (Bank of Italy)

This session had six background papers (contributed by five institutions: the IMF,[1] the BIS, the ECB, the Bank of Finland and the Bank of Italy), and four lead interveners. The panel of lead interveners included, usefully, both providers and users of statistics, as well as international standard-setters. The diversity of the points of view – also reflected in the wide range of topics covered in the background papers – was a key element in a rich discussion.

Given the lack of a clear-cut definition of financial stability, the analysis of systemic vulnerability was seen as an inherently complex task. It is intensive in terms of data requirements (high frequency data + details/breakdowns). It requires a large amount of data arising from various sources and a closer co-operation between financial supervisors and central banks. Speakers concentrated on open issues concerning drawbacks of existing statistical arrangements and possible lines of evolution. Several specific issues emerged.

1. First of all, financial stability is concerned with systemic risk, but aggregate data are not enough. Analysts ask for more detailed/frequent information on several economic sectors; in particular, there is a general consensus on the fact that global players (bank, insurance, non-financial enterprises, etc.) should be better monitored. Other key data requirements include distributional parameters like concentration data and tail weights. One specific area that seems to require attention in view of institutional and financial innovation is the monitoring of risk transfer, both domestic and international.
2. However, the collection, compilation and dissemination of data are costly activities (for regulators as well as for regulated firms), and accurate cost-benefit analyses should precede the introduction of further reporting burdens. New data requirements should be therefore only proposed when this is cost effective and there is agreement on their usefulness. Extra reporting costs can be contained to the extent that analysts make intelligent use of already available data (such as supervisory statistics, monetary statistics, financial market statistics, national and financial accounts) for financial stability purposes. This is not confined to the obvious case of monetary and supervisory data. For instance, national statistical agencies are rich sources of confidential intermediate data sources and the challenge is to make use of such data without violating confidentiality requirements. Also, it may be possible to make use of cross-sectional surveys designed for other purposes (such as social surveys) and add on questions relevant for financial stability issues. The use of such data may sometimes be second best for the purposes of FS analysis, but it does not seem realistic to establish an independent, dedicated set of statistical requirements. A judicious enhancement of the existing statistical framework is a more pragmatic option.
3. The convergence of statistical definitions and accounting standards is a way to reduce the costs of data collection. International statistical compilation guides facilitate comparability across countries, though one has to leave to domestic authorities the flexibility to deviate from the recommendations, when this is deemed necessary, to build up more meaningful indicators. The trade-off between standards and flexibility in statistical data collection was in fact recognised as a key issue. On the one hand compatible standards are required both for comparisons across time and space, and (crucially, in the light of the previous point) for the interoperability of data coming from different sources and originally collected for different purposes. On the other hand, flexibility is necessary because of institutional and economic differences across economies/sectors, and because of the need to ensure a prompt response to new data needs in light of a changing economic and financial environments. Introducing new standards is also expensive as data collection processes typically have high sunk costs.
4. In this light, the IMF and other standard-setting agencies have played an active role in trying to establish international standards for FS data. They have adopted a pragmatic approach, so that minimum comparability based on voluntary standards is often preferred to strict/mandatory comparability, to the extent that the latter would be unrealistic or unwise in light of the considerations above. In the longer term there appears to be scope for further

1 *The paper presented by Ms. Armida San Jose (IMF) at the Workshop is not included in this Bulletin.*

efforts. There are processes currently in place concerning international standards in various fields, including national accounts, supervisory statistics, and company accounts. While full comparability across standards was recognised as an unrealistic aim at this stage (and possibly forever), there was agreement that at least unnecessary differences should be avoided. As an example, the SNA review might offer an opportunity to enhance the usefulness of national accounts data for financial stability analysis.

5. Lastly, the assessment of the overall state of health of the financial system is not achievable without a strict interaction between micro and macro economists/econometricians, experts of both banking supervision/financial markets and monetary economics/policy. In particular, in the development of forward-looking tools, such as stress testing exercises, the co-operation between the supervisory authorities and the central bank is crucial in order to design consistent stress scenarios and obtain reliable measures of their impacts on financial intermediaries' balance sheets.

Luigi Federico Signorini (Bank of Italy)

Financial and non-financial accounts for monitoring financial stability[1]

Reimund Mink, Patrick Sandars and Nuno Silva (ECB)

1. Introduction

Financial stability implies that the financial system adequately fulfils its role in allocating resources, transforming maturities, mobilising savings and diversifying risks. The interest of central banks in analysing financial stability has increased considerably over recent years. In particular, the Asian financial crisis in the late 1990s highlighted the importance of correctly identifying the potential sources of financial risk and the real vulnerabilities of national economies. Furthermore, the growing interest of central banks in safeguarding financial stability is related to both the potential impact of structural imbalances (e.g. financial bubbles) on monetary stability and the fact that a stable financial system is needed for the effective transmission of monetary policy and the smooth operation of payment systems. Therefore, the analysis of financial stability overlaps to a large extent with that of monetary stability.[2]

Supported by the Banking Supervision Committee (BSC) of the Eurosystem/European System of Central Banks (ESCB), the European Central Bank (ECB) assesses both financial stability in the euro area and banking stability in the EU.[3] Various reports have already been published on this subject, most notably the ECB's regular "Financial Stability Review" (FSR).[4] In addition to financial markets and payment and settlement statistics, the analysis carried out in the FSR draws on consolidated banking data available from supervisory reports. The concepts underlying supervisory information differ to some extent from the methodology used in the compilation of other financial data collected and compiled by the ESCB, for example balance sheet statistics of monetary financial institutions (MFIs) and quarterly financial and non-financial accounts for non-financial corporations and households.

The use of quarterly financial and non-financial accounts for monitoring financial stability in combination with other data sets is seen as a major step forward in improving the overall framework for financial stability assessment. The system of quarterly accounts, which is in development for the euro area and for most EU countries, will provide a comprehensive and consistent set of financial and non-financial data for the respective economic area, its main institutional sectors and for the rest of the world. It will provide, in particular, a rich framework for analysing the households and the non-financial corporate sector and the inter-linkages between these sectors and the financial system.

This paper is organised as follows. Sections 2 and 3 present, respectively, the system national accounts and financial stability analysis methodologies. In Section 4 the two frameworks are compared. Section 5 assesses how far the national accounts data might be used for financial stability analysis, while Section 6 provides an overview of the possible enhancements to national accounts data for financial stability analysis. Section 7 concludes.

2. Methodology of the system of national accounts

The methodology of the system of national accounts is based on the international statistical standards as outlined in the System of National Accounts (the 1993 SNA) and in the European System of Accounts (the 1995 ESA). The system consists of a coherent set of integrated

1 *The views expressed in this paper are those of the authors and do not necessarily reflect those of the ECB. An earlier version of this paper was presented to the Bank of Canada/IFC workshop on data requirements for analysing the stability and vulnerability of mature financial systems, Ottawa, 21–22 June 2005.*

2 *See Issing (2003) for the links between monetary and financial stability.*

3 *As foreseen in Article 3.3 of the "Protocol on the Statute of the European System of Central Banks and of the European Central Bank".*

4 *The second issue was published on 31 May 2005.*

macroeconomic accounts. The compilation of the national accounts for an economy, its institutional sectors and for the rest of the world requires the definition of a set of well-defined economic activities and their results as flows and stocks. It further draws on harmonised descriptions of: (a) institutional units and their groupings into sectors, sub-sectors and by residence; (b) the time of recording; (c) the valuation principles; and (d) the maturity breakdown.

2.1. System of national accounts

The system of national accounts records two basic types of data: flows and stocks. Flows refer to actions and effects of events that take place within a given period of time, whereas stocks refer to positions at a particular point in time. In general, economic flows are described as transactions, if they are the result of interactions between institutional units by mutual agreement. Other flows are either revaluations or other changes in the volume of assets. The relationship between flows and stocks is shown in Table 1.

Based on these two types of data, the system of financial and non-financial accounts is built around a sequence of inter-connected accounts drawn up for all resident sectors, sub-sectors and for the rest of the world.[5] The sequence of accounts is composed of the current account, the accumulation account and the balance sheets. Table 2 shows how the transactions, other flows and stocks are presented in the system of national accounts.

The current account records the production of goods and services and the generation, distribution, redistribution and use of income. It belongs, like the capital account and the financial account, to the accounts in which transactions are recorded.

While all changes in assets, liabilities and net worth are included in the accumulation account, the corresponding stocks are shown in the balance sheet. The balance sheet comprises three elements: (a) the stock of non-financial and financial assets; (b) the stock of liabilities; and (c) the net worth as the balancing item between assets and liabilities. Drawing up a balance sheet makes it possible to focus on the net worth of a sector or an economy and see how this changes over time. Accordingly, the change in net worth is composed of saving, net capital transfers receivable, holding gains less holding losses, and other (net) changes in the volume of assets. The sequence of accounts is presented in more detail in Annex 1.

2.2. Institutional sectors and residence

To describe production, income, capital formation, financial transactions and balance sheets, institutional units[6] are grouped into five mutually exclusive resident institutional sectors based on their principal functions, behaviour and objectives (see Table 3). Some sectors are further divided into sub-sectors. Financial corporations, for example, are broken down into the central bank, other monetary financial institutions, other financial intermediaries except insurance corporations and pension funds, insurance corporations and pension funds, and financial auxiliaries.[7]

The system allows for a complete set of flow accounts and balance sheets to be compiled for each sector and sub-sector of the economy as well as for the flows and positions vis-à-vis the rest of the world. As the system is designed for the compilation of macroeconomic aggregates, covering the sectors or sub-sectors as a whole, the compilation systems do not usually provide the necessary scope for the compilation of "micro-data", i.e. by institutional unit.

The residence principle is based on the concepts of economic territory and centre of economic interest. Generally, an institutional unit is deemed resident in an economic territory, which consists of a geographic territory administered by a government, when it engages and intends to continue engaging in economic activities and transactions on a significant scale in that territory. In essence, an institutional unit is a resident of the economy in which it is ordinarily located.

5 *An account is a means of recording, for a given aspect of economic life, the uses and resources or the changes in assets and the changes in liabilities during the accounting period, or the stock of assets and liabilities existing at the beginning or at the end of this period.*

6 *Institutional units are economic entities capable of owing goods and assets, incurring liabilities and engaging in economic activities and transactions with other units in their own right.*

7 *The sector breakdowns in the 1993 SNA and 1995 ESA are slightly different. The euro area accounts use the 1995 ESA concepts.*

Table 1 – Relationship between flows and stocks

Stocks of assets and liabilities at the beginning of the accounting period *t*
+ flows (changes in assets and liabilities during the period *t* due to
transactions;
revaluations; and
other changes in the volume of assets)
= Stocks of assets and liabilities at the end of the accounting period *t*

Table 2 – Transactions, other flows and stocks as presented in the system of accounts

		Transactions	Other flows	Stocks
Current account		Production of goods and services, generation, distribution, redistribution, and use of income		
Accumulation account	Capital account	Net acquisition of non-financial assets, saving and capital transfers		
	Financial account	Net acquisition of financial assets and net incurrence of liabilities		
	Revaluation account		Holding gains and losses in non-financial assets, financial assets and liabilities	
	Other changes in the volume of assets account		Other changes in the volume of non-financial assets, financial assets, and liabilities	
Balance sheets				Non-financial assets, financial assets, liabilities and net worth

Table 3 – Resident institutional sectors and sub-sectors and rest of the world according to 1995 ESA[1]

S.1	**Total economy**
S.11	**Non-financial corporations**
S.12	**Financial corporations**
S.121	Central bank
S.122	Other monetary financial institutions
S.123	Other financial intermediaries, except insurance corporations and pension funds (OFIs)
S.124	Financial auxiliaries
S.125	Insurance corporations and pension funds
S.13	**General government**
S.1311	Central government
S.1312	State government
S.1313	Local government
S.1314	Social security funds
S.14	**Households**
S.15	**Non-profit institutions serving households**
S.2	**Rest of the world**
S.21	The European Union
S.22	Third countries and international organisations

[1]*The codification and terminology used in the table are identical to those used in the 1995 ESA.*

The economic relations between residents and non-residents are reflected as cross-border transactions, other flows and positions and are covered by the rest of the world account. A resource or a change in liabilities for the rest of the world is a use or a change in assets for the total economy and vice versa. If a balancing item is positive, it means a surplus of the rest of the world and a deficit of the total economy, and vice versa if the balancing item is negative.

In dealing with multi-country accounts, like euro area accounts, two specific issues arise. First, to compile the multi-country rest of the world account cross-border data refer only to transactions, other flows and positions between residents in the multi-country area and residents outside the multi-country area. Accordingly, the national rest of the world data have to be subdivided into data reflecting cross-border data within the multi-country area and outside the multi-country area. The intra-multi-country area data are treated as flows or positions between residents. Second, supranational organisations that are located within the multi-country area are treated as residents within this area if only relevant for the multi-country area (e.g. the ECB).[8]

2.3. Time of recording, valuation and maturity

The guiding principle for recognising assets and liabilities at any moment in time is economic ownership. Transactions are recorded when economic value is created, exchanged, transferred or extinguished. Following the accrual principle, the relevant date of recording is the date at which the assets ownership changes and not when the payment is actually made. Furthermore, the market valuation principle is followed, especially for marketable instruments (e.g. quoted shares). The balance sheet items are shown in gross terms, i.e. without netting assets and liabilities.[9] Where financial assets and liabilities are broken down by maturity (loans and debt securities), it is by original maturity. The usual split between short- and long-term maturities is usually based on the one year threshold.

2.4. From-whom-to-whom accounts

From-whom-to-whom accounts allow tracing the debtor/creditor relationships between institutional sectors, i.e. they usually show either the transactions or the balance sheet positions cross-classified by debtor sector and creditor sector. Chart 1 illustrates the from-whom-to-whom transactions as inflows and outflows, for one financial instrument, between the five resident sectors and the rest of the world.

To derive from-whom-to-whom accounts, data have to be compiled based on the quadruple entry principle. It means that each transaction is recorded twice by the two institutional units involved. For example, a subsidy paid in cash by a government unit to a non-financial corporation is recorded in the government accounts as a use under distributive transactions and a negative acquisition of assets under currency and deposits. In the non-financial corporate sector accounts, it is recorded as a resource under distributive transactions and an acquisition of assets under currency and deposits. On the other hand, transactions within a single unit (such as the consumption of output by the same unit that produces it) require only two entries.

This presentation allows for the analysis of who is financing whom, in what amount, and using which instruments. It allows questions to be answered such as: What are the counterpart sectors of the financial investment and financing decisions of the financial corporate sector? Which are the corporations (financial or non-financial, resident or non-resident) in which the non-financial corporations or households participate? Who is holding the corporate debt or equity within an economy or abroad? As regards the allocation of income, it also permits to trace who is paying/receiving income (e.g. interest) to/from whom.

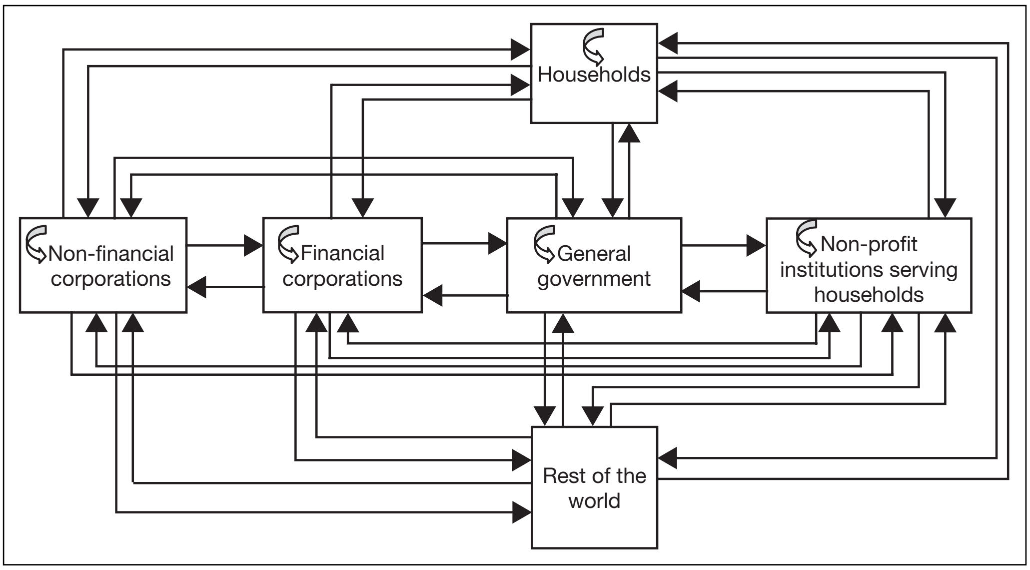
3. A general framework for financial stability analysis

A financial system is in a range of stability whenever its principal components – including financial institutions, markets and infrastructures – are jointly capable of absorbing adverse

8 *This applies, for instance, to the ECB in the case of euro area accounts, but not to other European Union institutions such as the European Commission or the European Investment Bank. However, the latter are treated as resident units within the EU accounts.*

9 *However, the transaction concept corresponds to acquisitions less disposals of the asset over the accounting period.*

Chart 1 – From-whom-to-whom transactions between the five resident sectors and the rest of the world sector for one financial instrument



Note: The arrows drawn within the individual sectors indicate the intra-sectoral transactions. Such transactions are, by definition, not shown for the rest of the world.

disturbances. Financial system stability also requires the financial system to facilitate a smooth and efficient reallocation of financial resources from savers to investors, that financial risk is assessed and priced accurately, and that risks are efficiently managed.

The stability of a financial system may be challenged by endogenous (within the financial system) and exogenous (e.g. real economy) elements. While financial authorities can influence or combat endogenous imbalances through regulation, supervision and adequate crisis management, they cannot do much about external disturbances, apart from implementing appropriate macroeconomic policies.

Accordingly, financial stability analysis covers all sources of (endogenous and exogenous) risks and vulnerabilities, which require the systematic monitoring of individual parts of the financial system and the real economy (households, non-financial corporations and general government). The analysis takes also into account cross-sector and cross-border linkages, because imbalances often arise due to a combination of weaknesses from different sources. This aspect is gaining importance on account of the main financial trends – financial deepening, integration and complexity – which is also increasing the scope for contagion.

Financial stability analysis may be understood as the "assessment and monitoring of the strengths and vulnerabilities of financial systems". Taking into account the complexity of the financial system, there is no single indicator that can be used to assess its degree of stability. Instead, a wide array of information is compiled to monitor the health and soundness of financial institutions and markets and of their corporate and household counterparts. One of the most important components in the stability assessment of financial systems is the so-called macro-prudential indicators (MPIs). The range of MPIs that should be followed and analysed depends very much on the characteristics of the economic area; however, their coverage typically follows the CAMELS framework (**c**apital adequacy, **a**sset quality, **m**anagement soundness, **e**arnings, **l**iquidity, **s**ensitivity to market risk). Such indicators include both aggregated information on financial institutions and indicators that are representative of markets in which financial institutions operate. They are compiled using mainly micro-prudential (individual) data, aggregated to the macro-level. As much detail on the structure of the financial sector is lost in the process of aggregation, there is an additional need to calculate dispersion indicators and carry out peer group analysis.[10]

In addition to MPIs and a myriad of other financial market and economic imbalances indicators, financial stability analysis also encompasses the review of macroeconomic indicators.

10 *A peer group is a set of individual institutions that have been grouped on the basis of specific analytically interesting criteria (e.g. size of assets or revenues and type of activity).*

These are quantitative indicators that provide a broader picture of economic and financial developments, such as interest rates, inflation, GDP growth and corporate and households debt developments, along with qualitative information on the institutional and regulatory framework – particularly through the assessment of compliance with international financial sector standards and codes – and the outcome of "stress tests", as well as scenario analysis to determine the sensitivity of the financial system to macroeconomic shocks.

4. Comparison between the system of national accounts and the framework for financial stability analysis

Although the national accounts methodology differs to some extent from the statistical concepts used for financial stability analysis, in particular for the compilation of MPIs,[11] national accounts data provide valuable insights into the financial structure of the economy and probably offer the best overall framework for the assessment of the financial soundness of non-financial corporations and households.

The major methodological differences between the two frameworks relate to how data are classified, consolidated and valued. Furthermore, data sets used for financial stability analyses typically cover breakdowns and details which are usually not provided within national accounts. This refers, for example, to information on instrument splits by residual maturity on non-performing loans or guarantees (off balance sheet information), interest rate spreads or real estate prices. Furthermore, specific statistical information is derived from micro-prudential data of supervisory reports to assess certain banking sector risks by means of dispersion analysis. Such data sets are usually not reconcilable with national accounts figures.[12] However, it should be mentioned that some euro area countries compile data for monetary and financial stability analysis within a common approach (e.g. Belgium and Italy), which reinforces the existing relationships between the frameworks and the need to reduce statistical burden.

4.1. Asset categories

The asset categories shown in the supervisory balance sheets generally include:[13] cash and cash balances; debt instruments; loans and advances; equity instruments; derivatives; tangible (fixed) and intangible (e.g. goodwill) assets; tax assets and other assets. On the liability side, the main categories are debt (mainly deposits in the case of banks), provisions, derivatives, tax and other liabilities and capital and reserves. Debt is further broken down by counterpart and financial instrument, while provisions are shown separately for pensions and similar obligations. Capital and reserves are split into subscribed capital, share premium, reserves and retained earnings.

For national accounts, the balance sheet items are mainly classified by type of instrument and liquidity. Although some obligations (e.g. provisions) are not always recognised as liabilities in the 1993 SNA, most of the national accounts instrument categories coincide with those of the supervisory balance sheet.

In the context of national accounts, profit and loss data are mainly used as a source for compiling the current account. Components such as financial and operating income and expenses, value-added and administration costs are extensively used. Data on depreciation are also important in the compilation of consumption of fixed capital. In fact, profit and loss data are often less detailed than required for a comprehensive compilation of national accounts. For example, while financial income and expenses are usually split into the two components, a further breakdown of the financial income into interest and non-interest income is not always available. As no detailed cash flow statements are usually made available, the compilation of transaction data from stocks might be done with some caveats. As a result, the derivation of the balancing items, like non-financial corporations' net lending/net borrowing or net worth, is rather difficult without using additional data sources.

11 *See Annex 2 for the differences between statistical requirements for monetary policy and financial stability purposes.*

12 *See the papers on financial stability published in the* IFC Bulletin, *issue No 9 for a review of the problems faced by the United Kingdom, Hong Kong, the BIS and the IMF. For a description of the approach of the ECB in the integration of macroeconomic and prudential information in the compilation of MPIs, see Grande, M. and Stubbe, M. (2002).*

13 *Based on the draft IAS compliant consolidated balance sheet proposed by the Committee of European Banking Supervisors for the banking sector.*

4.2. Consolidation

In compiling macro-prudential statistics it is advisable to collect data for domestically controlled deposit-takers (usually banks) on a cross-border and cross-sector (excluding insurance corporations and pension funds) consolidated basis (hereinafter cross-border cross-sector consolidation). Under this concept, data on the business of domestically controlled incorporated deposit-takers are consolidated with that of their (domestic and foreign) branches and deposit-taking subsidiaries. In principle, the collection of data on this basis should also apply to other financial corporations and the non-financial corporate sector.[14,15] In essence, cross-border consolidation is based on the idea of control by a parent corporation over its operating units, i.e. the focus of the analysis is on the concept of ultimate risk. Cross-border consolidation is essential in providing a complete picture of the activities and income of corporations. It is essential to present data on this basis when monitoring the integrity of capital in the banking sector as it eliminates double counting.[16]

By contrast, national accounts and the collection systems used for monetary, financial and other economic statistics, such as the MFI balance sheets statistics, are based on the so-called "host-country" principle or individual reporting. In this case, reporting institutions only provide data of their business, i.e. they consolidate the activities of their resident branches but not the activities of their non-resident branches and subsidiaries, whether resident or non-resident. It requires that such (non-resident) branches and subsidiaries are treated as institutional units that are part of the reporting population of the country in which they are located.

Consolidation in the context of national accounts refers to the elimination of assets and liabilities within a resident sector or sub-sector. Institutional units belonging to different sectors, sub-sectors or economic areas are (usually) not consolidated, while this may be done in the context of cross-border consolidation for financial stability analysis.

The use of national accounts data for the financial stability analysis of the non-financial corporate sector is not widely accepted. For example, the IMF recommends that the indicators for the corporate sector are compiled using aggregated data from cross border consolidated financial statements for the larger corporations. The reason is the same as for the financial sector (deposits takers), the consolidated approach is preferred so as to avoid double counting of assets and capital, and in the case of non-financial corporations, to avoid double counting of earnings. But it does acknowledge that for the corporate sector, consolidated national accounts data can be used when cross-border consolidated data do not provide sufficient coverage. However, drawing on the IMF's own analytical framework for the use of the corporate sector indicators, it could be argued that it would be useful to also analyse "host-country" data in their own right.

There are three main reasons for monitoring data for the corporate sector also on a "host-country" basis. First, there is large analytical value in separately measuring the exposure of the resident banking system to the national economy as opposed to major external economies. Second, effective use of the non-financial corporate sector indicators can only be made if the banking sector's exposure to this sector is also measured using the FSI on the sector distribution of lending. Hence, to derive an appropriate counterparty measure, data should be compiled on a residence basis separately identifying the national economy and its sectors and sub-sectors from non-resident economies towards which banks have exposures. Finally, this approach is consistent with the importance that the IMF places on the analysis of the macro-financial linkages between the real economy and financial intermediation.

4.3. Valuation criteria

Application of the quadruple entry principle requires symmetry of entries in the accounts of the various institutional units and sectors. To achieve this, transactions and balance sheet items should be recorded at their exchange, market or market-equivalent value. The market price is thus the basic reference for valuation. For financial stability analysis, it is often preferable to value the various entries of the balance sheet at their ultimate risk, e.g. the portfolio held to maturity is valued at redemption price, whereas the best measure of risk for the trading portfolio is certainly the market price. However, as the International Accounting Standards (IAS)

14 *No differences are observed for the consolidation of the household sector.*
15 *See Chapter 5 of the IMF's "Compilation Guide on Financial Soundness Indicators" (July 2004) for a comprehensive review of the issues of consolidated reporting.*
16 *See the Basel Committee on Banking Supervision on the "Core principles for effective banking supervision" (1997).*

move more in the direction of fair value accounting, the discrepancies in the applied valuation methods will gradually vanish.

4.4. Maturity and currency breakdowns

National accounts usually cover data on financial instruments with a breakdown by original maturity. Such data provide a good basis for liquidity analysis. Financial stability analysis, however, primarily looks at the imbalances between assets and liabilities based on data broken down by residual maturity. Yet another approach assessing the sensitivity to market risk refers to the calculation of the "duration" of financial assets and liabilities compiled as the weighted average maturity of a financial instrument.

While national accounts data with a breakdown by currency are usually not available, various financial statistical data sources, like MFI statistics, provide foreign currency splits for some of them, which allow for a currency concentration risk analysis.

5. Use of national accounts data for financial stability analysis

International organisations, in particular the IMF and central banks pay increasingly attention to financial stability issues in their regular publications.[17] Typically, these financial stability reviews are published once or twice a year. They examine the developments of the financial sector, financial markets and financial infrastructures (payment and settlement systems). They cover developments in the real sector to the extent that these form potential risks to financial corporations and markets and consequently to the overall financial system.

5.1. The general approach

Taking into account the conceptual differences that exist between the national accounts and the financial stability analysis framework (see Section 4), national accounts data should be seen as a complementary data set to the core consolidated data for financial corporations. In this context, balance sheet and transaction account data are needed, preferably with from-whom-to-whom detail, to compile specific macro-prudential indicators (MPIs) for non-financial corporations and households. The soundness of the financial system depends crucially on the sustainability of the level of corporate and household debt. From the financing side, indebtedness and the leverage of non-financial corporations are recognised as key leading indicators in identifying asset bubbles and financial distress.[18] In combination with credit growth, external (non-deposit) funding of banks and asset prices could help to detect dangerous economy-wide leverage.

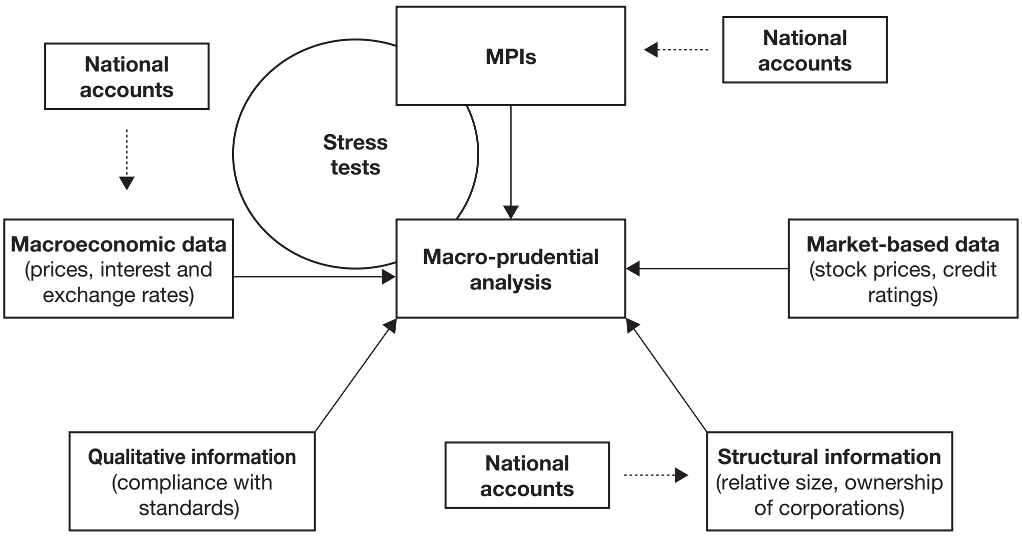
From the non-financial (real) side, "income-based financial fragility indicators" together with data on efficiency and profitability measures provide valuable information on the potential to honour commitments, i.e. to repay debt. Measures of the financing gap[19] provide information on the efficiency and continuity of the business, i.e. it gives an idea of the ability of the institution to regenerate and grow using internal cash flows (own funds). The real side also offers a rich set of information to be used in "stress testing", scenario analysis and macroeconomic modelling of the stability of the financial system that allows for a timely identification of potential instability pressures.

In summary, as indicated in Chart 2, national accounts play a major role in the compilation of certain MPIs – such as debt-to-GDP ratios and financial health measures of the non-financial sectors – as well as in structural analysis, including the importance of the main instruments, ownership structure and concentration.

The remainder of this section presents the IMF and the ECB macro-prudential analysis frameworks from the viewpoint of the use of national accounts data.

17 *See Annex 3 for an overview of such publications in the EU.*
18 *See Jaeger, A. (2003) on corporate balance sheet restructuring and investment in the euro area and Teplin, A. M. (2001) for the uses of US flow of funds data.*
19 *Difference between internal funds (saving) and investment.*

Chart 2 – Use of national accounts in macro-prudential analysis financial instrument



Source: Sundararajan, V. and others (2002) – adapted.

5.2. The IMF approach

The IMF has established a framework for financial stability analysis which encompasses the macro-prudential analysis of the financial system as well as the surveillance of financial market conditions and the analysis of macro financial linkages.[20] The figure in Annex 4 shows the relationship between the types of surveillance undertaken by the IMF and the indicators used to conduct this surveillance. The centrepiece of this surveillance is the macro-prudential analysis based on the IMF's FSIs.

The main focus of the FSIs is on banking indicators that permit to monitor the financial system vulnerabilities arising from credit, liquidity and market risks and its capacity to absorb losses, measured by capital adequacy ratios. These FSIs make up all of the "core" (or mandatory) indicators and many of the "encouraged" indicators.[21] In line with standard practice for macro-prudential analysis, the IMF requires these indicators to be compiled on a consolidated basis. For those indicators measuring capital adequacy, it is also recommended that supervisory concepts are applied (e.g. the new Basel II capital requirements). Although the IFM FSI Compilation Guide outlines possible ways of deriving many of these FSIs from national accounts, the main sources are micro-prudential data for banks collected by supervisory authorities.[22]

The situation is somewhat different for indicators describing the activities of the non-financial sectors. The IMF places some emphasis on compiling indicators to measure the financial soundness of the non-financial sectors as leading indicators of financial stability, which might provide an early, albeit indirect source of risk to the financial system. They include five main indicators for non-financial corporations: debt to equity; return on equity; earnings to interest and expenses; foreign exchange exposure to equity; and applications for creditor protection. As regards households, two indicators are recommended: household debt to GDP or gross disposable income and household debt servicing. In addition, there are indicators for the real estate markets (prices, lending).

5.3. The European Central Bank approach

In late 2004, the ECB joined the growing number of central banks around the world that are addressing their financial stability mandates[23] in part through the periodic issuing of a financial

20 *See Financial Soundness Indicators – Background Paper, IMF Staff Paper, 14 May 2003.*
21 *See Annex 5 for a list of core and encouraged Financial Soundness Indicators (FSIs) proposed by the IMF.*
22 *See Annex 6 for a country review of the data sources used in the compilation of the FSIs.*
23 *Under Article 3.3 of the Statute, the ESCB and the ECB shall "contribute to the smooth conduct of policies pursued by the competent authorities relating to the prudential supervision of credit institutions and the stability of the financial system". To pursue this task, the ESCB set up the BSC in 1998, which is supporting all the tasks related to macro-prudential analysis and financial supervision undertaken by the ESCB.*

stability review.[24] The semi-annual ECB Financial Stability Report has a wide focus, including an assessment of the banking sector as well as risks to stability arising in the other sectors of the euro area economy and internationally. The report highlights the evolution of both the endogenous and exogenous sources of risks faced by financial intermediaries, of developments in the euro area markets and of the payment and settlement systems.

The ECB's report is divided in two main parts. The first part deals with macro financial issues related to the environment surrounding the euro area financial system (economic developments in the United States, Japan, several non-EU countries, emerging market economies and other economies).[25] The second part concentrates on the risks faced by the various components of the financial system, namely, financial markets, financial intermediaries and infrastructures as well as on their ability to withstand shocks.

The financial stability report draws on the main findings of the annual report on the EU banking sector stability, first published in February 2003, which presents a macro-prudential analysis of EU banking sector stability conducted within the ESCB's Banking Supervision Committee (BSC).[26] The report aims, first, at detecting and monitoring vulnerabilities in the financial system, and, second, at increasing the understanding of trends in the financial system and the links between macroeconomic and financial system developments.

To produce the financial stability report, the ECB monitors a wide set of indicators, including MPIs, which are closely related to the FSIs proposed by the IMF. Although the data used in the monitoring of financial stability have been adequate, certain limitations remain to be surmounted. In particular, much of the data used to derive indicators for financial corporations were originally designed for other purposes, specifically to support the monetary policy of the ECB or for micro-prudential supervisory purposes. As far as non-financial corporations and households are concerned, the ECB mainly uses national accounts data in the analysis of the balance sheet and related indicators (e.g. performance). It undertakes this analysis not only for the euro area, but also for the euro area's main trade partners, in particular, the United States. This is important because (a) many euro area financial corporations have direct exposures to these markets through lending, and (b) conditions in the corporate sector of these economies may also affect the financing costs faced by large euro firms in global capital markets, both through competing demands for funds as well as in the global pricing of corporate sector credit and equity market risks.

6. Enhancing the use of national accounts in financial stability analysis

As presented in the previous sections, the concepts underlying the compilation of national accounts deviate from the optimal data framework for financial stability analysis and do not provide the necessary detail, particularly for financial corporations. This section presents the efforts currently being undertaken by the ECB to develop a comprehensive set of quarterly euro area accounts, and the worldwide initiative to review the statistical standards that will contribute to a convergence of the statistical and accounting standards.

As a medium-term priority, the ECB aims at improving the quality and availability of national accounts for the euro area by developing a comprehensive set of quarterly financial and non-financial sector accounts for the euro area (EAA) in close cooperation with Eurostat. This data set will bring together several data sources (MFIs, other financial intermediaries, especially investment funds, balance of payments, securities issues and holdings, government finance statistics, and national non-financial accounts) into an integrated framework that will primarily be of use for monetary policy analysis,[27] but that will also provide useful data for euro area/EU financial stability analysis.

The presentation of the EAA as an integrated system, and specifically in the context of a from-whom-to-whom analysis, facilitates the assessment of the financial transactions and other

24 *These assessments are prepared by the ECB under the aegis of its Directorate Financial Supervision and Stability (D-FS) and are available on the ECB's website.*

25 *Indicators of economic performance, external imbalances and financing gap and indebtedness are of the private non-financial sectors are among those analysed.*

26 *These two reports are complemented by a third report, namely the BSC's* Annual report on the EU banking structure, *first published in November 2002, which provides an assessment on the evolution of the structure of the EU banking system.*

27 *See Mink, R. (2002) for a description of quarterly Monetary Union financial accounts for the purpose of ECB monetary policy analysis and Jellema, T., Keuning, S., McAdam, P. and Mink, R. (2004) for the development of a euro area accounting matrix and its relevance for the ECB's monetary policy analysis.*

flows between the various sectors as well as their financial positions vis-à-vis other sectors.[28] It will permit to better highlight potential risks related to concentrations in specific financing sources and in components of financial investment by instrument, maturity, and counterpart sector. For instance, there might be a concentration in lending to the household sector or in short-term debt, which may cause liquidity concerns.

EAA will also help to reveal specific financial innovation developments and their implications. For example, "securitisation" is often captured by an increase in both the amount of debt securities issued by corporations and the loans granted by specific financial intermediaries. Measures of credit granted should now – more than ever – encompass all financial intermediaries, i.e. also special purpose vehicles (SPVs) and other credit granting institutions, and not only the MFI sector.

The ongoing review of the statistical standards (the 1993 SNA as well as the Balance of Payments Manual) will most probably also contribute to an improvement in the usefulness of the national accounts data for financial stability analysis. As the general opinion is that statistical and accounting standards should, as much as possible converge, information, for example on non-performing loans and market-equivalent value of loans will be requested, which would allow extracting statistical information on the asset quality of banks for financial stability analysis.

The body responsible for the 1993 SNA review, the Advisory Expert Group is also recommending distinguishing several types of implicit assets and liabilities. This would include: (i) provisions to cover events certain to happen but of an uncertain timing; (ii) provisions to cover events likely to happen but of an uncertain timing; (iii) contingencies; and (iv) impairment. The presentation of such statistical information in a complete set of supplementary accounts has the advantage that users are provided with a broad range of statistical information that may help to assess, for instance, the corporate risks as they are impacted by loan provisioning, securitisation and other specific financing arrangements. This additional detail will provide data that are more in line with the ultimate risk analysis framework.

As financial corporations become increasingly integrated all over the world, a system of macro-prudential surveillance focusing exclusively on the risks arising from the performance of the resident economy is losing momentum. For example, when the ECB is assessing the credit risk arising from the euro area's business in other regions of the world, it would be extremely important that countries in such regions have a sound and reliable national accounts framework that would permit a correct evaluation of all the risks. In this context, a system of financial and non-financial accounts that is used globally and based on internationally harmonised concepts would provide the right framework for cross-border analysis.

A comprehensive Central Balance Sheet Office (CBSO), which is integrated in the compilation of national accounts, would also be a valuable tool for financial stability analysis. Although the reconciliation between individual balance sheet information and macroeconomic aggregates is usually difficult to accomplish, detailed CBSO data used in the compilation of national accounts for the non-financial corporate sector would provide the necessary micro dimension to financial stability analysis.

7. Conclusion

Although the national accounts concepts and definitions do not entirely follow the theoretical macro-prudential analysis requirements, this paper suggests that there is still room for a fruitful use of national accounts data in assessing financial stability. A comprehensive set of quarterly national accounts would greatly support financial stability analysis. First, via the derivation of indicators taken from the financial balance sheets and the transaction accounts of the various non-financial sectors, like indebtedness and leverage of corporations. Second, an accounting matrix, showing both changes in assets and in liabilities, complemented by balance sheet information, would provide important statistical information on the decisions of economic agents to alter the level and composition of their portfolios.

Moreover, taking into account the increasing need to reduce reporting burden, it would in principle be advisable to develop data requirements for monetary and financial stability analysis that are as integrated and consistent as possible. In particular, macro-prudential indicators may well be provided as supplementary information to the individual accounts already collected

28 *It should be highlighted that comprehensive from-whom-to-whom accounts will only be available in the long-term and primarily for the financial relationships.*

for monetary policy purposes. In addition, the system of national accounts should move in the direction of recognising the needs for financial stability, with due consideration given to the possibility of developing robust links between the two approaches.

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Annex 1 – Example of the sequence of accounts (excluding other flows accounts)

ESA95 code		Account	Total economy	Non-financial corporations	Financial corporations	General government	Households and NPISH	Rest of the world
		Production of goods and services account						
P.1	+	Output						
P.2	–	Intermediate consumption						
B.1g	=	**Value added, gross**						
		Income account						
		Resources						
D.1	+	Compensation of employees						
D.2	+	Taxes on production						
D.3	+	Subsidies on production						
D.4	+	Property income						
D.41		Interest						
D.42		Distributed income of corporations						
D.43		Reinvested earnings from direct foreign investment						
D.44		Property income attributed to insurance policy holders						
D.45		Rents						
D.6	+	Social contributions and benefits						
D.7	+	Other current transfers						
		Uses						
D.1	–	Compensation of employees						
D.2	–	Other taxes on production						
D.3	–	Subsidies on production						
D.4	–	Property income						
D.41		Interest						
D.42		Distributed income of corporations						
D.43		Reinvested earnings from direct foreign investment						
D.44		Property income attributed to insurance policy holders						
D.45		Rents						
D.5	–	Current taxes on income, wealth, etc.						
D.6	–	Social contributions and benefits						
D.7	–	Other current transfers						
B.6g	**=**	**Disposable income, gross**						
		Use of disposable income account						
D.8	+	Adjustment for the change in net equity of households in pension funds reserves						
P.3	–	Final consumption expenditure						
B.8g	**=**	**Saving, gross**						

Annex 1 – (continued)

ESA95 code		Account	Total economy	Non-financial corporations	Financial corporations	General government	Households and NPISH	Rest of the world
		Accumulation account (capital and financial account)						
		Changes in assets						
P.5	+	Gross capital formation						
P.51		of which: gross fixed capital formation						
K.1	−	Consumption of fixed capital						
K.2	+	Acquisitions less disposals of non-produced non-financial assets						
F	+	Net acquisitions of financial assets						
F.2	+	Currency and deposits						
F.3	+	Securities other than shares						
F.4	+	Loans						
F.41		Short-term loans						
F.42		Long-term loans						
F.5	+	Shares and other equity						
F.51		Shares and other equity, excluding mutual fund shares						
F.511		Quoted shares						
F.512		Unquoted shares						
F.513		Other equity						
F.52		Mutual funds shares						
F.6	+	Insurance technical reserves						
F.61		Net equity of households in life insurance reserves and pension funds reserves						
F.62		Prepayments of insurance premiums and reserves for outstanding claims						
F.7	+	Other accounts receivable						
		Changes in liabilities and net worth						
B.8n	+	Saving, net						
D.9	+	Capital transfers, net						
F	+	Net incurrence of liabilities						
F.3	+	Securities other than shares						
F.4	+	Loans						
F.41		Short-term loans						
F.42		Long-term loans						
F.6	+	Insurance technical reserves						
F.7	+	Other accounts payable						
Memo items								
B.9		**Net lending/net borrowing (capital account)**						
B.9F		**Net lending/net borrowing (financial account)**						
		Statistical discrepancy (B.9 − B.9F)						

Annex 1 – (continued)

ESA95 code		Account	Total economy	Non-financial corporations	Financial corporations	General government	Households and NPISH	Rest of the world
		Balance sheet						
AN		**Non financial assets**						
AN.1	+	Produced assets						
AN.11		Fixed assets						
AN.12		Inventories						
AN.13		Valuables						
AN.2	+	Non-produced assets						
AN.21		Tangible non-produced assets						
AN.22		Intangible non-produced assets						
AF		**Financial assets**						
AF.2	+	Currency and deposits						
AF.3	+	Securities other than shares						
AF.4	+	Loans						
AF.41		Short-term loans						
AF.42		Long-term loans						
AF.5	+	Shares and other equity						
AF.51		Shares and other equity, excluding mutual fund shares						
AF.511		Quoted shares						
AF.512		Unquoted shares						
AF.513		Other equity						
AF.52		Mutual funds shares						
AF.6	+	Insurance technical reserves						
AF.7	+	Other accounts receivable						
AF		**Liabilities**						
AF.2	−	Currency and deposits						
AF.3	−	Securities other than shares						
AF.4	−	Loans						
AF.41		Short-term loans						
AF.42		Long-term loans						
AF.5	−	Shares and other equity						
AF.51		Shares and other equity, excluding mutual fund shares						
AF.511		Quoted shares						
AF.512		Unquoted shares						
AF.513		Other equity						
AF.52		Mutual funds shares						
AF.6	−	Insurance technical reserves						
AF.7	−	Other accounts payable						
B.90		**Net worth**						

Annex 2 – Differences between statistical requirements for monetary policy and financial stability purposes

Requirement	Monetary policy purposes	Financial stability purposes
Geographical coverage	Euro area	EU/euro area
Reporting population	Monetary financial institutions (and OFIs other than insurance companies and pension funds)	Credit institutions and other financial institutions belonging to a group (or sub-group) controlled by a Credit Institution
Reporting coverage	95% minimum (minimum threshold); data grossed up to 100%	As close as possible to 100%
Residency	Host country approach	Primarily home country approach complemented with host country approach
Geographical consolidation	Unconsolidated	Primarily consolidated complemented with unconsolidated
Institutional consolidation	Unconsolidated[1]	Consolidated, including other financial institutions belonging to the same group
Valuation	Market value	Market value/book value
Instrument breakdown	Basic (currency, deposits, debt securities, MMF shares, capital, remaining liabilities)	Detailed (e.g. syndicated loans, subordinated debt, e-business, etc.)
Maturity	Original maturity	Residual maturity

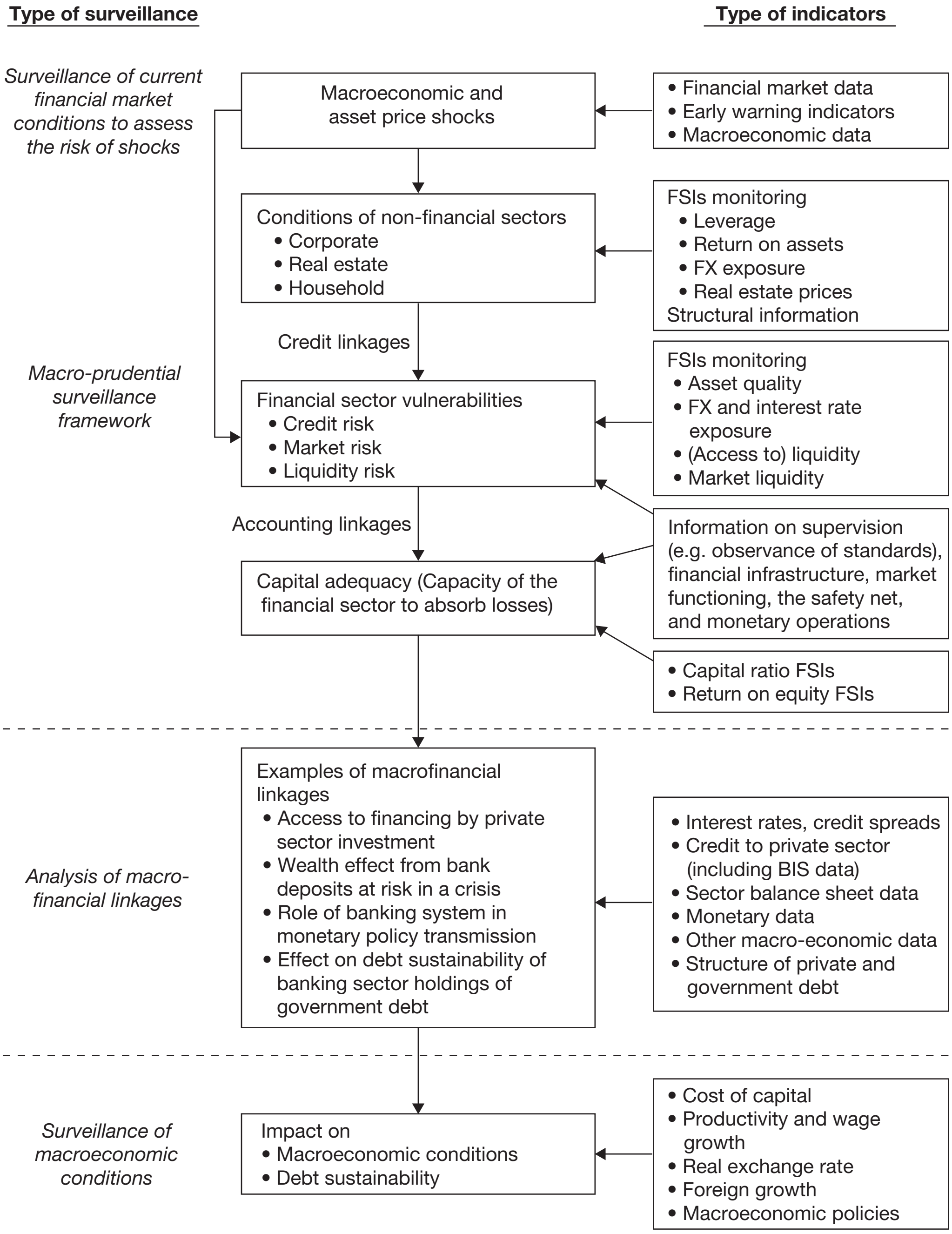
[1]*Consolidation is however permitted under certain conditions within the national territory, hence an MFI can, for statistical reporting purposes, consolidate its domestic offices, but not its offices located outside the country.*

Annex 3 – EU NCB's financial stability reviews/reports

Institution	Periodicity	First issue	Last issue
ECB – European Central Bank	Biannual	Dec-2004	Jun-2005
BE – Nationale Bank van België/ Banque Nationale de Belgique	Biannual	Jan-2003	Nov-2004
CY – Central Bank of Cyprus	NA	NA	NA
CZ – Česká národní banka	Annual	Jan-2005	Jan-2005
DK – Danmarks Nationalbank	Annual	May-2002[1]	May-2004
EE – Eesti Pank	Biannual	Nov-2003	Nov-2004
FI – Suomen Pankki – Finlands Bank	NA	NA	NA
FR – Banque de France	Biannual	Nov-2002	Nov-2004
DE – Deutsche Bundesbank	NA[2]	NA	NA
GR – Bank of Greece	NA	NA	NA
HU – Magyar Nemzeti Bank	Biannual	Aug-2000	Dec-2004
IE – Central Bank and Financial Services Authority of Ireland	Annual	2001[3]	2004
IT – Banca d'Italia	NA	NA	NA
LV – Latvijas Banka	Biannual	2003	2004
LT – Lietuvos bankas	NA	NA	NA
LU – Banque Centrale du Luxembourg	NA	NA	NA
MT – Central Bank of Malta	NA	NA	NA
NL – De Nederlandsche Bank	NA	NA	NA
AT – Oesterreichische Nationalbank	Biannual	Jun-2001	Dec-2004
PL – Narodowy Bank Polski	Biannual[4]	Aug-2003	Aug-2004
PT – Banco de Portugal	NA	NA	NA
SK – Národná banka Slovenska	Annual	2004	2004
SI – Banka Slovenije	Annual	2004	2004
ES – Banco de España	Biannual	Nov-2001	Nov-2004
SE – Sveriges Riksbank	Biannual	Jul-1997	Dec-2004
UK – Bank of England	Biannual	Autumn-1996	Dec-2004

[1]*The financial stability review for the years 2000 and 2001 was included in the Monetary Review of the second quarter of the respective year.*
[2]*However, the* Deutsche Bundesbank *publishes a regular assessment of the stability of the financial system in its Monthly Report.*
[3]*No report was produced in 2003.*
[4]*There were only three publications, the first one covered the period 2001–2002, the second the entire 2003 and the third the first half of 2004.*

Annex 4 – IMF framework for the relationship between the types of surveillance and the indicators used



Source: International Monetary Fund.

Annex 5 – IMF financial soundness indicators (FSI): core and encouraged sets

Core set	
Deposit-taking institutions (banks)	
Capital adequacy	Regulatory capital to risk-weighted assets
	Regulatory Tier I capital to risk-weighted assets
Asset quality	Non-performing loans to total gross loans
	Non-performing 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
	Non-interest 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 (banks)	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 non-interest 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]
Non-bank 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.*

Annex 6 – IMF financial soundness indicators: data sources

Indicators	**Data source**		
	Supervisory	**National accounts**	**Other**[1]
Core set and underlying data series			
Capital adequacy			
Regulatory capital to risk-weighted assets	16		5
Regulatory capital	19		1
Risk-weighted assets	19		1
Regulatory Tier 1 capital to risk-weighted assets	15		5
Regulatory Tier 1 capital	19		1
Risk-weighted assets	19		1
Asset quality			
Non-performing loans to total gross loans	14		4
Non-performing loans	19		1
Total gross loans	18		2
Non-performing loans net of provisions to capital	11		4
Non-performing loans net of provisions	18		1
Capital	18		2
Sectoral distribution of loans to total loans	6	2	7
Sectoral distribution of loans	8	2	8
Total gross loans	13	2	4
Large exposures to capital	11		4
Large exposures	18		1
Capital	18		2
Earnings and profitability			
Return on assets	13		8
Net income	15		6
Total assets	15		5
Return on equity	13		8
Net income	15		6
Capital	16		4
Interest margin to gross income	13		7
Interest margin	15		6
Gross income	15		7
Non-interest expenses to gross income	12		5
Non-interest expenses	14		6
Gross income	15		6
Liquidity			
Liquid assets to total assets	12	1	4
Liquid assets (core)	15	1	3
Total assets	16	1	3
Liquid assets to short-term liabilities	11	1	6
Liquid assets (core)	15	1	3
Short-term liabilities	14	1	4
Sensitivity to market risk (excluding duration indicators)			
Net open position in foreign exchange to capital	9	1	5
Net open position in foreign exchange	15	1	3
Capital	17	1	3

[1] *It also includes non-specified data sources.*

Annex 6 – (continued)

Indicators	Data source		
	Supervisory	National accounts	Other[1]
Encouraged set and underlying data series			
Deposit-taking institutions			
Capital to assets	11	1	4
Capital	15	1	4
Total assets	15	1	4
Geographical distribution of loans to total loans	6	1	2
Geographical distribution of loans	7	1	4
Total gross loans	13	1	4
Gross asset position in financial derivatives to capital	8	1	1
Gross asset position in financial derivatives	11	1	3
Capital	15	1	4
Gross liability position in financial derivatives to capital	8	1	1
Gross liability position in financial derivatives	10	1	3
Capital	15	1	4
Trading income to total income	8		7
Trading and foreign exchange gains (losses)	13		5
Gross income	14		6
Personnel expenses to non-interest expenses	9		5
Personnel expenses	13		7
Non-interest expenses	13		5
Spread between reference lending and deposit rates	6	1	9
Spread between highest and lowest interbank rates	3		7
Customer deposits to total (non-interbank) loans	10	1	5
Customer deposits	14	1	5
Total gross loans	15	1	4
Foreign currency denominated loans to total loans	9	1	5
Foreign currency denominated loans	13	1	5
Total gross loans	14	1	6
Foreign currency denominated liabilities to total liabilities	9	1	5
Foreign currency denominated liabilities	13	1	5
Total liabilities	14	1	6
Net open position in equities to capital	10		4
Net open position in equities	14		1
Capital	17		3
Market liquidity			
Average bid-ask spread in the securities market			9
Average daily turnover ratio in the securities market			10
Non-bank financial institutions			
Assets to total financial system assets	2	5	6
Assets	6	4	5
Total financial system assets	2	9	5
Assets to Gross Domestic Product (GDP)	2	5	4
Assets	6	3	5
GDP		15	2

[1] *It also includes non-specified data sources.*

Annex 6 – (continued)

Indicators	Data source		
	Supervisory	**National accounts**	**Other[1]**
Corporate sector			
Total debt to equity		3	11
Total debt		6	10
Equity (capital and reserves)		6	10
Return on equity		1	12
Earnings before interest and tax (EBIT)		4	10
Equity (capital and reserves)		4	11
Earnings to interest and principal expenses		1	6
Earnings before interest and tax (EBIT)		4	9
Interest receivable from other non-financial corporations		1	5
Debt service payments		3	7
Corporate net foreign exchange exposure to equity		1	0
Net foreign exchange exposure		1	1
Equity (capital and reserves)		2	9
Number of applications for protection from creditors			10
Households			
Household debt to GDP		6	6
Household debt	2	7	8
GDP		14	4
Household debt service and principal payments to income		5	5
Household debt service and principal payments	1	6	4
Household income		13	4
Real estate markets			
Real estate prices		2	10
Residential real estate loans to total loans	5	1	7
Residential real estate loans	8	2	6
Total loans	10	2	6
Commercial real estate loans to total loans	4	1	5
Commercial real estate loans	8	2	6
Total loans	10	2	4

[1]*It also includes non-specified data sources.*

Usefulness of existing structures in the statistical system and new initiatives

Art Ridgeway (Statistics Canada)

My remarks will be organized in two parts – first, I will address the usefulness of existing structures in the statistical system and secondly, new initiatives currently underway.

On the question of existing structures, I have a lot of sympathy with the remarks just made in that one of the main issues I have heard as people have raised their demands for information is the focus on the consolidated bank structure and most of the macro data is nationally based. This demand for data on a consolidated basis is not just arising with the bank data but with the globalization indicators, other trade data and outsourcing. All over the world statistical offices are seeing more and more demand for information about the global enterprise as it becomes the driving force of much economic activity. The nationally based macro accounts are increasingly viewed with some skepticism. Are they are going to give us the right answers for some questions? So this is a major challenge not just for banking statistics but for macro statistics as a whole.

Having said that, there is still a lot of basic infrastructure in statistical offices that can help shed light on these issues. We have goods survey frames that provide the basic relationships between the micro units, the individual enterprises, and the macro data that can be exploited more if we develop them appropriately. I think that this will be a major goal down the road.

This meeting's major focus is the bank data, in the Canadian context, the central bank and the supervisor collect most of that data and in fact, I and others at the statistical office become users of this data. I think that where the statistical office has an advantage is when we broaden and deepen the questions into other sectors of the economy – the non-financial sector, the household sector – where survey and other kinds of tools are more useful. We are then moving into the 80%–20% kind of situation that Sheryl Kennedy spoke of at the beginning because we are not going to try and collect data for the entire non-financial sector. It is only certain parts of it that significantly affect the financial markets. While we have the basic tools to look at these issues in a more fundamental way, we need a better integration of information with other data suppliers and input on the specific aspects of the balance sheet information that needs expansion.

Stepping back a little, I was interested in the first remarks by the IMF that we weren't using the macro accounts for vulnerability analysis. I think there is a real truth to that. We have built up the macro accounts from the GDP – production accounts. If you take the SNA93 manual you start with the production account and at the end you get to the balance sheet. Sometimes, I think that there is too little attention to the balance sheets in the macro accounts, whereas in the world that we are now facing we have to turn that around and we need to recognize the importance of the balance sheet. What we start with is a set of resources that we can then apply to production and redistribution activities in the economy. We need to think about the whole model backwards and how the balance sheet is a primary input to the whole process of analyzing the economy. I think we need some help from some of you who work more with the balance sheet information to help reformulate the model.

The other points I would like to address are developments that might help in this areas. There are a couple of things that are happing at Statistics Canada that I think may be also happening in other parts of the worlds.

We are in the middle of redesigning our business register used for all of our business surveys. One of the things that we are insisting upon is that we have a better representation of the global enterprise. That is, we will try to represent the enterprise so that we can look for the global consolidation of Canadian enterprises. Previously our business register was focused on the national units that we use for the national accounts and for units that were *offshore*, were the domain of the balance of payments which has until now not been connected to the central business register.

So one thing we have agreed upon is that for enterprises that have their headquarters in Canda, we will focus on both the global and the national enterprise. We do still have to produce the national accounts and the balance of payments which use this resident concept. But as a statistical agency, we must be able to bring forward information on this global enterprise view as this is what users are demanding.

The other issue deals with the fact that we get into more and more detail (and the reason we are looking for more and more detail, it seems to me, is that life has become more complex – we have international transactions moving at the speed of light), and we have to start applying technology to answer some of the questions. We are going to hear some papers later on XBRL and other electronic data collection tools. We are also working on such issues at Statistics Canada. This year we will be going out to about 10–12 large multinational corporations in Canada and try to link at a very detailed accounting record level and pull data out of their files and into Statistics Canada. We are focusing on GDP type variables at the beginning. We have already worked with two multinational companies. We are working with both Canadian based and foreign multinationals with branches in Canada. So far we have had very good success and very good cooperation from the companies. We have been able to pull in a large amount of data and it looks as if it will be very profitable in the sense that we may be able to reduce response burden, we may increase accuracy and, hopefully, increase timeliness for some of these data.

One of the questions we have not yet answered is how deep into their accounting systems we can get. Are they willing to let us dig down and get more and more detail? So far we are fairly high up in the accounting system at the level of their published balance sheet and income statements. But the demands that we were hearing this morning and in the papers submitted before the meeting are getting into much more detail within the financial statements. We are still testing how far this approach can take us.

If we are gong to succeed at that level of detail what is key is standardization. And not just standardization within Canada but working with other statistical offices to build taxonomies that link very nicely with accounting standards around the world. So that is the other thing we are doing at Statistics Canada. We have a project to work with the accounting profession to build taxonomies for the statistical system that can be easily mapped from the accounting systems. This is important if automated collection processes are to be efficient and not need excessive hand tailoring for each enterprise.

In summary, one of the main things that we have to offer as a statistical agency is expertise in standards building – classification structures – that will be necessary if we are to have internationally comparable data on these issues.

Art Ridgeway (Statistics Canada)

Financial stability analysis – evaluation of existing data sources

Leena Mörttinen (Bank of Finland)

1. Introduction

Financial stability analysis is a young area of research. For instance, in Finland it was driven by the urgency to understand and resolve the banking crisis that shocked the foundations of the economy in the beginning of the 1990s. Financial stability work has developed as "the sister in hand-me-down clothes" i.e. making use of data that were originally created for other purposes. The availability of these data have sped up the growth and expansion of financial stability analysis conducted by central banks globally. While it may have, to a certain extent, outgrown the available statistics, it is important to carefully consider what are the actual data requirements of the leading edge financial stability analysis tools before embarking on new and costly data collections.

This note discusses why the general data requirements may differ between financial stability analysis, monetary policy and supervision. It also highlights some of the key data sources used for financial stability analysis in Finland as well as their shortcomings. The note is structured as follows. Section 2 discusses the definition of financial stability as well as conceptual differences between monetary policy and supervision. Section 3 briefly explores the possible constraints for accessing the available data sources or collecting new data for financial stability analysis. In Section 4, the evolution of the analysis and the specific data requirements for financial stability are briefly discussed. Against these requirements, Section 5 discusses the shortcomings in the Finnish national accounts data and monetary statistics while Section 6 examines other data sources used for financial stability analysis in Finland. Section 7 concludes the note with some general observations about the need to develop new data collections to support financial stability analysis.

2. Conceptual differences between financial stability, monetary policy and banking supervision

Definition of financial stability

In order to assess conceptual differences between financial stability analysis and monetary analysis on the one hand, and supervisory analysis on the other, it is useful to discuss what is meant by financial stability.

There are many different definitions of *financial stability* and many institutions define financial instability rather than stability.[1] However, there seems to be a tendency towards certain key ingredients. In particular, it is important to note that in the majority of definitions there is a clear role for economic efficiency as part of financial stability.[2] For instance, the euro system characterises financial stability as *maintaining the smooth functioning of the financial system and its ability to facilitate and support the efficient functioning and performance of the economy.*

Similarities and differences with monetary policy analysis

While both financial and monetary stability analysis aim for efficient allocation of resources it is important to note that the two are not the same, as shown by the experiences in the past twenty

1 *On the different definitions of financial stability please see Houben, A., J. Kakes and G. Schinasi (2004), "Toward a Framework for Safeguarding Financial Stability", IMF Working Paper, No. 04/101.*

2 *See Fell, J. and G. Schinasi (2005), "Assessing Financial Stability: Conceptual Boundaries and Challenges", ECB, Financial Stability Review – June 2005. See also Koskenkylä, H. and K. Virolainen (1999), "Macroprudential supervision of financial markets", Bank of Finland Bulletin No. 3.*

years of lowered inflation expectations combined with periods of fluctuating asset prices and financial instability in various countries.

Part of the apparent discrepancy between monetary and financial stability may be explained by the increasing feedback between real and financial sectors to some extent caused by the deregulation of financial markets. It is possible that monetary stabilisation has forced some of the adjustment to financial markets. The question has been raised whether monetary policy should react to the build-up of financial imbalances even if short-run inflation pressures remain in check. This calls for further development of both analysis areas with a growing emphasis on interlinkages between the two.[3]

The chosen quantitative targets for achieving the policy objective dictate analysis tools and data requirements. Contrary to monetary stability, it is generally agreed that it is not possible to define financial stability through a simple target. Since financial markets are responsible for pricing of risks in financial contracts, tools available to authorities should only be used to improve the efficiency of the financial system and to remove disruptions caused by various market imperfections as far as possible. Consequently, financial stability analysis aims to provide information to the authorities on possible distortions in the pricing and allocation of risks as well as to improve transparency and dissemination of information to encourage the natural self correcting mechanism of the financial system. To capture the potential distortions there is particular emphasis on assessing the build-up of risk exposures and testing the ability of the system to withstand various extreme tail events with potentially large systemic impact on financial markets and the general economy. This differs from monetary policy analysis that aims to forecast a credible baseline for the economic performance. While also in the course of macro forecasting the risks of deviating from the baseline are assessed, there is very little interest in studying the consequences of more extreme negative tail events.

The scope for the analysis between monetary and financial stability analysis also differs. Financial markets provide a means to allocate resources and diversify risks present in the national economy across the national borders. In the euro area the increased integration and the widening and deepening of money and capital markets have reduced the national perspective even more. The systemic implications stress the need for consolidated view to risks that are not limited within national borders. This is also reflected in the compilation of indicators for financial stability analysis.

Finally, the level of aggregation is different between the two areas. Since the aim is to improve the understanding of how disturbances spread through the financial system from the more fragile entities and industries to rest of the agents, an adequate level of disaggregation is required from the analysis and consequently from the underlying data.

Similarities and differences with supervisory analysis

Owing to the systemic importance of banks, financial stability analysis has often involved close co-operation with banking supervisors (not least through sharing of supervisory data). Overall the aim of the financial stability analysis, i.e. the stability of the financial system as a whole, quite closely aligns itself with micro-prudential goals of the stability of individual banks. This is why the data requirements of these two areas match each other better than with monetary stability analysis. However, there are also certain important differences in the two approaches.

The adequacy of individual institutions' solvency can be considered the target for banking supervision. While banking sector stability is important also for financial stability, it more explicitly emphasises the efficiency aspect from the point of view of the general economy in the behaviour of financial institutions. In other words, productive efficiency of a bank or high capital ratios are not enough to conclude that the financial system is stable as it may not be fulfilling its potential in allocation of savings into profitable investments.

Furthermore, financial stability analysis puts more emphasis on system stability and systemic risk. While behaviour of an individual institution may seem prudent the similar behaviour of all institutions in the system may result in general risk concentration and susceptibility to systemic risk through interlinkages between institutions.

Finally, it is important to note that the approach adopted by supervisors may be less data intensive than in the case of financial stability. Supervisors aim to validate the adequacy of individual institutions' risk management systems rather than conducting the analysis on behalf of

3 *See also Speech by A. Crockett at the BIS Conference on "Monetary stability, financial stability and the business cycle", Basel, Switzerland, 28 March 2003.*

these institutions. This reduces the data collection needs and burden to reporting institutions quite considerably. While this is a well justified approach for supervisors, it diminishes the pool of available data for financial stability analysis.

3. Access to information and legal basis for collecting data

The approaches to division of responsibilities regarding financial stability analysis vary greatly between countries. While it is clear that monetary policy is conducted by central banks, there is no clear consensus under whose roof the various supervisory authorities should reside, or who should be responsible for financial stability analysis. Separation of these roles can limit the access to existing sources of data for financial stability analysis. In addition, the manner in which the responsibility is assigned to the authority in question may be important. Simple agreement between authorities may not be sufficient to give the right to e.g. impose costly data collections on various reporting entities.

In many countries, the central bank is responsible for both monetary policy and financial stability. This is the case also for the Bank of Finland. In addition, the Bank of Finland has a close connection to the banking supervision as they are administratively part of the same entity. While this guarantees access to monetary statistics as well as to a large share of supervisory information it is important to note that an explicit mentioning of the financial stability responsibilities in the Act on the Bank of Finland can be interpreted to entitle it to collect information specifically for financial stability purposes. However, so far it has not used this right.

4. Evolution of financial stability analysis and key data requirements

There is a close interaction between the evolution of financial stability tools and data. Tools set the standards for the quality of data while costliness of data sets constraints and forces efficiency when designing the tools. Consequently these two should always be considered together.

The brief history of the financial stability analysis at the Bank of Finland provides one example of the evolution of analysis tools and respective data requirements. When financial stability analysis was taking its first steps in Finland, it relied quite heavily on financial accounts information as well as aggregate statistics collected for monetary policy purposes. Particularly during the banking crisis, the analysis was mainly concentrated in assessing banking stability from backward looking financial statement information, with relatively little regard for systemic risk. The limited usefulness of financial accounts and monetary statistics was soon realised. The main problems with conventional supervisory and monetary statistics had to do with the level of aggregation as well as information content since data on actual bank risk exposures and systemic risk factors was practically non-existent. Consequently, the analysis tools were further complemented with more detailed breakdowns of supervisory data. This work continues with strong emphasis on international co-operation with central banks and supervisors within the European System of Central Banks in order to avoid overburdening the reporting institutions with overlapping data requests. In addition, more efforts have been invested into developing tools that benefit from public or market information.

Since detailed discussion on the present stage of analysis tools is outside the scope of this paper it suffices to note that data should enable:

- assessment of key financial statement and balance sheet indicators, particularly on the condition and risks of the banking sector, with early warning qualities,
- modelling of the financial sector, with emphasis on the banking sector, to produce baseline forecasts of the condition of the sector as well as outcomes from more extreme stress scenarios,
- studying forward looking market indicators of key non-financial and financial sectors.
- assessment of the efficiency of risk allocation in the financial system.

Preferably, all these tools are used in parallel since each tool provides a slightly different perspective to the functioning of the system and risks to financial stability. Owing to the strong emphasis on the timely and accurate measurement of risks in financial markets, the underlying data have to fulfil certain requirements concerning the frequency and timeliness of data, consolidation concepts and data breakdowns. In addition, data will have to provide means to forward-looking analysis.

Timeliness of data is important for the analysis. The frequency of data varies depending on the type of data. Trading volume and price information have to be available real time while in the case of institution related financial statement data monthly and quarterly data suffice. At the Bank of Finland, monitoring of key bank balance sheet indicators is conducted monthly with more substantial analysis including income statement information updated quarterly. In addition, the database will have to consist of adequately lengthy time series to enable rigorous analysis.

Data should contain a consolidated group level view to banking sector risks. This requires consolidation of the activities of domestic and foreign banking subsidiaries and branches with the parent bank data. To achieve a complete view to risks, cross-sector consolidation is also necessary as far as possible i.e. non-bank parts of the group will also have to be consolidated with the parent company.

As mentioned above, financial stability analysis requires tools to analyse the possible differences in the fragility of underlying agents. Consequently, it requires a sufficiently disaggregated data that should optimally include detailed breakdowns by counterparty sector and residency, currency of assets and liabilities, detailed instrument breakdowns, and risk categories of instruments. In the case of banks, information on different size and peer groups has also proved to be useful.

Finally, data should provide means to conduct forward-looking analysis. Possible stress scenarios will have to be created preferably using existing macro-models to guarantee consistency of the scenarios. While timely non-performing and exposure information can be used as proxies in stress-testing models, more forward-looking indicators are needed in disentangling the ex ante shifts in risk from ex post realisations.[4]

5. Problems in available statistical frameworks used in monetary policy analysis

The rigorous statistical harmonisation work has created a large pool of timely, well defined data which are consistent across different economic agents in Finland as well as the euro area countries enabling aggregation and country comparisons. These comprise of quarterly national accounts information (based on European System of Accounts 1995), collected in Finland by the Statistics Finland, financial accounts data collected by the Bank of Finland, monthly balance sheet data of the monetary financial institutions (MFIs)[5] and harmonised interest rates paid and charged by MFIs. These data could potentially be useful in the conventional early warning indicator analysis. However, they suffer from certain shortcomings, examples of which are discussed below.

A key component in the financial stability work is the analysis of the banking sector condition and risks. While euro area money and banking statistics (MBS) include a lot of information on banks' assets and liabilities available on individual institutions on country level, in Finland their use in financial stability analysis is limited to assessing non-financial sectors as well as to situations where other consistent data are not available. This is because the applied statistical standards reduce the usefulness of statistics particularly as sufficient substitute data, satisfying key data requirements, are available from supervisors. It is important to note, however, that in the case of financial stability analysis on the level of the euro system, MBS data can be quite useful owing to their consistent definitions and comparability across countries, which is not necessarily the case for some of the supervisory data at the moment.

National accounts statistics are used in the assessment of sectors other than banking. They provide a view to the aggregate balance sheet conditions of households, non-financial firms as well as insurance companies and other financial institutions. As discussed in more detail below, their greatest shortcoming is the high level of aggregation.

Consolidation

Consistent risk analysis requires a consolidated view to risks of a banking group. This view is also followed by supervisors in their individual institution analysis. This is in contrast to

4 *It is important to distinguish between ex post realisations of credit problems from changes in the ex ante loss distribution arising from different macroeconomic conditions (i.e. changes in risk). For more discussion, see e.g. Mörttinen, L., P. Poloni, P. Sandars and J. Vesala (2005), "Analysing banking sector conditions – How to use macro-prudential indicators", ECB Occasional Paper No. 26.*

5 *ECB Regulation ECB/1998/16.*

the concept used in monetary policy analysis. The aggregate national MFI balance sheet statistics are compiled from underlying monthly solo data on individual resident banks i.e. excluding foreign branches and subsidiaries. While financial stability analysis could benefit from this high frequency individual institution data, their use is limited by the lack of consolidation. Solo data can distort the picture as some of the domestic risks may be absorbed through a group structure. On the other hand, non-resident (foreign) branches and subsidiaries of domestic banks should be included in the data through consolidation as their risks will impact the general resilience of the group.[6] Regarding cross-sector consolidation, other financial institutions should be consolidated into the group data for financial stability purposes.

It is also important to mention that while intra sector consolidation used in the aggregate euro area monetary statistics is unsuitable for financial stability analysis as it removes important interbank exposures, the use of underlying core data helps to avoid these problems. For instance in Finland, underlying data items include full bank balance sheet information on solo basis i.e. also including data on interbank assets and liabilities. While suffering from the handicap of the solo-view, this detailed institution specific information can be useful for financial stability analysis (see the discussion on contagion below).

Breakdowns

The level of aggregation in national accounts statistics is too high for financial stability purposes. Regarding households, while aggregate information on indebtedness and wealth are readily available in Finland, it has turned out to be very difficult to link information on the distribution of household wealth with information on the distribution of household debt. If wealth and debt are allocated to different households, this may imply a much higher credit risk to banks.

As mentioned above, monetary statistics provide access to monthly balance sheet data of individual banks. While suffering from the lack of institution level consolidation, the usefulness of these data could be improved through additional breakdowns. For the purpose of the detailed assessment of corporate sector credit risk, the breakdown of lending to small, medium and large firms as well as by industry could benefit the analysis. Moreover, these data should provide a breakdown of assets and liabilities to counterparties outside EU.

Further breakdowns of bank loans according to the type/quality of collateral as well as remaining maturity are also needed for the analysis. However, MBS only provide information on original maturity. Remaining maturity is particularly relevant for the assessment of interest rate risk. This analysis also needs more detailed breakdowns of instruments that what is available from monetary statistics.

With regard to interest rate statistics, while data on interest rates charged on corporate loans by size of loan are available, more useful for the financial stability analysis would be breakdowns by size of firm. For instance, separation of large firms from small and medium-size firms would enable analysis of differences in risk premiums charged.

Missing items

One of the biggest handicaps in the available monetary statistics is lack of bank income statement information. Since stability analysis includes as an important part the analysis of past profitability developments, this assessment has to be conducted using other sources. Consequently, quite often data from MBS are ignored in order to avoid using inconsistent sources.

6. Additional data sources

Owing to the above mentioned shortcomings as well as the additional data needs caused by the adoption of new analysis tools, the Bank of Finland utilises information (both qualitative and

6 *While also foreign controlled branches may be important for the domestic banking markets as they affect competitive conditions and general availability of credit, they are likely to have less relevance if they face an idiosyncratic crisis. In this case they are considered to be the responsibility of their foreign parent and the relevant authorities. However, the situation may be different in the case of a systemically relevant foreign branch.*

quantitative) from many other sources in addition to those available for supervisory and monetary policy analysis. These are discussed below:

Indicators on banks' financial condition

Owing to the problems related to bank balance sheet information provided in monetary statistics, in Finland the central bank sources are usually used only to complement the quarterly consolidated data from supervisory sources or in the monthly monitoring. The use of supervisory data is further supported by the consistency requirements between balance sheet and income statement information. Owing to the small size of the Finnish banking sector, publicly available data can be used to create lengthy historical series to complement supervisory data. However, the use of data from public sources is rarely an option for a larger country with complicated and large banking sector.

With regard to bank solvency information, detailed regulatory solvency data are only available from supervisory sources. These data are considered quite reliable as they include a consolidated view to banking groups' risks through risk weighting (with the well-known shortcomings of Basel I) of different asset items.

Since majority of the above discussed data used in financial stability analysis are backward looking, they can be usefully complemented with forward-looking indicators on bank condition. These include stock price, credit default swap and subordinated debt spreads, as well as distance to default measures derived from market information for the publicly traded banks.

Insurance companies and other financial institutions

Data on insurance companies and other financial institutions (OFIs) are less readily available. However, some information is available from national accounts data as well as public or commercial data sources. As with banks, market sources can be used to compute forward looking indicators.

With the establishment of bancassurance firms, the assessment of various links between insurance companies and banks has grown in importance. At the moment, this information may be best obtainable from banking supervisors. There is co-operation with insurance supervisors particularly regarding stress tests that cover the whole system including the insurance sector.

From the global perspective, while it can be argued that based on the size of their balance sheets OFIs in general pose less of a systemic risk to the financial system, there are clear indications that some OFIs, such as hedge funds, may be important for the stability of the whole system owing to their high trading volumes and various links to the banking sector. In the case of a small country such as Finland banks' links to hedge funds have remained limited. At the moment this monitoring is done through ad hoc supervisory surveys.

Condition of non-financial sector

While national accounts data and monetary statistics provide a useful source for information on non-financial sector, the above mentioned shortcomings limit analysis to a certain extent. Consequently, the aggregate national accounts data are complemented with survey information. However, as discussed above, access to data with breakdowns according to firm size would be very useful for the analysis.

As in the case of banks and other financial firms, the condition of the non-financial firm sector is further supplemented with market based indicators such as stock price data, bond spreads, expected default frequencies computed by the KMV etc. These give the forward-looking market view to the condition of various corporate sub-sectors and can be useful in assessing banks' credit and market risks. These data are readily available from different market data sources.

Financial market developments

Market data are usually readily available from different commercial sources such as Bloomberg. Price and volume information are useful in assessing the market sentiment and the degree of risk aversion present.

In addition, qualitative information available through market sources is considered to be very useful. Discussions with market participants are conducted regularly to better understand the market dynamics as well as risks to banks from market movements.

Data on bank risk exposures

Data on risk exposures are essential for financial stability analysis. However, exposure assessment is extremely demanding owing to the aim for an aggregate view to risks. Among other things, this would require a full data on the amount of risk mitigation. As these data are rarely available, exposure data can provide the maximum loss perspective which can be quite different than the actual loss given default.

Furthermore, exposure data, even without information on risk mitigation tools, are difficult to obtain. While it is often assumed that risk exposures are available from supervisors, this may not be the case. Owing to accountability issues, it is often not desirable for the supervisor to collect vast amounts of detailed information on different risk categories. Rather, supervisors encourage banks to prudently manage their risks through overseeing the adequacy of risk management tools in place in banks.

Credit risk is still considered the major risk for banking sector stability. However, presently primarily authorities in countries with central credit registers have access to firm and industry specific exposure data. Since Finland does not have a central credit register but the supervisory authorities regularly collect data on banks' industry exposures. Sector level credit risk assessment benefits from MBS available for monetary policy purposes. In the case of international credit exposures, data are available from the BIS data collection.

Assessment of credit risk has been further complicated by growth in credit risk transfer. While these instruments are likely to improve the allocation and diversification of risk in the financial system, at the same time they render banking books less transparent. In certain cases, transferred risks may still be partly carried by banks to avoid loss of reputation in the event of a default or other credit event of the underlying entity.

From the financial stability perspective, market risk has grown in importance. At the Bank of Finland, data on market risk used in computing regulatory solvency requirements are available from supervisors. However, among other things information on breakdowns of value at risk estimates are not readily available. IFRS fair value rules are likely to improve the quality of available information in this regard.

Regarding other risks, very little information is available at present. From 2007 the situation regarding data on banks' risk analysis is likely to improve with the implementation of Basel II. The requirement for detailed credit risk analysis will potentially provide access to large pools of data to supervisors. The same applies to other risks in the context of the Pillar II such as interest rate risk on banking book not covered by Pillar I. It is still unclear whether financial stability analysis will benefit from this information. This will depend on how the supervisory review will actually be conducted and what data will be collected in this context.

Systemic risk channels

Analysis on systemic risk channels is quite demanding. Owing to the lack of other sources, data on interbank assets and liabilities available from the underlying core data collected for monetary policy purposes can be useful for the analysis. However, these data are non-consolidated and contain no information on risk mitigation. To overcome these shortcomings, in Finland supervisors have begun the collection of information on individual interbank exposures also containing information on the counterparty. This will be very useful for systemic risk analysis. In addition, market data are used to capture propagation between institutions through information channels.

Efficiency of financial intermediation

In order to assess efficiency of the financial sector, tools are being developed at the Bank of Finland to measure e.g. banking sector productivity as well as the technological potential of the sector. The analysis utilises data from both banks' financial statements as well as MFI interest rate statistics. At the moment, new tools and market data are also considered for better measurement of pricing of risks, which is an integral part of the quality of services provided by banks.

On the demand side, an annual survey on financing conditions conducted among non-financial firms provides the key information source for assessing efficiency of financial intermediation in Finland. This survey contains detailed questions about firms' relationships with banks, credit availability and lending standards. The sample covers the full spectrum of Finnish non-financial firms. In addition, bank lending survey conducted quarterly in euro area countries provides a more frequent supply side view to these issues.

7. Conclusions

The existing statistical frameworks, complemented with supervisory, commercial and publicly available information form a large pool of data for financial stability analysis in Finland. However, these data are based on varying definitions and statistical standards. With a growing importance of financial stability analysis, the adequacy of these data is being questioned and revisions to existing statistical frameworks are being discussed both in Finland as well as internationally. However, before establishing new data collections, careful consideration should be given to the adequacy of available analysis tools as well as to already ongoing data endeavours in order to make sure that full benefits are obtained for financial stability analysis. This refers to implications from the IFRS and Basel II among others as well as in the context of the euro area new data collections envisaged regarding e.g. OFIs.

Moreover, the increasing data needs and costs involved necessitate further international co-operation in developing data collections for financial stability in order to avoid overlaps and discrepancies. The IMF-FSIs provide a good starting point for core common standards for compilation of financial stability indicators. However, more work is needed in developing data that enables better measurement of the balance between efficiency and risks in the system. This entails in particular development of tools for measuring pricing and allocation of risks as well as potential build-up of risk concentrations by banks, OFIs, insurance companies and non-financial sectors.

Leena Mörttinen (Bank of Finland)

Financial stability: an overview of Bank of Italy statistics

Riccardo De Bonis, Giuseppe Grande, Silvia Magri, Luigi Federico Signorini and Massimiliano Stacchini (Bank of Italy)

1. Introduction[1]

This paper describes the main pieces of statistical information that are used for monitoring financial stability in Italy. The focus is on purely statistical aspects and on macroeconomic data. A companion paper prepared by the Bank of Italy (the Bank) for this workshop (Quagliariello, 2005) describes in more detail supervisory data and regular internal reporting practices, as well as certain examples of analytical models of risk that are used in the supervision activity of the Bank.

As the Bank has full responsibility for the supervision of banks and other financial institutions, as well as for macro stability, in Italy the activity of monitoring of financial stability at the aggregate level is seen as closely intertwined with micro-level supervision on the one hand, and, on the other hand, with the Bank's responsibility in the monetary domain and in the payments systems. There is therefore no separate financial stability report. Reporting on financial stability development are presented in various public documents, most comprehensively in the Annual Report of the Bank. Internal reporting, briefly described in the companion paper, is also extensively used, like in many other central banks.

The responsibility for the collection and compilation of the relevant statistics is shared among various departments of the Bank, mainly Supervision (supervisory reports by banks and banking groups, central credit register, etc.), the Statistics area of the Research Department (monetary statistics, financial accounts, company and household surveys, market statistics, etc.), and the Credit System Information Department (data collection, database management, structural and detailed banking statistics). For the data compiled by the Bank, comprehensive tables are published in the Annual Report and in the half-yearly Economic Bulletin. Detailed and/or high-frequency data are published in the Statistical Bulletin and its Supplements, mostly at monthly or quarterly intervals.

Other data that are used in monitoring financial statistics come from external sources, which include most notably national accounts and other macro real data (National Institute of Statistics) and company account data (collected and compiled by the Central Balance Sheet Office, a separate company, sponsored and partly owned by the Bank and commercial banks).

This paper gives a simple overview of five sets of data: financial accounts, survey data, banking/monetary statistics, other financial intermediaries (OFI) statistics, and market statistics. For each we provide background information and some comments concerning their uses for financial stability purposes.

2. Financial accounts

Italy has one of the longest traditions in the compilation of financial accounts (FA). The Bank's Annual Report for 1964 contained the first complete version of FA; back series for the households' and firms' financial assets and liabilities were provided starting with the year 1950. From then on, FA have been published on a regular basis in the Annual Report and, since the beginning of the 1990s, in a quarterly Supplement to the Statistical Bulletin as well (Banca d'Italia, 2003).

In accordance with European statistical rules, quarterly FA based on the ESA95 standard were published for the first time in 2000, with series going back to 1995. The construction of long back series is currently under way. The FA are produced by the Monetary, Banking and Financial Statistics Division of the Research Department.

1 *We would like to thank Laura Mellone for helpful comments. The views expressed in this article are those of the authors and do not involve the responsibility of the Bank of Italy. All remaining are ours.*

The compilation of FA follows the "from-whom-to-whom" principle. Each element of the FA specifies the amount of financial instrument that is issued by a certain sector (row) and held by another sector (column). This is in line with the practice in other leading OECD countries. Following ESA95, the Italian FA group institutional units into five sectors: 1) non-financial corporations, 2) financial corporations, 3) general government, 4) households and non-profit institutions serving households, and 5) the rest of the world. As a rule, data are not consolidated within sectors, which means that transactions between units belonging to the same sector increase assets and liabilities of the sector involved. Non-financial corporations include private and public corporations and "quasi-corporations" (general partnerships, limited partnerships, informal partnerships, *de facto* partnerships and sole proprietorships, with more than five employees). The household sector includes consumers and sole proprietorship, the latter if not classified as quasi-corporation. Data for consumer households and sole proprietorships are compiled separately (not a requirement under ESA95), but separate statistics are not currently published.

Financial instruments are ordered by decreasing liquidity; securities and loans are also split by original maturity. ESA95 defines short-term instruments as having an original maturity of up to one year. In line with ESA95, financial assets and liabilities are expressed at market value at the end of reference period; this rule does not apply to assets for which there is no secondary market, such as bank deposits and loans. All assets and liabilities are recorded on an accrual basis. Flows are defined as net transactions at market value and need not be equal to changes in stocks.

Financial stability requires that 1) the financial system ensures a smooth and efficient reallocation of financial resources from savers to investors; 2) the main agents of the financial system are capable of absorbing shocks; 3) risk is accurately priced and efficiently managed. On the first point, FA give detailed information about flows between different sectors, thus offering a broad picture of financial intermediation either through intermediaries or markets; further, the development of the financial balances of each sector can be carefully analysed by using FA. On the second point, FA are also very useful, specifically to study the corporate and the household sectors' balance sheets in order to evaluate their exposure to risk. As in other countries, the indicators mainly used in the Bank's publications and internal reports for this purpose are essentially based on the value of sector liabilities normalised to GDP and on the sector ability of servicing debt (European Central Bank, 2004; International Monetary Fund, 2005).

Specific attention is paid to the composition of household financial assets; this helps in assessing the household vulnerability to changes in asset prices. Households' gross debt has increased fast in recent years, like in many other countries. One of the most widely used indicators of financial fragility is the ratio of household debt to the GDP; this is regularly commented e.g. in the Bank Economic Bulletin and Annual Report. Despite its rapid increase, this ratio is still low when compared with the euro-area average (around 28 per cent as against more than 50 per cent; the gap with the UK and the US is even wider). Other commonly used indicators include the households' ratio of debt service to disposable income and of debt to financial assets. The volatility in the value of assets is also a key issue. Compared with other euro-area countries, in Italy the average household portfolio asset has a larger share of securities other than shares and a smaller share of insurance policies and pension funds.

Similar indicators are used for assessing the financial stability of non-financial corporations (NFC). The ratio of NFC financial debt to GDP has increased since the end of the 1990s, to more than 60 per cent in 2004; however, as in the case of households, it is still lower than in other euro-area countries. The ratio of net financial costs to value-added has declined in recent years, mainly because of a marked decrease in interest rates. Other indicators tracked in the Bank's publications include those showing the financial choices of corporations, mainly the choice between debt and equity (leverage) and the duration of debt.

The comparability of FA-based indicators of financial fragility across countries is an open issue. In order to promote further harmonisation, the International Monetary Fund has included most of these indicators among its "encouraged" set for the coordinated compilation exercise for financial soundness indicators. In all, 59 countries (including 38 emerging countries) have volunteered for this exercise. The Fund's Compilation Guide on financial soundness indicators does not impose strict harmonisation; however, countries whose data are not fully consistent with the Guide are expected at least to explain the main methodological differences.

3. Micro data for nonfinancial sectors

While (macro) financial accounts show average levels and trends, micro-level accounts supply disaggregated and distributional data that are often extremely useful for the monitoring of financial stability even at the systemic level. Tails in the distribution of certain variables are sometimes more relevant than averages for systemic risks. Micro-level associations between phenomena are also relevant.[2] For this purpose a variety of micro-level data exist. Bank and OFI data are treated in the next paragraphs; we now concentrate on micro financial statistics of private nonfinancial units.

Concerning households, the main source of micro level information in Italy is the Bank's biennial Survey of Household Income and Wealth (SHIW). The SHIW contains detailed information on income, wealth composition and social, demographic and economic characteristics of a sample of approximately 8,000 households. The basic survey unit is the household, defined as a group of individuals linked by ties of blood, marriage or affection, sharing the same dwelling and pooling all or part of their income. The SHIW is based on a representative sample of the Italian population. Results are published in a special Supplement to the Statistical Bulletin.

SHIW microdata have a variety of uses. A large body of empirical research on household behaviour, both by the Bank and by outside researchers, is based on them. Its use as a primary source for the compilation of certain elements in the macro accounts is also being enhanced, though this has limitations. For financial stability monitoring it provides data that are not available in any other way. A given amount of aggregate household debt has different import for the stability of financial intermediaries depending on the distribution, e.g. are most households moderately indebted or is debt concentrated in a few highly indebted units? What is the net worth/net financial position/net income of the typical indebted households, i.e. are indebted households mainly rich or poor? The SHIW can be used for this type of questions.

On the comparability issue, an initiative worth mentioning is the Luxembourg Income Study (LIS), which is a non-profit cooperative research project with a membership that includes 25 countries on four continents. The LIS project began in 1983 under the joint sponsorship of the government of Luxembourg and the Centre for Population, Poverty and Policy Studies (CEPS). LIS collects the results of household income survey conducted in all participating countries, and tries to harmonise the definition and presentation of the micro-data in the different surveys in order to facilitate comparative research. A more recent project along similar directions is being developed for wealth data, which are currently even less satisfactory than income data: data are available for fewer countries, data collection procedures differ widely and the same definitions of the wealth components are far from being homogeneous across nations. If the "Luxembourg Wealth Study" is successful, it is likely to enhance significantly the usefulness of survey data for the analysis of the financial vulnerability of households.

The analysis of non-financial corporations financial conditions can also benefit from micro data. As in the case of households, aggregate financial ratios in the macro accounts do not tell the whole story. The size of "tails" in the distribution of financial ratios may have more important implications for stability than the level of the average ratio.

The most comprehensive set of micro statistics in Italy consists in the accounting data provided by the Central Balance Sheet Office (CBSO), and related data, discussed in greater detail in the companion paper to this paper (Quagliariello, 2005). The CBSO has detailed and carefully harmonised balance sheet and profit/loss data on approximately 40,000 non-financial corporations, which account for about 40 per cent of the value-added of the non-financial sector. CERVED data, also repackaged and distributed by the CBSO, are based on corporate accounts filed with local Chambers of Commerce in fulfilment of firms' statutory obligations; this database contains simpler, less harmonised data on every private incorporated entity in the land (several hundred thousand units). This is an enormous amount of data. It provides comprehensive disaggregated information (e.g. by area, industry, firm size), tail/distribution information, and (provided certain privacy/safety safeguards are met) can even be crossed by supervisors with supervisory data on banks to provide information on firms who have borrowed from specific institutions. This information is used, e.g. as input for stress testing exercises.

For international comparisons of company data based on micro sources, several databases are available. BACH (Bank for the Accounts of Companies Harmonised) collects data from the national CBSOs in Europe, Japan and the US. This database is based on a cooperation between the EU Commission and the ECCB (European Committee of Central Balance Sheet Data Office). However, BACH, while ultimately based on company accounts, does not in fact disseminate any individual data, only aggregates by sector and size class. The second source is Amadeus, a private, pan-European database of harmonised balance sheet data. Amadeus contains financial information on 6 million public and private companies in 38 European countries. It is a modular product, where one can choose a required level of coverage: the top 250,000

2 *Bank of England 2003, 2004.*

companies' in Europe, the top 1.5 million or all companies. Nonetheless, problems of comparability remain. Compared with other sources of non-financial companies' micro-data, such as Worldscope and Datastream, BACH and Amadeus have the advantage of including data on unlisted companies.

4. The banking system

Banking statistics are collected for two main purposes: supervision and monetary policy. Banking data are also used for the compilation of financial and non-financial national accounts, as well as for other real-economy statistics; in most cases input for these statistics is a by-product of supervisory and/or monetary statistical reporting obligations. Reporting is fully integrated in Italy, i.e. despite different statistical needs and legal bases for supervisory data and monetary data, there is a single data collection system. This reduces the reporting burden for banks and makes cross-checking easier: in principle, monetary and supervision data are fully consistent, in the sense that they are based on a single set of banks' internal accounts. While a variety of auxiliary information is also collected, most of bank reporting consists in accounting data.

There are several types of banking statistics. A first set of data is represented by balance sheets and loss/profit accounts.[3] Based on a consistent set of underlying accounts, statistics have different formats, valuation and disaggregation criteria, according to the purpose to which they are devoted (monetary or supervisory). For instance, supervisory data are mainly consolidated and attention is paid to all entities belonging to a banking group (including non-banks); on the contrary, monetary data are based on individual bank balance sheets and do not include statistics on branches and subsidiaries abroad. The methodology for monetary data is largely determined at the European level; supervisory data collection, while influenced by European and international norms and standards, is still largely national. Another set of information refers to interest rates, with national and European reporting requirements. A third important set of data is the central credit register, containing statistics on individual loans and interest rates.

The analysis of risks to stability makes use of elements from all sets of data. Banking statistics, are published quarterly in the Statistical Bulletin as well as in two monthly Supplements. The main aggregates are presented and commented in the Annual Report and in half-yearly Economic Bulletin.

Here we discuss in detail balance sheet data (paragraph 4.1) and statistics on interest rates (paragraph 4.2). Supervisory data and their uses are described in Quagliariello, 2005.

4.1. Statistics on balance sheet items

Statistics on balance sheet items (BSI) of banks have been collected by the Bank since at least the 1960s. As stated above, there is now a dual system: non-harmonised national statistics for supervision versus harmonised European statistics for monetary policy. Harmonised data are sent to the European Central Bank for constructing euro area monetary and credit aggregates. Apart from differences in definitions, there is also a difference in the reference universe between the two sets of data. Supervisory statistics refer to banks, while monetary statistics refer to Monetary Financial Institutions, i.e. banks plus other institutions that issue money-like liabilities, represented in Italy by money market funds.

Banking statistics provide information on the main balance sheet items: on the assets side, cash, loans, securities other than shares, shares and other equity, broken down by counterparty sector (MFI, General government, households and firms), counterparty area or residence, purpose of the loan and maturity (both original and residual), on the liabilities side, deposits, debt securities issues, capital and reserves, etc. Data on deposits are broken down by counterparty sector and instrument category.

Unconsolidated balance sheet reports are mainly oriented to the analysis of monetary developments and to the construction of statistics on assets and liabilities of banking system. In a financial stability perspective, given the host country principle on which the data are collected, indicators are used to address risks in geographic areas and to detect signals of financial imbalances causing risk to the banking sector. Finally, monetary data are crucial to the study of linkages between macroeconomic phenomena (like cyclical and monetary conditions). Knowledge of such linkages is obviously helpful to monitor vulnerability to crises or financial distress.

3 *For the use of such data in financial stability monitoring in the European context see European Central Bank, 2005.*

For the analysis of credit risk and asset quality there are a number of finely disaggregated data available. Data on loans backed by collateral or personal guarantees are available by maturity and counterparty sector. Non-performing loans are available by counterparty sector and branch (23 branches, applicable to nonfinancial corporations and producer households). Statistics also exist on various definitions of substandard loans (i.e. loans that are problematic, but not yet technically non-performing).

On the liabilities side, balance sheet data show patterns and trends in the composition of bank funds, which may reveal a dependence on particular funding sources. The exposure to foreign exchange risk is monitored through statistics on banks' net external debtor position as a percent of total liabilities and from data on balance sheet items denominated in foreign currency. Structural liquidity problems are revealed by the ratio of cash and negotiable securities to the aggregate of domestic liquid assets plus loans.

The Eurosystem is currently discussing enhancements to monetary balance-sheet data. New statistics are expected to be introduced concerning the breakdown of loans by type of interest (fixed or floating), branch, residual maturity and collateral status (secured/unsecured). Loan securitisation and syndicated loans are also likely to be covered.

In Italy as in most other countries banks' balance sheet statistics will also feel the impact of new accounting and supervisory standards, such as the IAS, Basel II and the Committee of European Banking Supervisors' (CEBS) reporting framework. The impact will be stronger on consolidated data, profit and loss statements, and information on the quality of loans and transfer of risk.

4.2. Statistics on interest rates

Three sets of statistics on banking interest rates are available: *decadali*, harmonised statistics (MIR) and Central Credit Register (CCR) statistics.

Decadali ("ten-daily") interest-rate statistics have been collected three times a month since 1978 from a sample of major banks on a core set of key rates. While originally their primary use was as a tool for monetary policy analysis, they are now mainly used for internal research. The definitions of *decadali* rates has been brought largely in line with harmonised European interest-rate statistics. Very high frequency data may be a precious tool in high-risk macro conditions.

Harmonised statistics are called "MIR" for "Monetary Financial Institutions interest rates" – a slightly misleading acronym as only banks are actually involved. They have been collected for monetary policy purposes since January 2003 from a representative sample of banks, according to ECB rules. All large banks are represented in the MIR sample in Italy. Statistics consist of monthly data on 45 interest rates indicators relating to new business and outstanding amounts of households and nonfinancial firms. As regards households, interest rates are collected on loans for house purchase, consumer credit, bank overdraft, other purposes; on the liabilities side, data are broken down by maturity type (overnight deposits, deposits with agreed maturity, redeemable at notice, repos). With reference to nonfinancial firms, interest rates on loans are classified according to the size of the financing; for deposits the structure is the same as that for households. Breakdowns by maturity are also provided.

Finally, the Bank's Central Credit Register (CCR) provides information on individual bank-customer positions. This is an extremely rich data set that can be combined with loan data from the same CCR and with counterparty data from the CBSO or other sources. Individual data are not publicly available. Published statistics include averages by area, sector/branch, maturity, existence of securities, performing status. CCR interest rates are also collected through a sampling approach. Rate definitions have been brought in line with harmonised MIR definitions to the extent possible. The sampling approach is also consistent with the MIR sample.

For the analysis of financial stability, statistics on interest rates have several uses. CCR data are devoted to the analysis of credit risk exposure of banks. In the companion paper to this work there is a description of how such information is used. In general terms, statistics on retail interest rates are employed to monitor information on prices of funding and lending by banks, and interest margins. Given the harmonised reporting scheme of MIR statistics, such statistics are well suited for cross-country comparisons in the euro area.

Further, MIR statistics permit a detailed analysis of the mechanism for the transmission of monetary policy. Understanding monetary transmission is crucial to measure the sensitivity of bank profitability to monetary policy through the reaction of banks' margins to official rate changes. Perhaps even more important is understanding how a change in monetary conditions affects banks indirectly, through its impact on the vulnerability of bank customers.

In the future MIR statistics may be enhanced to provide information on the national dispersion of interest rates, the treatment of fees and commissions, the impact of collateral on prices charged by banks.

5. Other financial intermediaries

The role of non-bank intermediaries in finance and the appropriate way to regulate and supervise them has been the subject of much theoretical and empirical debate since long ago.[4] While banks (and therefore banking statistics) usually take centre stage, non-bank financial intermediaries statistics are also important for the conduct of monetary policy, prudential supervision and financial stability.

In Italy, non-bank financial intermediaries largely coincide with the "Other financial institutions" (OFI) category of ESA95. This is a very important set of financial institutions in the country. According to FA data for 2004, the OFI share in total financial assets in Italy (about 7 per cent) was among the highest in Europe.

There are two main reasons why OFI statistics are relevant for financial stability. One is that a large share of them, in terms of business, belong to bank-centred financial conglomerates, so that the risk profile of the OFI sector is closely linked to that of banks. The other is that a significant share of the financial investment (and to a lesser extent of liabilities) of non-financial sectors, especially the household sector, is channelled through mutual funds and other OFIs. Therefore OFI data are needed for the compilation of financial accounts and, more generally, for an assessment of the risk profile of non-financial agents in the economy.

Italian OFI statistics cover four groups of intermediaries: mutual funds, financial companies, investment firms, and special purpose vehicles. Statistics differ across groups because of the specific characteristics of each. Harmonised European OFI statistics are expected for the medium term, though the discussion on this is still in a preliminary stage.

5.1. Mutual funds

Mutual funds are the most important group of OFIs in Italy. There are two classes of funds: open-end investment funds, quantitatively the largest subgroup, and closed-end funds.

Balance-sheet statistics of most open-end funds are monthly and very detailed. Assets are reported on a security-by-security basis. Counterparty information is available. Most open-end investment funds are dedicated to small retail investors, which account for as much as 90 per cent of total mutual funds business in Italy. Open-end investment funds also include other specialised funds, e.g. those reserved to institutional investors (5 per cent of the total), and hedge funds. While retail open-end funds were introduced in Italy in 1983, hedge funds have been introduced only in 2001, but they have grown rapidly since then, reaching a market share of 2.2 per cent at the end of 2004.

Closed-end investment funds have been created only in the past few years. They invest in real estate assets or securities. Real estate funds benefited from the recent increase in house prices; at the end of 2004 their assets accounted for about 2.0 per cent of those of the total population of funds. Securities funds are less widespread than real estate funds; their assets equal 0.8 per cent of the total. They invest mainly in unquoted shares of young firms and correspond to venture capital companies and private equity firms existing in many countries. Some closed-end investment funds are reserved to qualified investors while others are active in the retail business. Statistics on closed-end funds are collected quarterly.

From a financial stability perspective, mutual funds are relevant both because they manage a significant share of the financial investment of households and others, and because many funds managers belong to banking and insurance groups. The regulation of hedge funds is a specific issue. In 1998 financial distress at Long-Term Capital Management (LTCM) alerted to the risk that excessive leverage at one institution might increase the likelihood of systemic problems. Several measures were proposed to constrain excessive leverage[5]: improving transparency, enhancing private risk management practices, developing more risk-sensitive approaches to capital adequacy, encouraging offshore financial centres to comply with international standards.

Statistics on hedge funds are not homogeneous across countries and their harmonization will be a challenging task for the next few years.

4 *Gurley and Shaw (1960); Tobin (1967).*
5 *See the Report of The President's Working Group on Financial Markets (1999).*

5.2. Financial firms

"Financial companies" is an umbrella term that covers different intermediaries that grant loans to customers and/or manage financial assets, without collecting deposits from the public. This group includes leasing companies, factoring firms, consumer credit firms, other loan-granting institutions, firms specialised in equity investments, credit card firms and foreign exchange intermediaries. Balance sheet statistics are available on a quarterly basis, while profit and loss accounts are produced twice a year.

Financial firms contribute to the financing of the economy together with banks. Unwise credit practices or a deterioration in their asset quality may, in some circumstances, have similar effects as in banks. Statistics and regulation are however lighter than those on banks, mainly because financial intermediaries do not issue monetary liabilities.

Factoring and leasing institutions are by far the most important financial firms in terms of market share. The Italian factoring market is among the largest in the world, as trade credit is particularly important in Italy. Although universal banking has been allowed in Italy since the beginning of the 1990s, most banking groups operate in the leasing, factoring and consumer credit business mainly through specialised subsidiaries. At the end of 2003 bank-controlled companies had 86 per cent of the leasing market and 64 per cent of the factoring market.

5.3. Investment firms

Investment firms engage in various businesses: trading on own account, trading on account of third parties, underwriting, placement without guarantee, individual portfolio management, reception of orders and brokerage. Since the introduction of universal banking in Italy in 1993, the number of investment firms decreased, mainly as a consequence of restructuring within banking groups. Today investment firms engage principally in trading on customers' account, reception of orders and placement services. Many of the companies are controlled by insurance groups or individual investors, as banks typically manage investment activities through internal divisions.

Investment firms' statistics include the monthly portfolio composition for those companies acting on own account; a quarterly statement of assets and liabilities; the profit and loss account twice a year. Information on securities held is disaggregated by type of security, maturity, currency, issuer sector and residence.

Investment firms' data are monitored mainly to ensure investor protection. Their statistics might be harmonised in Europe in the future. The institutional framework differs across countries, however, reflecting mainly the degree of diffusion of universal banking.

5.4. Special purpose vehicles (SPVs)

SPVs (also known as financial vehicle corporations) exist to act as a conduit for asset securitisation.

One type of securitisation that it is important to monitor for financial stability purposes is that of bank assets. Banks securitise loans to acquire balance-sheet flexibility and liquidity, or to "clean" balance sheets from non-performing loans. A central issue is the extent of risk transfer. Normally asset-backed securities are held by institutional investors, not retail investors. A second type of securitisation was developed in recent years by the government, with a view to improving public finance through the selling of dwellings and other assets. Both banks' and the government's securitisations are recorded in the Italian financial accounts.[6]

Compared with other industrialised countries, Italy started to allow loan securitisation only relatively late: a law on the subject was passed only in 1999. Since then the loan securitisations business has boomed. In Italy most performing loans are securitised. Today the amount of securities issued by SPVs is greater than that of securities issued by non-financial corporations.

Statistics on SPVs were started in June, 2002. The SPVs' reporting obligations include data on the balance sheet, the profit and loss account, the outstanding amounts of securitised loans expired and not expired (broken down by type of loans: mortgages, consumer credit, leasing and other), purchase price of assets (broken down by residency of the counterparty, currency, maturity), security priority (senior, mezzanine, junior), flow data, income details; specific data on

6 *On the statistical treatment of the General Government's securitisations see the Eurostat's press releases of July 2002 and May 2005.*

Table A – Main financial market indicators used at the Bank of Italy

Prices		Volumes	
Exchange rates:	cross rates volatility	*Bond markets:*	net issues[1] gross issues[1]
Interest rates:	yields forward rates volatility	*Mergers and acquisitions:*	number[1] amount[1]
Bond markets:	yields[1] spreads[1] premia on CDs[1] default rates changes in ratings[1]	*Initial public offerings:*	number[1] amount[1]
Stock markets:	price indexes[1] volatility valuation ratios[1] investors' risk aversion earnings forecasts[1]	*Mutual funds:*	net sales net total assets
Commodities:	gold oil raw materials		
Real estate:	price indexes		

1. *Broken down by economic sector.*

each transactions are required. SPV statistics are produced twice a year, except for the profit and loss account which is available yearly.

From a financial stability perspective, data on securitisations are necessary to control the extent of the transfer of banks' loans to other institutions, to better evaluate the risk bearing of the overall economy. Harmonisation of European statistics will imply the collection of data not only on the flows of securitised loans but also on their stocks, which can only be obtained from SPV balance sheets.

5.5. Insurance companies and pension funds

Since the second half of the eighties, the Bank has collected data on Italian insurance companies and pension funds. Data are gathered from supervisory authorities and industry associations. Statistics are compiled by the Bank once a year and published in the Annual Report. They also serve as input for the financial accounts.

The focus of Bank's statistics on insurance companies and pension funds is the holdings of financial assets by these categories of institutional investors. Portfolio data are quite detailed; for instance, for insurance companies a simple breakdown of shares by currency is available (euro versus other currencies).

These statistics are used in the Bank's Annual Report to analyse the portfolio choices of the intermediaries and to assess the sensitivity of their balance sheets to interest rate and stock market risk. For financial stability purposes, a more detailed analysis would require higher frequency data and information on portfolio flows and the liability side of the balance sheets.

6. Financial market indicators

In recent years the analysis of financial markets at the Bank has developed considerably. This fact has been a consequence of the rapid growth of both financial markets and institutional investors in Italy and the euro area since the middle of the 1990s. It has also reflected the increasing involvement of the Bank in the international fora for co-operation among financial supervisory authorities, as well as the need to compare market developments in Italy with those in the other countries of the euro area after the introduction of the common currency.

For the Italian financial markets, a large amount of data is available and many statistics are compiled by the Bank on its own. Moreover, several indicators are regularly published in the statistical publications and in the Annual Report.[7]

An outline of the main financial market indicators currently used at the Bank is provided in Table A. Data availability has improved remarkably in the fields of the international bond market, M&As, IPOs, mutual funds and analysts' earning forecasts. For most of these fields, both market analysis and research activity have increasingly used sector indicators as well (e.g. bond spreads in the auto sector, expected earnings-per-share in the bank sector, IPOs in the high-technology sectors).

In the analysis of the stability of the Italian financial system, market-based indicators have played a growing role in recent years. This is due to the fact that in Italy almost all the largest banks, insurance companies and non financial groups are listed on the Italian stock exchange; bond issues by banks and major non financial firms are sizeable; financial intermediaries usually value securities on a mark-to-market basis; an increasing share of households' financial wealth is invested (directly or through institutional investors) in market-based financial instruments.

While the set of indicators shown in Table A has proved to be a sound statistical framework for assessing financial market trends, expanded attention is needed on the following three main areas: (*i*) growth of derivatives and structured financial instruments; (*ii*) access to financial markets by non financial corporations; (*iii*) changes in risk premia.

6.1. Growth of derivatives and structured financial instruments

The use of derivatives

Derivative markets are placed at the crossroads of many financial transactions that are relevant from a financial stability perspective. In Italy disclosure requirements on banks for derivative positions were first introduced in 1992 and have recently become stricter, in view of adoption of the IAS. For other market participants, data on derivatives are much more limited and do not supply timely and complete information on the aggregate positions of the main institutional sectors. For example, even in the relatively simple case of exchange-traded derivatives, it is not possible to assess which institutional sectors were net sellers or net purchasers of options in a given quarter. Information at higher frequencies are even more difficult to find. A case in point is the rapidly growing market for credit default swaps, that allow banks and other intermediaries to hedge credit risk. A critical aspect of this market is the possible occurrence of high risk concentrations among intermediaries,[8] which is difficult to ascertain because of the limited transparency of trades.

Non-standard financial instruments

In recent years in Italy, as in many other countries, both retail and institutional investors have been showing a growing interest in structured financial instruments, such as, for instance, bonds with an option having an effect on the principal or coupons. These structured products may be linked to indexes (or tailor-made baskets) of equities, interest rates or even hedge funds and commodities. Minimum yield guarantees may be present. In some cases the analysis of the indexation mechanism and the risk/return properties of the investment is quite complex. The high heterogeneity of these hybrid instruments may hinder the construction of aggregate indicators. Moreover, commercial data vendors may not be able to provide detailed information, as certain characteristics of the instruments are not easily codified in the databases.

6.2. Access to financial markets by non-financial corporations

Cost of debt for Italian non-financial bond issuers

Monitoring the cost of debt for Italian companies is straightforward for large issuers. Their bonds are all rated and highly liquid and, in some cases, they are also included in benchmark

7 *On a monthly basis, the Bank of Italy publishes data on:* (i) *the securities issued by Italian residents (net issues, gross issues and net purchases and holdings by groups of investors);* (ii) *yields, turnover and duration of bonds listed on the MTS and MOT markets;* (iii) *features of each single issue of Italian government securities. Other data on Italian bond and stock markets are published at lower frequencies. Statistics on the Italian Stock Exchange have been regularly published by the Bank of Italy since 1939 at least.*

8 *Committee on the Global Financial System (2003).*

indexes. In the case of smaller companies many bonds are unrated and they are not traded frequently on the OTC market. In these cases, we follow two approaches. First, we try to match the Italian bond with foreign bonds that are comparable in terms of duration, rating, economic sector and other characteristics. Second, we compare the yield of the Italian bond with the yield of benchmark indices for different rating classes (e.g., the Merrill Lynch indexes for euro-denominated bonds issued by non-financial companies in the international market).

Capital raised in the stock market

While we have comprehensive information on primary and seasoned issues of shares at the Italian stock exchange, we cannot easily compare these data with those of the other main stock markets, because of differences in data definitions and availability across stock exchanges. A certain degree of harmonisation of these statistics is instrumental in analysing the size and determinants of the investment flows channelled by stock markets in the main industrial countries. In the Eurosystem, the collection of harmonised data on quoted shares has recently started and the publication of harmonised statistics is currently under consideration.

Balance sheet indicators of major listed non-financial corporations

Data on the annual balance sheets of Italian firms are available with a reporting lag of about one year (see Section 3). The main exception is represented by major listed companies, which in some cases publish balance sheet items on a quarterly basis. For a restricted sample of large companies of the euro area, we compute quarterly indicators of leverage, profitability and cash flow (e.g. the ratio of debt to the sum of debt and equity, the ratio of gross operating profit to total sales, the ROE and the ratio of cash flow to financial debt). Data are taken from Bloomberg. It is worth emphasising that the financial conditions of listed non-financial companies may differ substantially from those of unlisted companies.

6.3. Changes in risk premia

Changes in investors' risk aversion

Risk premia may vary for two reasons. First, the uncertainty surrounding the expected future prices of financial instruments is subject to revisions. Second, investors' tolerance of risk may change over time. The latter factor may have contributed to the large movements in equity price volatility observed in recent years. Monitoring the average attitude of investors toward risk is a very important task and in recent years several types of indicators have been proposed. An approach that we have followed for the last two years is based on a comparison of the probability distribution of stock indexes embedded in option prices and the probability distribution inferred from historical data.[9]

Cyclical patterns in sectoral stock prices, equity and credit risk premia

The business cycle is one of the main driving forces behind financial market variables, as it affects real interest rates, expected earnings of listed companies, likelihood of corporate insolvency and risk premia. An effective way of spotting cyclical factors in bond and equity markets is to look at sectoral indicators, such as the share price index of telecom companies. The sensitivity of asset prices to the business cycle may in fact differ considerably across economic sectors (for instance, a slowdown in GDP may affect more severely the shares of companies producing durable goods or high technology). Sectoral indicators provide additional information on overall business conditions and allow analysts to trace the propagation mechanisms of aggregate shocks, such as currency and oil price shocks. They may also make it possible to isolate sector-specific shocks, as well as highlight sectors where there are stressed conditions. By combining data on stock prices and analysts' earnings forecasts, it is possible to assess changes in equity premia at the sectoral level as well.

9 *See, for instance, Aït-Sahalia and Lo (2000).*

Correlations across financial asset classes and across markets

As a result of increasing portfolio diversification and closer linkages between financial markets, growing importance is given to time-varying correlations across asset classes (e.g. between long-term interest rates and stock price indexes) and across markets (e.g. between long-term interest rates in the US and in the euro area). In some cases short-run movements in correlations may be obscured by longer-run trends, which have to be filtered out.

Liquidity risk in the corporate bond market

It is hardly disputed that liquidity is a factor in corporate bond prices. The market is highly segmented and bonds are often traded only over the counter. In these cases measuring liquidity is a very challenging task, as publicly disseminated data on prices may be scarce and there are no data on trading volumes. Bid-ask price differentials can be computed for highly liquid bonds included in benchmark indexes. These indicators provide some information on liquidity risk. However, bid-ask spreads also reflect the degree of risk aversion of market-makers and their market power. For a definite improvement on liquidity risk in corporate bonds one would need data on trade turnover or on portfolio holdings.[10]

7. Final remarks

There are several dimensions to data quality: reliability, frequency/timeliness, coverage, detail and comparability are among the most important. There are basically no problems with the first four as far as banks and (mostly) other financial intermediaries are concerned. Information is abundant and complete in Italy and it satisfies high standards.

Financial market information is less consistently satisfactory in terms of coverage and detail (frequency and timeliness are not usually the problem). This is mainly due to the rapidly changing institutional and technological environment, which makes old statistics obsolete, and entirely new statistics needed, much more rapidly than in the more stable (though by no means immobile) world of banking activity. It is therefore natural that financial market statistics are in a sense in a perennial state of change, always trying to adapt to innovation. On the other hand it is clear that innovation, while offering new opportunities for improved efficiency of the financial system, is also a source of growing concern in terms of risk. Constantly improving the quality of the available statistical information is therefore a crucial element in the monitoring of risk. As has been explained above, the Bank, like other similar institutions, has been making in the past few years a great effort to keep the quality of the statistics it offers always up to ever more demanding needs.

Financial accounts have the gigantic task of keeping track, in principle, of every financial asset and transaction in the economy. The quality of financial accounts is conditioned by the primary statistics it is based on. All quality aspects are up to high standards for bank data and for data for most other financial corporations. In the case of non-financial corporations quality in its various dimensions generally increases with firm size; it is more difficult to keep track of small businesses. For households, primary information is limited and residual imputation has sometimes to be resorted to. While the Italian financial accounts must be rated as among the most comprehensive, reliable and detailed in the world (as well as among the oldest), the Bank is making great investments in a continuous improvement of their coverage and general quality. One current line of action, e.g. is trying to study the possibility of making a more intense use of survey data to estimate the assets held by households. In contrast with financial market indicators, this is more a case of steady, progressive enhancement than of continuous change.

One cross-cutting issue, which is not confined to Italy, is that of comparability. One can have the best statistics in the world but they are of limited use if they cannot be compared across time, space, types of activity and/or sectors of the economy. In this respect, the situation is far from satisfactory, though it is improving. There are several international standards that are relevant to our subject, such as the SNA (and its European version, ESA) for macroeconomic data; the IMF Manual for external (BoP/IIP) data; the accounting standards; the IMF recommendations for macro-prudential indicators; various agreements concerning supervisory data; etc. But some of

10 *See Chacko (2005).*

them are too loose to result in unquestioned comparability (the European harmonised monetary data are an exception), and they are sometimes mutually inconsistent. For instance, BoP and national-accounts definitions of certain assets or transactions do not always square; monetary data and supervisory data on banks are not the same (and, even within Europe, supervisory data are not fully harmonised across countries); accounting and statistical concepts sometimes diverge, which is a problem because statistical reporting is less of a burden for respondents, and yields more reliable results, if data can be taken directly from company accounts; etc. In certain fields no internationally recognised standards exist: one example is microeconomic surveys of households, a very useful source of information on risk patterns as we argued above.

Probably a complete alignment of disparate standards is an unrealistic goal, given that they answer different and possibly conflicting needs; but at least unnecessary deviations should be avoided. In each of the cases we just mentioned there are efforts to improve the interoperability of standards. They are never easy, because harmonisation often requires high set-up costs. However, the impression one gets from a survey of disparate statistics serving one goal is that in many cases these costs would be fully repaid by the advantages of increased comparability.

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Assessing financial stability at the Bank of Italy: data sources and methodologies

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Summary

International evidence on financial crises has shown the relevance of macroeconomic factors in triggering banking sector problems and the need for financial stability authorities to identify risks and vulnerabilities arising from the real economy.

From a micro-perspective, the soundness and the performance of the single financial institution are better assessed by using firm-level indicators, since macroeconomic shocks have different effects depending on the characteristics of individual intermediaries. From a macro-prudential perspective, a comprehensive assessment of the soundness of the overall banking sector requires also the analysis of the transmission mechanism from the real to the financial sector and of possible feedback effects.

The Bank of Italy (the Bank) studies the evolution of the various sectors of the economy in both the Research and the Supervision Departments. The purpose of the paper is to describe the analyses of the financial system within the Banking and Financial Supervision Area, that are performed and compiled in the form of periodic reports to the Executive Board.

Financial soundness is evaluated with reference to two main areas. The first step is the evaluation of the soundness of the banking system in terms of riskiness, profitability and capital adequacy. The assessment is based on various tools, ranging from the analysis of aggregated micro-data to the analysis of macroeconomic factors that are more likely to have an impact on the stability of the financial sector. The second step is the assessment of the resilience of the banking system, i.e. its ability to absorb potential exogenous shocks, by conducting stress testing exercises.

The note is organised as follows. The introduction briefly recalls the main explanations of financial sector fragility and provides an overview of the data needs for macro-prudential analysis purposes. The following section describes the main data sources available at the Bank of Italy for micro and macro-prudential analysis. Section 3 illustrates the contents of the internal financial stability report employed for conjunctural analyses on banking sector stability. Section 4 surveys some of the analytical tools developed so far within the Banking Supervision Departments to carry out macroeconomic stress tests. Most of them will be used during the Italy FSAP (Financial Sector Assessment Program), currently under way. Finally, Section 5 deals with the possible role of market data as a supplementary source of information for financial supervisors.

1. Introduction

There is consensus on the fact that the banking sector is particularly prone to financial fragility, contagion and, thus, systemic crises. According to De Bandt and Hartmann (2000), there are three characteristics that explain the vulnerability of financial systems and their subjection to systemic risk: a) the structure of banks' balance sheets, b) the interrelations among financial institutions, c) the intertemporal features of financial contracts, which may entail credibility problems.

* *This note surveys the results of some of the empirical research carried out in the Banking Supervision Area of the Bank of Italy. I would like to thank all my colleagues for their contributions and Alessio De Vincenzo for his comments on an earlier draft of the note. My special thanks to Antonella Foglia for her advice. Obviously, I take full responsibility for any errors. The opinions expressed herewith are mine and do not necessarily reflect those of the Bank of Italy.* *Email: mario.quagliariello@bancaditalia.it*

In general, the episodes of financial instability are the consequence of the overall fragility of the economy; the external shock simply ignites the crisis. The more fragile the financial system is, the more severe the effects of the crisis are. Indeed "financial crises usually occur [. . .] when financial institutions are weak and face macroeconomic shocks" (Evans et al., 2000).

Over the years, various theories have been developed to describe the factors that foster the eruption of a crisis. While earlier studies stress the role of changes in economic fundamentals as the main source of financial vulnerabilities and crisis, more recent theories try to explain the episodes of financial instability by developing models based on imperfect information and on the expectations of market players[1].

Since different theories of financial fragility entail different data needs and early warning systems, it is useful to briefly recall some of them, deserving particular attention to the role of the banking system.

In explaining financial fragility, Fisher (1933) emphasizes the nexus between debt and financial instability and considers financial crises as a consequence of an excess of borrowing that can occur in financial markets in a boom phase of the business cycle. Usually, it is an exogenous event which leads to new and profitable investment opportunities and which triggers the cyclical upturn. The abnormal increase in lending is associated with a rise in interest rates, which is the source of financial fragility. Further increases in interest rates, possibly linked to the intervention of the monetary authority, make the repayment of the debt more difficult and can lead to systemic risk and financial crises. According to the theory of debt and financial fragility, the analysis of financial accounts and flow of funds data is particularly useful in predicting financial distress. An abnormal growth in corporate and households debt accumulation may signal an increasing level of vulnerability. The rise in the stock of debt relative to assets, especially when associated with fixed investment expansion and rapid increase in asset prices, may indicate a boom and bust cycle.

The monetarist theory highlights the role of banks' reputations as a key factor in the money creation process (Friedman and Schwarz, 1963). A possible pattern of financial fragility is the accommodation of excessive monetary growth and inflation, followed by an anti-inflationary policy consisting of a sudden and unexpected increase in the official interest rates and a decline in monetary aggregates accompanied by a bank panic crisis.

The monetarist approach clearly suggests the use of monetary data to control the behaviour of the money market and in particular the growth of the main monetary aggregates, since it may precede financial instability.

According to the monetarist approach, the shock that triggers the crisis may be the failure of a relevant financial institution which reduces the confidence of the public in the banking system ability to convert deposits into currency and, in turn, entails contagious panic phenomena and, possibly, bank runs. Indeed, banks are involved in an intermediation activity which implies maturity transformation; they typically lend long and borrow short. Moreover, banks' assets are not easily marketable, whereas large part of their liabilities is very liquid; reputational effects are therefore very important in ensuring the stability of the credit sector. Bank runs are the consequence of the maturity mismatching between bank assets and liabilities and of imperfect information in the bank loan market which make bank runs possible even on solvent, but illiquid, banks (Diamond and Dybvig, 1983).

Since bank runs strongly depend on the market's perception of the banking sector stability, market's indicators of bank riskiness such as spreads between inter-bank claims and treasury bills or the behaviour of bank share prices with respect to the rest of the market may signal changes in the soundness of the banking system.

Moreover, since different categories of depositors show different tendency to bank runs, it is quite important to evaluate the share of different kinds of funding. For instance, wholesale depositors are usually "readier to run than retail" since they have better information than small lenders and are not usually covered by the deposit insurance scheme (Davis, 1999). On the contrary, household deposits are typically more stable.

The existence of asymmetric information, adverse selection and agency costs in the credit market is also relevant in explaining sudden increases in credit crunch which, in turn, reduces funds available for borrowers and slows investments. Mishkin (1991), for instance, points out that the asymmetric information between lenders and borrowers on the overall quality of investment projects may lead to a crowding out effect of the high-quality investments since they pay the average interest rate which is higher than the interest rate that they would pay in the absence of asymmetry.

1 *For a complete survey, see Davies (1992).*

Credit rationing may be predicted by the fall of bank capital ratios; adverse selection may be proxied by the net worth and leverage of borrowers which signal their ability to repay the debt.

Finally, external factors such as huge balance of payment deficits or abrupt changes in the exchange rate can contribute to deepen financial instability.

Of course, not all the variables suggested by the different theories are commonly available. The problem of data dissemination remains one of the main obstacles to a wider application of macro-prudential analysis.

2. Data sources at the Bank of Italy[2]

The information required by the Bank in connection with its institutional responsibilities concern the operations of credit and financial intermediaries. The Bank can require information from the intermediaries under its supervision; most of the data are collected under legal reporting requirements. In addition, intermediaries make some non-obligatory reports available on a voluntary base (e.g., the survey of individual lending/deposit rates). A specific power of addressing Monetary Financial Institutions for the provision of money and credit statistics is given as well by the European Council and ECB regulations for setting up the common monetary policy.

2.1. Supervisory reports

The most comprehensive report, whose contents are also exploited for a wide range of statistical purposes connected with the Bank's tasks as central bank, is the so-called "matrix". Conceived in the early seventies, the reporting framework is designed as an integrated source of information for systematic analysis of banks' technical situation – such as banking risks, capital adequacy and profitability – estimation of monetary and credit aggregates and structural analysis of the credit market. In the nineties this framework has been further developed by giving appropriate evidence of derivatives and of the internationally wide prescriptions in the field of prudential supervision, such as the Basel Capital Accord and the related European Directives on solvency and capital adequacy of banks and investment firms. Reporting on a consolidated basis has also been implemented following the specific EU Directive. The database has been further enhanced over time in order to discharge the Bank's duties regarding oversight of the payment system and of financial markets. In recent years, an enhancement of the reports was made in connection with the adoption of the Euro.

The basic concept of the "matrix" is to put together all the information required for different purposes by the various Departments of the Bank, in order to exploit all the benefits arising from the overall integration.

2.2. Central Credit Register

Bank's Central Credit Register (CCR) was set up in 1962 and is legally binding under the Banking Law. Reporting institutions include all Italian banks, leasing and finance companies, Italian branches of foreign banks. Data must be reported on all categories of borrowers.

Reported data include a wide array of exposures. The reporting threshold is 75,000 euros; however, bad debts must be reported irrespective of their size (no threshold).

Elementary data include all additional information needed to identify borrowers, such as taxpayer identification numbers, name of the borrower, sector of activity, geographical area. Data are reported on a monthly basis; with the same frequency the total amount of loans received by the each borrower is returned to the reporting institutions with reference to their own customers. Statistical data on the distribution of total loans by type, geographical area and sector of economy activity are also returned to reporting institutions and published in the Bank's Statistical Bulletin.

2.3. Company Account Registers

The Bank has access to the Company Account Register – *Centrale dei bilanci*, a private company set up jointly with the main Italian banks in the early 1980s' to collect, process and analyze financial statements of Italian firms.

2 *A more detailed description of the main pieces of statistical information that are used for monitoring financial stability in Italy can be found in De Bonis et al. (2005).*

The basic components of this database are financial statements entered in a standardised format. The financial statements' issuers are identified with their taxpayer identification numbers, names and economic sectors, which can be matched with the Credit Register's identification data.

The file includes roughly 40,000 individual financial statements of medium and large firms. Reports are very detailed and include consolidation perimeters and shareholder links.

The Bank has also access to CERVED, a joint stock company set up in 1993 by the Italian local chambers of commerce and local companies to collect the company accounts of some 500,000 limited liability companies. CERVED's scope is therefore more representative of Italian firms than the *Centrale dei bilanci* register, but the reporting framework is less detailed.

3. The use of financial soundness indicators for conjunctural analyses

The Bank carries out an aggregate analysis of risk, profitability and capital adequacy of banks on a quarterly basis. The report provides evidence of the main indicators of banks' soundness for the system as a whole and for the main geographical/sectoral/dimensional components. Evidence on the structural dynamics of the banking system (which accounts for mergers, acquisitions, and evolution of market shares) is also provided.

The report starts analysing banks' exposures to different sources of risk: first and foremost credit risk, followed by concentration, market and country risks. Afterwards, the investigation focuses on the impact of such risks on banks' profitability and, in turn, capital adequacy.

The monitoring of credit risk is based on the evaluation of loans' dynamics and quality. As for non performing loans, several indicators are presented, with banks' category breakdowns. In particular, both the ratio of non performing loans to total loans and the ratio of new bad loans to total loans (as a proxy of the default rate of the system) are reported. The flow of new bad loans is computed for the various economic sectors, activities and regions. The report takes also into account the securitization operations of performing and bad loans that have influenced the aggregate portfolios.

The examination of credit risk exposures relies also on the prospects for loan quality, as given by synthetic indicators of individual borrower's credit quality. The Supervision Department of the Bank has developed a corporate scoring system based on a logit model, that exploits both financial (from the CERVED archives) and credit relationship information (from CCR data). The scoring system is used to assess the quality distribution of a large sample of corporate borrowers. In the first quarter of each year (t) company account data at year $t - 2$ and credit register data at year $t - 1$ are available to forecast the probability of default of corporate bank borrowers for the current year (as a proxy of aggregate default rate). This analysis is regularly performed for the Bank's Annual Report.

The diversification of credit portfolios with respect to the different sectors of economic activity is also analyzed, with evidence of the total amounts, growth rates and shares of outstanding loans. In periods of specific concerns (e.g., in the aftermath of September 11th, the IT bubble), the aggregate loans to the more sensible sectors of the economy are also closely monitored, and subject to an in-depth analysis. The large exposures of banks to single customers or to connected customers are also monitored, with reference to exposures greater than 10 per cent of regulatory capital. Evidence of the number and amount of exceeding exposures is given, for the whole system, for the main banking groups and according to the geographic location of the intermediaries.

The evidence on banking sector risks at the aggregate level is supplemented with the information on market risks. With reference to the trading book, the position risk of both debt and equity securities is computed in percentage of regulatory capital, separately for general market risk and specific risk. With reference to the entire banking book, foreign exchange risk is also monitored.

Finally, in the country risk section, the share of Italian banks' loans to total loans outstanding to non OECD countries and the minimum prudential provisions on such loans are reported. According to Italian prudential regulation, countries are classified into 7 risk buckets, corresponding to different levels of compulsory prudential provisions. The risk classes are determined on the basis of a method that takes into account various indicators for the assessment of the credit risk of sovereign borrowers (debt repayment performance; macroeconomic indicators such as debt service ratio, foreign debt/GDP, foreign debt/exports, etc.; market indicators such as ratings, spreads, recent access to the market; evidence of possible exceptional circumstances). The countries' risk weights are decided in bi-annual meetings with the Banking Association and with the major internationally active banks, where the Bank presents its view based on the analysis of the relevant macroeconomic information on sovereign risk. Each quarter a meeting also takes place to monitor the evolution of the financial situation of non-OECD countries.

Bank profitability reflects recent developments in credit and financial markets, as well as the expected future impact (through provisioning) of shocks that have already materialized. It indicates the extent to which internally generated funds are capable of sustaining future shocks, and hence the (short term) resilience of the banking sector. The report provides consolidated semi-annual data on bank margins, income and expenses, as well as operating and profitability ratios for the system as a whole, for the main groups and for the two macro-areas of the country. Moreover, on a quarterly basis a separate report on the aggregate results of the main banking groups is compiled, drawing from the returns given by the main banks to the market according to what is required for listed companies.

As for capital adequacy, risk based capital ratios are computed on an aggregate, consolidated basis, with the evidence of the various tiers of capital. The number of banks below the regulatory minimum and the amount of capital shortfalls, as well as their share in terms of system's assets, are also accounted for.

4. Stress testing tools

The second step of the evaluation of the banking system's soundness is the assessment of its resilience, i.e. its ability to absorb potential exogenous shocks. This is done by conducting stress testing exercises. With respect to the analysis of the macro-prudential indicators, the stress testing approach allows a more forward-looking perspective.

When setting up the framework for stress testing exercises, it is necessary to identify the risks that have to be considered and the range of factors to be included; indeed, stress tests can be used to analyse the impact of a change in a single risk factor (sensitivity test) or the effect of a simultaneous change in several risk factors (scenario analysis). It is also important to determine whether the exercise should be based on historical scenarios, assuming that past shocks may happen again, or rather on hypothetical scenarios, that is on extreme but plausible changes in the external environment regardless of the historical experience.

Within this framework, the Bank has developed – both at the Research and Supervision Departments – some tools in order to carry out aggregate stress tests applying macroeconomic shocks to system-level portfolios (top-down approach); some of these methodologies have been developed in order to assess banks' aggregate conditions in normal times, but they can be used also for stress testing analyses. Stress tests have been largely based on historical scenarios for credit risk and on both historical and hypothetical scenarios for market risks.

As far as credit risk is concerned, the risk factors considered in the analyses were the downturn of the general economic activity or the worsening of the financial condition of the corporate sector. For market risks, the impact of changes of the interest rates and the fall of financial assets prices have been evaluated.

In some cases, different statistical procedures may have similar or even overlapping goals (e.g., the estimation of future loan losses): this is the explicit acknowledgement that cross-checks are an essential part of stress testing and the prerequisite for policy implementation.

The following paragraphs provide an overview of these tools and a description of the underlying methodologies.

4.1. Credit risk

4.1.1. Loan loss provisions over the business cycle using panel data

The reduced-form relationships between loan loss provision ratio and the default rate, on the one hand, and the business cycle indicators, on the other, have been estimated by using panel data techniques[3].

The sample employed for the estimation includes over 200 Italian banks and covers the period 1985–2002. The sample excludes mutual banks (*banche di credito cooperativo*) and, to reduce measurement errors, the outliers; it represents around 90 per cent of Italian banking system's consolidated total assets. Along with this large unbalanced sample, a smaller panel of 11

3 *Quagliariello (2004).*

large banks (representing over 60 per cent of total assets) whose data are available for the whole period under exam (18 years) have been used to carry out robustness checks.

Both static fixed-effects and dynamic models have been estimated in order to verify whether banks' performance is linked to the general economic climate and to understand the timing of banks' reactions to economic changes. The starting set of regressors has been selected according to the insights provided by the economic theory and the empirical results that emerged in previous analyses; in particular, the regressors include the real GDP growth, the long-term real interest rate, the loan-deposit spread, the stock exchange index changes. The lag structure of the explanatory variables takes into account the plausible delay with which macroeconomic shocks affect banks, the frequency of the observations and the need to start from a quite general model without losing many degrees of freedom.

The results of the model have been then employed to carry out stress tests that simulate the impact of some macroeconomic shocks on the Italian banking system. In particular, using the coefficients of the static models, single factor stress tests and scenario analyses have been carried out.

For the sensitivity analyses, all the variables for 2002 have been assumed to be constant, apart from GDP changes. Although GDP growth rates have not been chosen according to any historical/probabilistic criterion, the lower values include extreme events; for instance, a 1 per cent contraction of GDP has been experienced only once in the 18 years under consideration, in the aftermath of the European Monetary System crisis in 1992–93. In the scenario analyses, all the relevant macroeconomic regressors have been set at their 1993 (crisis) and 1994 (recovery) levels, ceteris paribus. In the exercises any potential second round effect or policy response has been neglected.

In order to assess the resilience of the banking system, the resulting figures for the loan loss provision ratio and the rate of classification of loans as non-performing (a proxy of the default rate) have finally been compared with the pre-tax profit of banks (i.e. the income available for absorbing the extra-provisions arising from the stress scenario) and the level of supervisory capital above the minimum requirements (i.e. the buffer against losses beyond banks' income).

4.1.2. Cyclicality of bank borrowers' default rates using VARs

The impact of the business cycle on bank borrowers has been estimated using a vector autoregression (VAR) approach[4]. With respect to cross-sectional or panel techniques, VARs allow to fully capture the interactions among micro and macroeconomic variables, providing an ideal framework for capturing possible feedback effects. This enables to perform a more comprehensive assessment for financial stability purposes. As in the existing literature, the analysis starts with a simple open economy model in which the default rate equation is introduced in order to catch the direct effect of the business cycle on banks' portfolio riskiness. To evaluate the possible existence of a feedback effect, an equation linking credit supply and bank capital is then added. This allows to test whether banks' portfolio riskiness affects, in turn, the real economy and the nature of the transmission mechanism. Following the capital crunch hypothesis, some measures of capital adequacy are used as indicators of banks' ability to keep sufficient loan supply in recessionary conditions.

The empirical results are quite supportive of both a first round effect and some feedback effects over the last two decades in the Italian economy. In particular, the econometric results confirm that the default rates follow a cyclical pattern. They fall in good macroeconomic times and increase during downturns. This evidence is robust to different measures of the output gap and holds for the household and corporate sectors as well as for the non-financial sector as a whole.

Furthermore, empirical findings seem to suggest that, when capital surpluses over regulatory minimum are low, banks may reduce lending, which, in turn, negatively affects the output levels. Although based on a relatively short time period and a single country, these results confirm the importance for banks to keep sufficient capital buffers in order to maintain an adequate credit supply also during contractions, thus reducing the possibility of procyclicality.

The estimated relations may be easily employed for carrying out stress testing exercises in order to assess the resilience of the banking system in the presence of sudden unfavourable macroeconomic shocks, thus strengthening supervisory authorities' capability to forecast and, possibly, prevent financial crises.

4 *Marcucci and Quagliariello (2004).*

4.1.3. Probability of default (PD) for the corporate sector

The probabilities of default of a large sample of corporate borrowers have been estimated on the basis of a scoring model that employs a logit specification in order to distinguish sound from insolvent firms[5]. In particular, balance sheet data at time t and Credit Register information at time $t + 1$ have been used to assess the probability of each firm of being recorded as defaulted at time $t + 2$. A firm is regarded as defaulted if it is reported in the Credit Register's bad debt (non-performing) category for the first time in the year $t + 2$ by at least one lending bank.

The estimation procedure has been applied to a set of 180,000 companies split into four sectors of economic activity (manufacturing, trade, construction, and services)[6]; a separate regression model has been estimated for each sector. Through a stepwise procedure, 11 significant explanatory variables have been selected out of about 30 ratios proxying for profitability, productivity, liquidity, financial structure, tension in credit relationships, growth, size and geographical location of the enterprises.

Estimated PDs have been subsequently used in order to carry out a stress testing aiming at evaluating the impact of an adverse macroeconomic environment on the credit quality of the aggregate loan portfolio of Italian banks and on the overall capital buffer (above the minimum requirement) of the banking system.

Specifically, the exercise tried to replicate the adverse circumstances of the economic recession experienced in Italy at the beginning of the nineties; to this purpose, the default probabilities have been computed using, for each company still in life, information on credit relations and on balance sheet indicators related to the years 1993–94. For the other companies, reference has been made to average values of the indicators of the relevant sectoral/geographical/dimensional category. The "historical stress scenario", together with an "hypothetical stress scenario" of a downgrading of one rating class for each borrower, have been used to compute the average credit quality of the aggregate loan portfolio under the above-mentioned adverse scenario and the consequent increase in the capital requirement.

4.2. Market risk

4.2.1. Interest rate risk for banks' balance sheet

For the measurement of interest rate risk exposure of the banks' balance sheet, a Value-at-Risk (VaR) methodology has been developed[7]. The steps of the analysis are the following: a) computation of the duration parameters on the basis of the interest rate values observed in the market at the time of the evaluation; b) computation of convexity; c) development of a Principal Component Scenario Simulation methodology for the evolution of interest rates. The interest rate risk exposure is derived taking into consideration the first percentile of the profit and loss distribution.

Interest rate changes have been modelled through the Principal Component decomposition (PCA) of the observed term structure; this allows to reduce the number of risk factors and to concentrate on the main sources of risk, while retaining most of the information contained in original data. The PCA representation of the observed term structure is then used in the Monte Carlo simulation to reproduce the correlation structure of the original risk factors and to generate a large number of possible movements of the yield curve for a defined horizon.

The Value-at-Risk exposure based on Monte Carlo simulation is evaluated according to two different approaches: a parametric approach, based on the normal distribution of the underlying risk factors, and a non parametric approach, that takes into account the skewness and fat tails of the Principle Components' empirical distributions. Once derived, the Principal Component Value at Risk (PC VaR) methodology is applied to the balance sheets data (on a residual maturity basis) of Italian banks.

The methodology is then used for calculating PC VaR on a one year holding period (240 working days), first according to the parametric approach and then using the square root of time rule for the non parametric approach on a daily basis.

The model can be used to perform stress analysis on the volatility of interest rates and to compute potential losses.

5 *Fabi, Laviola and Marullo (2004).*

6 *Overall, the Italian non-financial firms with more than one employee are approximately 1,600,000. Non-financial companies reported to the Central Credit Register are approximately 500,000.*

7 *Fiori and Iannotti (2004).*

4.2.2. Market risk for banks' trading book

In order to assess and monitor the market risks faced by the Italian banks that do not rely on a validated internal model the Supervision Department has developed a procedure to calculate a set of risk measures for the banks' trading book. Specifically, VaR estimates have been obtained for Fixed Income and Equity portfolios employing the information provided by banks in the supervisory reports[8].

The procedure computes for each bank the VaR for different asset types (equities, fixed income securities, derivatives etc.) based on parametric (delta, gamma, vega, 99th percentile) and historical simulation (252 days, 99th percentile) approaches.

The methodology takes into account the correlations between the same asset types and the different yields along the term structure; however, it does not allow for any "correlation benefit" among different asset types in computing aggregate VaR. Simplifying assumptions about derivatives positions are made, since the available data do not allow to match exactly the delta equivalent of derivatives and the corresponding underlying assets.

The risk measure currently used for supervisory purposes is the greater of the two VaRs (parametric and historical simulations) multiplied by 3.

The VaR methodology could be employed in order to carry out stress tests. Some possible exercises might be based on the following hypotheses:

- Correlation stress: the correlation among different assets might be set to zero within the same asset type, therefore not considering any gain from the diversification of the portfolios.
- Volatility stress: using higher percentiles of the distribution for the parametric VaR (however, the multiplication coefficient is already a large swing towards the very end of the tail of the distribution).
- Historical Simulation 100th percentile: the worst of the mark to market values for the single portfolios within the considered time period.

The hypothesis of extending the time period for the historical simulation has also been considered; this would allow to consider the worst possible outcome on a larger set of scenarios. However, since the procedure tries to get a perfect mapping of the portfolio on market data, the extension of the time period may lead to increasing inconsistencies in the evaluation process due to short time-series or the presence of structural breaks.

5. Other issues: the role of market information

In recent years an intense debate has developed among academics, practitioners, and bank supervisors on the potential usefulness of market-based data in improving supervisors' knowledge on banks' financial condition.

The main idea is that market participants have incentives for comparing the reported accounting figures to the real financial condition of a bank and pricing a bank's securities based on their best estimates of its ability to generate profits. For this reason the picture supervisors draw on the risk profile of banks might be integrated with the information that financial markets, if efficient, promptly reflect in prices. In other words, even though supervisors have a considerable amount of insider information, financial markets might help them to update their evaluations faster.

The research carried out at the Bank[9] focuses on various commonly used equity-based indicators on Italian banks whose shares were listed on the Italian stock exchange from 1995 to 2002. The correlation across banks (for the same indicator) and across indicators (for the same bank) is examined in order to verify what type of signals (if any) different variables are able to convey. Furthermore, following the methods adopted in the recent literature, the ability of market variables to add information to the quantitative supervisory data is tested.

In principle, it is possible to build up several equity-based indicators according to the different availability and frequency of the data. The data generally differ in complexity, and thus provide different information on the market perception of the bank's riskiness. Of course, there is an understandable trade-off between timeliness and accuracy. In fact, the descriptive analysis clearly shows that different indicators do provide different information on banks' exposure to

8 *In particular, the supervisory reports provide evidence of: a) all the quoted instruments (with ISIN code); b) the interest rate exposure stemming from cash and derivatives (delta equivalent) positions divided into 13 time buckets; c) the gamma and vega impact (as stated in the amendment to the Basle Accord of 1996) for equities and interest rate derivatives.*

9 *Cannata and Quagliariello (2005).*

either idiosyncratic or common risks. On the one hand, as economic theory suggests, stock prices cannot really reflect the development of a bank's riskiness. Also, stock prices are deeply affected by market trends and changes in consumer prices. On the other hand, the indicators that build on the option pricing framework seem to be variables that are better suited for catching banks' specific riskiness.

This evidence is confirmed by comparing equity-based variables with the supervisory ratings assigned each year by the Bank (PATROL ratings). The distance-to-default is consistent with supervisory ratings. Equity returns provide reliable insights only when they refer to time windows close to the supervisory assignment. They are also noisier for wider time horizons, which makes their interpretation more difficult. Econometric results confirm the informative content of equity-based variables and their complementarity with supervisory information. These variables provide a picture of the intermediary's soundness, which, even if less accurate, is more easily and frequently available.

This seems to suggest that monitoring the development of equity markets may represent a valuable tool for supervisors in order to acquire preliminary data on listed banks' risk profile. In a macro-prudential perspective, this might enrich financial stability assessment.

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SESSION 3

What are the data gaps regarding banking institutions and how can they be narrowed?

Chair's summary: Mr. Gerald Goldstein (Office of the Superintendent of Financial Institutions, Canada)

Papers:

Time varying model for bond rating transition probabilities
Mr. Yutaka Soejima (Bank of Japan)

Measuring interest rate risk in the banking sector: the Swiss experience
Mr. Robert Bichsel (Swiss National Bank)

Enhancements to the BIS international banking and financial statistics
Mr. Philip Wooldridge (BIS)

Effects on the usefulness of ordinary banking statistics from cross-border consolidation – experiences from a small open economy with a concentrated financial sector
Mr. Jan Schüllerqvist (Sveriges Riksbank)

Banks and systemic problems: a review of selected literature
Mr. Gerald Goldstein (Office of the Superintendent of Financial Institutions, Canada)

Chair's summary

Gerald Goldstein (Office of the Superintendent of Financial Institutions, Canada)

The focus of the session was an assessment of the quality of information obtained from banks (in mature financial systems) for assessing financial stability. There was general agreement that banks are of systemic importance in most nations, and that there must be ongoing efforts to make bank data better in the sense of more timely, comparable, and relevant to the specific issues being addressed.

To assess financial stability the traditional view has been that one needs macroeconomic data, market price information, information about borrowers, qualitative information and detailed bank information. What the banks typically provide is information about risk and solvency, about the structure of the banking market, and about links to the real economy. With respect to hard data, the discussions underlined that there are choices to be made in choosing data sets for any particular purpose – i.e. consolidated versus unconsolidated data, accounting data versus market data, GAAP (Generally Accepted Accounting Principles) versus regulatory accounting, etc.

Information from banks is increasingly coming from multiple sources, not just the regulatory returns; for example, there seems to be a growing reliance on "soft data" based on market contacts by central banks. However, there was some debate about the usefulness of such information from an analytic point of view. For policy makers and researchers at times have different needs; policy-makers need "real time" information to help them to make correct decisions *today*. Researchers need robust data. The current emphasis on public disclosure, in Pillar 3 of Basel II for example, holds out the promise of higher quality, more comparable data.

It was apparent from the mini-presentations that there are ongoing efforts to improve measurement of banking risks, and in particular, to go beyond credit risk; for example, Switzerland's new detailed reporting on interest rate risk in the banking book, and Japan's quantitative work on measuring the pro-cyclicality of credit costs in the loan book. At the international level there are ongoing efforts to improve the quality of bank data; for example, the new BIS consolidated banking statistics incorporate the effects of risk transfer (ultimate risk) and off-balance sheet exposures (derivatives and guarantees) on foreign claims. The objective has been to provide aggregate information compatible with banks' own risk management practices.

In Sweden, there has been work on improving cross-border information. Swedish analysts have found that changing cross-border linkages can create challenges for regulatory reporting, as illustrated by the case of Nordea Group in Scandanavia which operates different business lines out of different countries. For example, lending in Sweden might be booked in Finland. The solution for this type of problem seems to point toward more information sharing among regulators/central banks as well as enhanced reporting to the lead regulator of banks of this type. This case underlines the need to understand, and take into account banking structure, when gathering and analyzing data.

The chairman of the session struck a cautious note with respect to the value of the data which is being collected, and its ultimate usefulness for *ex ante* identification of emerging problems in banking systems. His review of the literature on banking failures suggests the re-emergence time after time of a few determining factors, fraud, bad luck and, in particular, lack of diversification (as illustrated by Canada's regional banking crisis). The chair noted that we should not assume that the banks' information systems can always tell us exactly what we want to know about their risky activities. We should always be aware of the costs of providing such information. Further, much information is already collected from banks and is not being used. Regulatory reporting requirements should be carefully crafted based on the priority needs of regulators and central banks.

Given the recognized limitations of data as an *ex ante* surveillance tool, regulators place significant emphasis on processes and procedures for dealing with risk within the banks. In addition, while the key focus of regulators is the risks involved in bank activities, regulators must refrain from becoming so intrusive as to actually discourage risk-taking, which is an essential function of banking. Agencies should also be cognizant of the potential moral hazard consequences of imposing standards on banks; Basel II may, in fact, ultimately lead us into such problems.

On the other hand, others noted that there is a strong public good aspect to compiling and publishing banking data. For example, it was suggested that if the BIS banking statistics were not being compiled the private sector would almost certainty ask for something similar. Another comment was made to the effect that the banks in different countries are increasingly examining published FSRs (Financial Stability Reviews) and often requesting access to the parameters and data sets published in them.

Financial institutions, government departments, central banks, regulators, international organizations (the IMF, the World Bank, the BIS, the OECD etc.), academics, consultants, and others produce and consume information relevant to issues of financial stability. Further, the objectives of these organizations in producing and making use of the information often varies. The discussion did not lead to an identification of data gaps. What did come out clearly was that we have a great deal of data with which to work, but that the "ideal" data set is still an elusive target.

Jerry Goldstein (Office of the Superintendent of Financial Institutions, Canada)

Time varying model for bond rating transition probabilities

Yutaka Soejima (Bank of Japan)

1. Introduction

The control of credit risk plays a central role, equal to that of managing interest rate risk, in the integrated risk management efforts of financial institutions, and is also a critical tool for selecting and controlling the risk-return characteristics of asset portfolios. Since credit risk is normally pro-cyclical in nature, increasing during recessions and decreasing during economic expansions, there is a need to quantitatively measure how credit risk changes using an approach to risk management and portfolio investment that is either calibrated to, or diachronically averages out, the business cycle. Furthermore, the New Basel Accord seeks to make better use of ratings by outside agencies and by the banks themselves when measuring credit risk. For these reasons, there has been considerable research on ratings transition probabilities since early on, and changes in transition probabilities over time, especially those changes in response to the business cycle, have become a central issue in recent years.

In Japan, as well, the introduction of self-assessments and the implementation of a system of loss reserves has resulted in transition probabilities by obligor category taking on the single most important role in recognizing and forecasting the amount of credit costs to be incurred. Although non-performing loan disposals by Japanese banks have already peaked, cyclical fluctuations in credit costs are expected to occur on an ongoing basis, since continued appreciation in the value of collateral, as occurred up until the 1980s, can no longer be assumed in the current economic environment. Assuming a continuation of the business model and banking industry structure now in place, changes in transition probabilities by obligor category are likely to be one of the most important determinants of business trends at the Japanese banks, ranking in importance with the impact that changes in the shape of the yield have on bank earnings and their rebuilding of asset-liability structures.

The relationship between credit costs and the business cycle is also critical from the perspective of monetary policy. A system of financial intermediation through the banks necessarily brings with it a negative accelerator problem (the problem in which the supply of loanable funds tightens and provides negative feedback to the economy, as the increase in credit costs that occurs during a recession winds up lowering both risk tolerance and risk appetite). As long as the banks play a central role in the monetary policy transmission mechanism, a deep understanding of the mutual interdependence between the real economy and the banking sector is a necessity for implementing the appropriate monetary policies. Using a transitions probability model to capture the fluctuations in credit costs caused by the business cycle should be helpful in this regard.

Based on an understanding of the problem as outlined above, this paper presents its analytical results via a theoretical model that explains changes in the time series of the transition probabilities for R&I (Ratings and Investment Information, Inc.), the ratings agency that rates the largest number of bonds issued by Japanese firms. The theoretical model used in this paper is a two-period extension of a single factor model, expressed as a bivariate normal distribution with a strong correlation to the conditional probability, assuming rating m in the prior period, of having the rating n in the next period. The single-factor model is convenient for discriminating between those factors particular to each asset and those factors common to all when trying to understand the probability distributions of, or future fluctuations in, asset values. Consequently, it is one of the fundamental tools used for constructing credit risk models and is also used for measuring credit risk under the New Basel Accord.

Our model captures the shape of the distribution of bond ratings using the individual factors, while capturing the time series shift of the distribution as a whole using the single common factor. This makes it possible to represent the underlying trend for ratings overall (upgrade or downgrade) using the time series shift of the common factor. By doing so, the abstract concept of "changes in credit risk" can be indexed off the movement of a single variable. We call this here the "transition index". We found these movements to be pro-cyclical and nearly simultaneously correlated with the real GDP growth rate and the *Tankan* DI. Depending on the timeframe, we also observed numerous instances of a one-year lag, with the transition index tending to lag the economy. Because of the time lag between perception of a change in the economy and corporate earnings and the actual change itself, we interpret our observations ratings changes as evidence of pro-cyclicality with a slight lag.

Assuming a stable relationship between the economic variables and the transition index, it is possible to predict changes in transition probabilities based on the economy's future path. Furthermore, by applying the transition probability matrix of the bank's internal ratings and borrower categories to our model, and assuming a reserves ratio for each rating, it is also possible to predict changes in the credit-cost rate.

This paper is structured as follows. We begin in Chapter II by surveying the recent literature and explaining the theoretical model and measurement methodology that we have adopted herein. In Chapter III, we explain how we constructed the transition probability data and describe that data's characteristics, and in Chapter IV we give our results. In Chapter V, we summarize our findings and consider extensions to our model.

2. Review of recent literature

2.1. Two approaches to theoretical modeling

Theoretical models aimed at capturing changes in the transition probability matrix over time can be broadly categorized under two main approaches. The first approach finds the transition probabilities by using a traditional qualitative choice model and estimating the conditional probabilities (the probability that firms deemed by the model to have the equivalent of an i rating in the current period will be deemed to have a j rating in the next period). Analyses based on this approach includes Morihira and Sumida (2001), which used ratings of Japanese firms, and Nickell, Perraudin and Varotto (2000), which used ratings of US firms. These papers constructed cohort data by taking as the initial conditions a grouping of the firms by rating at the time the rating was announced and then estimating the percentage of firms in each cohort (with each initial condition) that would have a rating change. Qualitative choice models can use either a polynomial logit (probit) model or an ordered logit (probit) model.[1]

The second approach is based on the use of survival analysis models, also known as hazard models or duration models, that look at the time until an event occurs. The time that a given rating lasts (survival duration) is treated as a probability variable, with multiple events envisioned depending on the new rating assigned when that rating changes. Next, a function is set to express the hazard rate, which in this context is the probability of a ratings change within a given short period of time. By categorizing the different events into what rating is assigned at the end of the observation period after starting out with a given rating, the parameters for the hazard function that can best explain the event's occurrence are estimated.[2,3] When the hazard function includes time-dependent explanatory variables, changes in the transition probabilities are also time-dependent. Recent literature has used financial variables as well as variables expressing recessions and other macroeconomic conditions as explanatory variables in the hazard function. In order to confirm the Markov characteristics, i.e., that past events have no effect on future transition probabilities, Lando and Skodeberg (2002) used as explanatory variables whether there had been an upgrade or downgrade in past and the duration from when the current rating was awarded until a downgrade. With both downgrades and duration showing a significant correlation in many rating categories, they found that transition probabilities were

1 *It is conceivable that a polynomial logit (probit) model can use a different set of explanatory variables and parameters for each choice. Another variation is the nested logit (probit) model, which contains subcategories within some of the categories.*

2 *The Cox proportional hazard function is frequently used for this. The function is expressed with a portion determined solely by time and with an exponential of a linear sum of the other explanatory variables (known as covariates). For a detailed explanation, see Marumo and Ieda (2001).*

3 *Hazard models can be difficult to work with, in light of the possibility of (1) multiple events can occur within a given time period (multiplicative hazard models can handle a succession of upgrades, for example); (2) the period can expire without any event occurring (the censoring problem); and (3) a rating can be changed temporarily then restored. Mori et al (2004) introduces a model and estimation method for cases in which the covariates in a Cox hazard function change in a time-dependent manner.*

non-Markovian.[4] In the Japanese context, Mori et al (2001) estimated a model using financial variables to examine transition probabilities for separate categories based on ratings assigned by Teikoku Data Bank. This paper showed that its model outperformed Markovian models (especially for longer time periods) and that when the initial rating differed, the factors needed to explain subsequent transitions also differed.

Survival analysis models, incorporated into models for pricing financial products with credit risk, are now widely used in the financial engineering field. Pioneered by Lando (1998), which incorporated the Cox process into the hazard rate, and by Duffie and Singleton (1999), which applied this to a model for corporate bond yields (credit spreads), such models are increasingly being used for such practical applications as asset pricing and risk management.[5]

2.2. Selecting a theoretical model and a method for estimating transition probability data

We have shown two approaches, but the method used to confirm transition probabilities (method of constructing data) is tied to the theoretical model chosen.[6] Transition probabilities are normally dealt with in a matrix format, in keeping with a discrete-time approach that focuses on changes between an initial period and an end period. In contrast, a continuous-time approach focuses on the point in time when the rating changes. Using a short time period under discrete time is problematic in that the observed transition probabilities do not reflect the real transition probabilities. For example, the probability of a downgrade from AAA to B is observed to be zero if it does not actually happen during that period, whereas if the rating is first downgraded from AAA to A, and then from A to B the following year, it follows that the real probability of a sudden downgrade within a year is not zero. One way to handle this would be to set a longer observation period, but the drawback of this approach is that a momentary downgrade followed by an offsetting upgrade would not be observed. The second problem is that because the time information regarding the change is ignored, it is not reflected in the transition probability. That is, an increase in the number of instances in which there is no rating at either the beginning or the end of the period causes a loss of information. On the other hand, using continuous time under a survival analysis approach makes it possible to treat a downgrade as a censored variable, thereby reducing information loss. Jafry and Schuermann (2004) showed how information loss under a discrete time approach was greater than under continuous time assuming a Markov process.[7]

2.3. Recent research trends: Pro-cyclicality, momentum, and rating standard and its stability

It has long been pointed out, through such means as measuring transition probabilities separately for periods of economic expansion and economic contraction and by testing for autocorrelation in ratings changes, that transition probabilities exhibit a pattern of cyclical change and momentum in a way that may align with the business cycle. It has further been shown that either the standards used to rate credit have been unstable because of the existence of an underlying trend[8]

4 *There were many categories in which past upgrades were insignificant. Furthermore, while downgrades showed momentum, the probability of a downgrade declined the longer the period from entry into the current rating until the next downgrade. The authors therefore discovered that although momentum was present, it disappeared if the rating held firm at the downgraded level for a certain length of time. The authors pointed out that, because of the possibility of this occurring, the ratings agencies are less than enthusiastic about changing ratings by more than a single notch.*

5 *Jarrow, Lando and Turnbull (1997) estimated transition probabilities for a term-structure model using a model for pricing corporate bond yields, but they assumed that the transition probabilities were Markovian and independent of time. Ieda (1999) applied an improvement of that model (maintaining the Markov characteristics) to corporate bond data from Japan to estimate transition probabilities.*

6 *There is not necessarily a one-to-one mapping of qualitative choice models to discrete time and survival analysis models to continuous time. Use of continuous time makes constructing data more costly, while discrete time fits the rating agencies' pattern of making periodic announcements. Consequently, survival analysis models often use transition probability matrices measured in discrete time.*

7 *This paper uses a number of different statistical tests to measure differences between transition probability matrices as well as methods for verifying those differences.*

8 *Carty (1997) showed that Moody's rating drift (upgrades minus downgrades/number of ratings) expanded in the negative direction during the 1980s, but then returned to zero in the 1990s.*

over the long run in which the fraction of low-rated issuers either increases or decreases, or that ratings standards have been volatile based on evidence of ratings exhibiting pro-cyclicality relative to changes in the market's credit risk assessment reflected in bond prices.

Along with the development of theoretical models has come progress in using the models to examine these disputes. We turn next to a survey of the most recent research trends. Christensen, Hansen and Lando (2004) focused on the previously noted insights of Lando and Skodeberg (2002) to consider a model in which a downgrade produces an "excited state," a state in which a ratings change becomes more likely than it would normally be.[9] They found it possible to interpret the presence of an excited state as consistent with a downgraded firm remaining on a negative watch and with consecutive downgrades becoming more likely to occur. Fledelius, Lando and Nielsen (2004) showed there was inertia in both directions (upgrade and downgrade) and that 20–30 months following the change the rating was still in an excited state.

Cantor and Mann (2003) noted that Moody's reports strove for balance between accuracy and stability in ratings and sought to avoid frequent ratings changes and rating reversals (a ratings change in the opposite direction from the last change). That is, although it may be possible to raise the short-term correlation between ratings and default by making frequent ratings changes in response to new but possibly transitory information, this would hurt stability.[10] Consequently, Moody's states that it only issues ratings changes when there has been a relative change in basic creditworthiness. This means that the agency's credit assessments are neither point in time nor completely through-the-cycle, and that only changes in credit deemed not to be temporary are reflected in the rating.[11] The inclusion of the term relative is to make it clear that Moody's purpose is not to assign a specific default rate for each rating category but rather to rank order credit risk (see Fons (2002) and Cantor and Mann (2003)).

Standard and Poor's (2005), the document that sets out the standards by which Standard and Poor's rates firms, indicates that the rating agency views its ratings not as current snapshots, but rather as forward looking based on the longest analytically foreseeable time horizon. It goes on to say that although through-the-cycle is ideal, it is difficult to predict the business cycle, and even when the business cycle is accurately predicted it has a permanent impact on a firm's credit quality, and thus rating changes are partially effected by the economy.

These ratings guidelines of Moody's and S&P could be characterized as being based on a "quasi through-the-cycle view." In this paper, when a non-temporary change in creditworthiness (a change in default risk from a long-term perspective) occurs and results in a ratings change despite being caused by cyclical factors, we call it a quasi through-the-cycle view. A pure through-the-cycle view, which is the polar opposite of a point-in-time view, omits all business cycle related factors, whether permanent or temporary, but given that most of the time that the term through-the-cycle is used it refers to the quasi case, the pure version can be considered as nothing more than a conceptual artifice to bring clarity to be the concept.[12]

We turn now to recent analyses of pro-cyclicality. The debate over pro-cyclicality has developed in concert with the debate over ratings standards and the excessive stability of ratings.

As a result of the rating guidelines noted above, ratings no longer completely reflect the possibility of a change in an issuer's credit standing in all cases. Consequently, the ratings agencies use a ratings outlook in parallel with a rating watch (Cantor and Mann (2003) and Hamilton

9 *This model ignores the possibility of a change in economic factors or rating standards. To eliminate the effects from the former, samples are only chosen from those periods that exhibit overall stability and no change in response to the business cycle.*

10 *The major measures of stability include frequency of change, frequency of large change, and frequency of rating reversal. The primary measures of accuracy include the CAP curve (horizontal axis: cumulative proportion of issuers rank ordered from low to high; vertical axis: proportion of defaulting issuers; the more convex in the upward left direction, the more accurate), an accuracy percentage that encapsulates this curve in a single number (the area between the CAP curve and a 45-degree line as a percentage of the entire area above the 45-degree line), the default rate for investment grade issuers, and ratings history of issuers that have defaulted. Although Moody's purpose in assigning individual ratings is not to indicate a certain default rate, Cantor and Mann (2003) note the possibility that the stability of defaults per category is potentially a primary measure of accuracy.*

11 *Standard and Poor's (2003) has also indicated in its corporate rating criteria that ratings should be understood not as current snapshots, but rather as forward looking based on a time horizon as long as can be projected.*

12 *The unconditional transition probability that uses all observable samples could also be thought of as a pure version that has eliminated all cyclical factors by taking long-term averages. Nevertheless, because the rating agencies do not guarantee that all issuers with the same rating have the same default risk in different time periods, it may be meaningless to take an average value across time periods. Furthermore, when a long-term trend in which all ratings shift in a downward direction is in place and is overlaid with a cycle corresponding to the business cycle, as occurred in the US in the 1980s, unconditional probabilities drawn from long-term averages will not have eliminated the factors caused by the business cycle.*

and Cantor (2004)).[13] Sovgyra and Theodore (2004) and Hamilton and Cantor (2004) showed that ratings outlook was a powerful predictor of future ratings change. These papers drew a comparison with the inertia effect, which refers to the level of information contained in the last ratings change, and showed clearly when comparing the conditional probabilities of past changes with recent outlook changes that the former did not contain any more information than the latter.

Nickell, Perraudin and Varotto (2000) estimated a transitional probability model using a conditional ordered probit model to show that the business cycle had a greater impact in determining transition probability than did differences in industry sector or country. To advance the analysis of pro-cyclicality, Bangia et al (2002) considered transitional probabilities with a first order Markovian assumption[14] and proposed a regime switching model for transitional probabilities between periods of economic expansion and periods of economic contraction; they found that this improved goodness of fit.

In contrast, Cantor and Mann (2003) showed that ratings were not as pro-cyclical as the market's assessment of credit risk (corporate bond spreads and the default risk implied by the share price) and argued that the rating guidelines noted above invited such a phenomenon. Altman and Rijken (2004) found that the parameters of a rating estimation model more closely resembled parameters for long-term default forecasting models than those for a short-term default forecasting, a finding that is consistent with the rating guidelines. They also showed that ratings stability could not be fully explained only by differences in valuation horizon, that the actual rating would change if the divergence from the model reached a given level, that the actual rating would change in graduations even if the model indicated radical change, and that all of this reinforced the tendency to adopt a through-the-cycle approach.[15]

By reasoning that it was possible to distinguish between permanent shocks and temporary shocks to default risk and thereby analyze ratings changes as a response to permanent shocks, Loffler (2004) applied a Kalman filter to the Merton default model and created a model that distinguishes between the two shocks.[16] The analysis notes that although the model does not predict default as well as a model using a point-in-time view because ratings ignore temporary shocks, ratings that focus on long-term changes in default risk (views concerned only with permanent shocks) offer an advantage in regulating banks.[17]

Likewise, Amato and Furfine (2004) considered it natural that ratings would have a degree of pro-cyclicality, since the business risks and financial risks considered by the ratings agencies when evaluating long-term default risk would be affected by any permanent shocks to the economy, as well as by the business cycle. They looked for a variable that measured long-term credit risk in order to measure the appropriate level of pro-cyclicality, and then showed that the economic variable had no marginal impact after adjusting for its effect on the rating. They also provided empirical evidence that the conclusion reached by Blume, Lim and MacKinlay (1998) – which was that even when making such adjustment there was a secular trend through the 1980s of ratings criteria becoming more strict – was based on misleading results because of insufficient instrumental variables, and showed that ratings criteria did not become more strict. The use of an empirical model to show fluctuations in ratings criteria, as done here, requires a healthy dose of skepticism regarding the validity of the model used. Likewise, employing an empirical model to distinguish between permanent shocks and temporary shocks entails substantial model risks.

13 *An outlook is the forecast direction of the issuer's credit, i.e., an opinion on the direction of the rating over the intermediate term (on average 18 months ahead), and is either positive, negative, stable, or developing (tied to the progress of an event and rarely used). A credit watch is a part of the outlook and a stronger opinion on future direction; it can be either in the upgrade direction, downgrade direction, or an unknown direction (not used very often). When a company is put under review, it is placed on the watch list.*

14 *When a probability is dependent only on the relevant transition probability of one period prior it is known as first-order Markovian. In a perfectly Markovian process, probability is completely unrelated to past information and is time homogenous.*

15 *They pointed out that the inability to explain the timing of future changes even in a well-fit ratings model stems from use of a point-in-time model that reflects recent conditions as is, which does not match with the standards used by the ratings agencies.*

16 *Within business cycle theory, ever since the emergence in the 1980s of real business cycle (RBC) theory, which posits economic fluctuations as a build-up of permanent shocks, periods estimation techniques have been developed to distinguish between economic fluctuations caused by permanent shocks and those by temporary shocks. Classic examples of these include structural VAR with long-term constraints and common-trend VAR models. Another example of applying transition probabilities to the Merton model can be seen in Gordy and Heitfield (2001).*

17 *This paper introduces the argument, from Estrella (2001) and Catarieneu-Rabell, Jackson and Tsomocos (2003), that regulatory authorities should avoid the pro-cyclicality of required equity capital, while making the point that through-the-cycle accomplishes that objective and is thus one valid approach. On a related subject, it is possible to note that a market-based internal ratings model risks increasing the negative accelerator effect because of its acute responsiveness, while an internal ratings model grounded in a through-the-cycle view risks misreading the increase in long-term credit risk (or risks giving the impression of intentionally covering it up).*

2.4. Summary of disputes and the approach used here

To summarize the disputes dealt with in the recent literature, we have classified the different rating approaches in the table below. The first dispute revolves around the constancy of the threshold value related to the ultimate measure used to categorize either the ratings or the default rates for each rating; specifically, determining whether the threshold is constant, or its constancy cannot be guaranteed. It is impossible to create a theoretical model without assuming constancy. On the other hand, the rating agencies do not necessarily guarantee constancy in their actual ratings. Accordingly, if there is a secular shift in the rating distribution or a secular change in the rating drift (defined as (upgrades minus downgrades)/number of ratings), a theoretical model that accurately grasps the qualitative nature of the credit risk is required in order to ascertain whether this was a result of a change in ratings criteria or a secular change in credit risk. Nevertheless, as explained previously, arguments are often based on a constancy assumption because of the difficulty in proving the appropriateness of a model. Our approach here is to express the ratings distribution in terms of a standard normal distribution and a threshold value for each rating, with that threshold assumed to be constant throughout. We are therefore following much of the recent literature in making a constancy assumption.

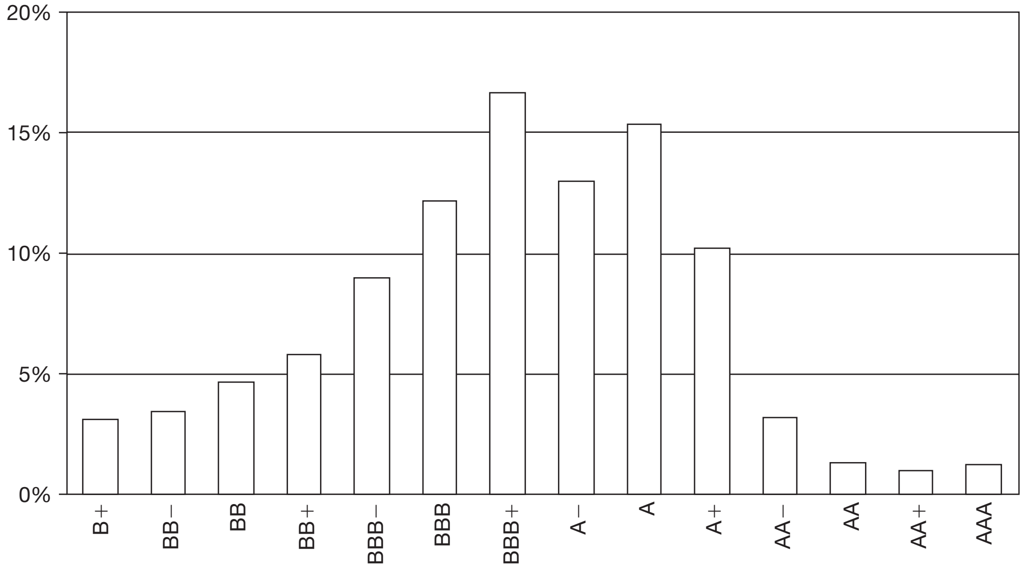
		Through-the-cycle		Point-in-time
		Pure: ignore all business cycle factors	Quasi: include business cycle factor if it has permanent effects	Include all factors
Default probability in each rating	Quantitatively stable		Recent econometric models	Early econometric model
	Not assure quantitative stability		Rating agencies	

Another dispute concerns the differences between the quasi through-the-cycle and point-in-time views. The initial theoretical models were based on the point-in-time view, but this did not fit the actual data. This probably makes it necessary to use the quasi through-the-cycle view, which reflects the criteria used by the ratings agencies. Nevertheless, in general the process of distinguishing between permanent shocks and temporary shock can be easily influenced by the choice of a model and of explanatory variables, and this may lead to erroneous conclusions. For that reason, we did not specify the variables for explaining rating at the theoretical modeling stage. Both model types, the qualitative choice model and the survival analysis model, use a single common index to measure, via either a logit (probit) function or a hazard function, which ratings the explanatory variables apply to. In contrast, we use here a single-factor model, representing shifts in the overall rating distribution with a common factor and representing the shape of the rating distribution with individual factors. The index is defined as a weighted sum of both types of factors, and changes in the transition probabilities matrix are represented by pro-cyclical changes in the common factor.

Our approach to estimation is to first extract those common factor movements that provided the best fit with the observed data, and then check for what sort of relationship existed between the pattern of change in estimated values and the economic variables. Our approach is therefore opposite to that of the normal model, in which selection of the explanatory variables is the starting point. By taking this approach we were able to avoid the problem of omitted variables normally associated with variable selection. We assumed that the individual factors determining the shape of the rating distribution and the threshold values were constant throughout the sample period. During the credit crunch that occurred in 1998, when a large number of new ratings were issued, mostly of firms with relatively high credit risk, there was substantial change in the shape of the rating distribution for the actual data. We handled this by using two separate sample periods.

Our model is specified in a way that precludes distinguishing between permanent shocks and temporary shocks. Since the objective of this paper is to check for the presence of, and nature of, pro-cyclicality in ratings, we have abstracted from the entire issue of distinguishing between the two. Nevertheless, we will provide a simple explanation of the implications this has for our results in the last chapter.

Figure 1 – Distribution of ratings: 1993–2004 average



Note: A simple average of the breakdown of rating categories from the beginning through the end of the sample period. The authors totaled the frequency of occurrence of each rating category throughout the sample period. When employing a method of calculation to determine the structure of the rating distribution, we took a simple average, because of the effect of the difference in the size of the sample set each year. However, no matter which method of calculation was employed, there was almost no change in the shape of the distribution.

3. Dynamic, single-factor model

In this chapter, we explain the model we have proposed for understanding the pro-cyclicality of transition probabilities. We made two important assumptions in building our model, both of which are natural assumptions when extending a single-factor model to encompass transition probabilities.

3.1. Single-factor model

The single-factor model is one of the typcial models used to measure credit risk. The model considers that firm i is in default when its value A_{it} drops below a constant threshold value. For example, when defining default as an excess of liabilities over assets, the threshold value for net assets A_{it} would be zero. The firm's value A_{it} at time t is given by a probability distribution, and the probability of the firm defaulting at time t is determined by the relationship between the distribution and the threshold value.

The single-factor model expresses the firm's value A_{it} as a weighted sum of the common factor X_t for all firms and the firm-specific factor X_{it}:

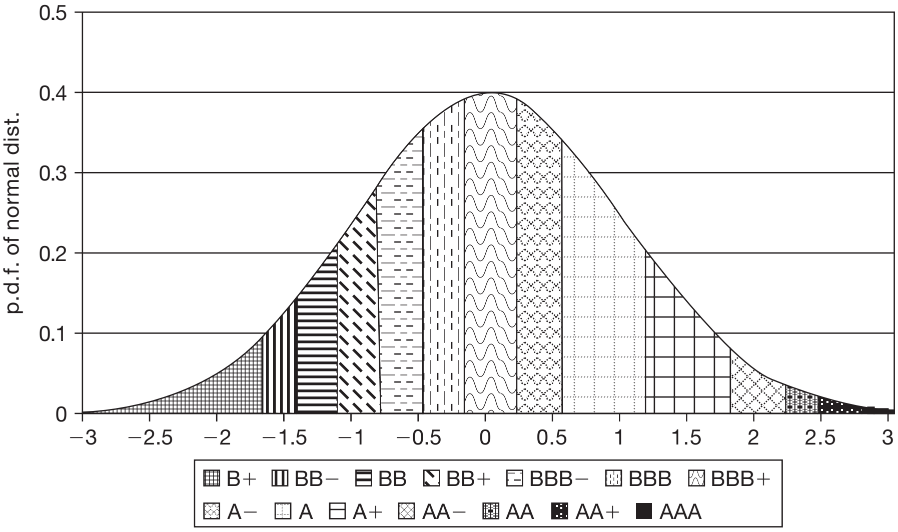
$$A_{it} = pX_t + \sqrt{1-p^2}X_{it} \quad .$$

The parameter used to express the weight of the common factor is p. The common factor X_t and the individual factor X_{it} are mutually independent, standard normally distributed (N(01) probability variables.[18]

In this paper, we take the firm's value A_{it} as the index representing credit risk quality. Furthermore, since substituting the expected value of i into the formula above yields $E_i[A_{it}] = 0$, we can see that the common factor X_t determines the average value of A_{it}. The rating distribution can be expressed by setting multiple thresholds for the distribution of A_{it}, Figure 1 shows the relative frequency distribution for R&I's 14 rating categories. The distributions for fiscal years 1993–2004 (with the latest data at end-December 2004) are calculated by pooling the samples for 12 years. In Figure 2, the 13 threshold values are mapped to the standard normal

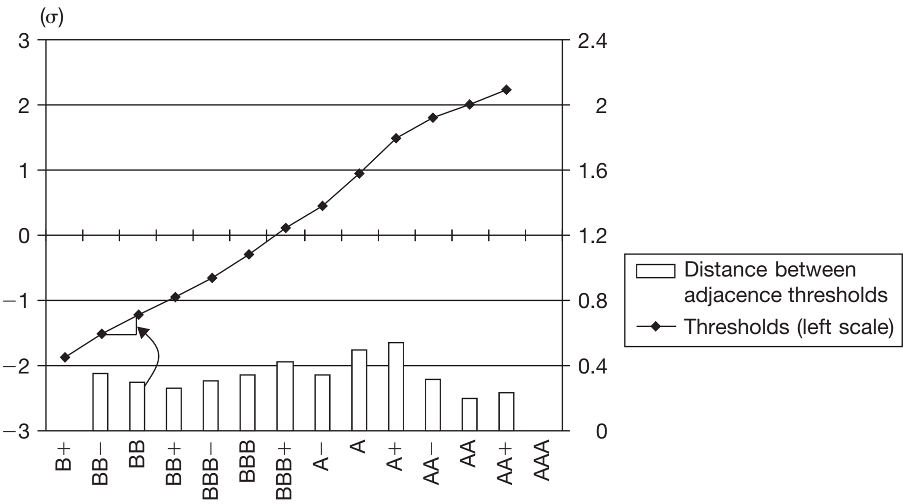
18 *Because we analyzed a single probability variable, the distribution of R&I's ratings, we used an average value for the individual factor* X_{it} *of 0. For example, when analyzing the distribution of credit risk quality in the loan and bond portfolios of multiple banks, the average value of the individual factors differs among banks, so that the individual factor* X_{it} *is given by the normal distribution N(*u_i*, 1), with* u_i *also subject to estimation.*

Figure 2 – Rating distribution by standard normal distribution and thresholds



Note: The AA, A, BBB, and BB ratings are each divided into three internal categories, which are indicated in the graph.

Figure 3 – Thresholds for standard normal distribution

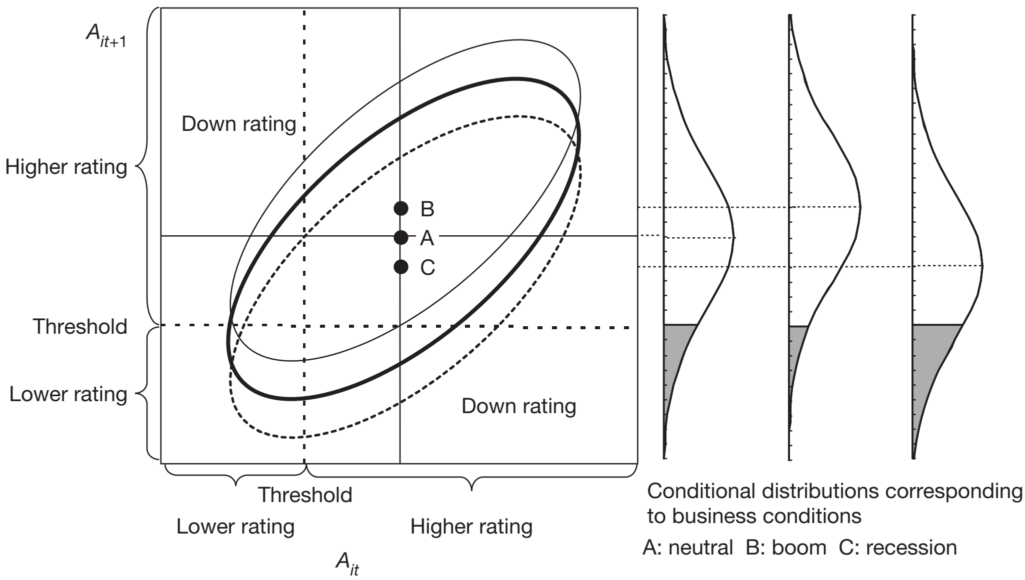


Note: This indicates the distance between threshold values. For example, in the case of a BB− rating, the distance between the threshold between B+ and BB−, and the threshold between BB− and BB is shown. For a line graph of the value of BB−, the threshold between BB− and BB is indicated. For B+ and AAA ratings, because there are no upper or lower threshold limits, the distance between threshold values is not indicated.

distribution, with the integral steps between threshold values set so as to agree with the relative frequency. The intervals are not always the same size, as can be seen from the distances between adjacent threshold values (Figure 3). If the intervals were uniform in size, the shape of the relative frequency distribution would be close to normal, but it is evident from Figure 1 that the distribution's tail is thicker on the lower-rated side, and, from Figure 3, that A ratings account for a large share and AA ratings a small share.

The unconditional distribution in Figure 1 is posited as economy-neutral, and the threshold value held constant for the entire fiscal year. When the normal distribution in Figure 2 is shifted to the left or right in response to changes in aggregate credit risk, the entire sample on average has a tendency toward upgrade or downgrade. It is conceivable that ratings changes exhibit procyclicality, since the business cycle is normally linked to changes in aggregate credit risk. Nevertheless, our model does not directly link the two, but examines the relationship with the macroeconomic variables by using an index that measures changes in aggregate credit risk. In the framework of a single-factor model, the common factor X_t equates to this index, and the midpoint of the normal distribution in Figure 2 shifts in response to changes in X_t.

Figure 4 – Two-dimensional normal distribution and conditional distribution



The rating for each firm, on the other hand, primarily depends on the firm-specific factor X_{it}. Based on the strong tendency of a given firm's rating m to be the same the following period, it is likely that X_{it} is strongly dependent on its actual value from the preceding period, so we assumed that X_{it} follows a first-order Markovian process and that ratings migration was sticky. In effect, we used a conditional probability dependent on the rating in the preceding period for the transition probability, and then devised a way to estimate this using a two-period extension of the single-factor model.

3.2. Two-period dynamic model

The probability that a loan to a borrower classified as m in the current period will migrate to n in the following period is given by the following conditional probability:

$$\Pr[G_n < A_{it+1} \leq G_{n+1} \mid G_m < A_{it} \leq G_{m+1}].$$

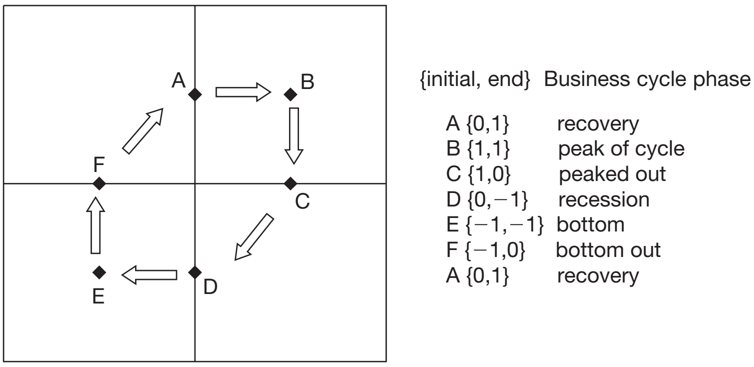
This describes the probability that A_{it+1}, conditional on its being within the threshold interval corresponding to the m classification in the current period (which is greater than G_m and equal to or less than G_{m+1}), will fall into the threshold interval corresponding to the n classification in the following period (which is greater than G_n and less than or equal to G_{n+1}). Commonly used transition probability is based on the conditional distribution. This representation, however, drops information related to the distribution at the beginning of period. The transition model in this paper uses joint probability:

$$\Pr[G_m < A_{it+1} \leq G_{m+1} \quad \text{and} \quad G_n < A_{it} \leq G_{n+1}].$$

Based on the assumption that the unconditional distribution of A_{it} is normal, the joint distribution becomes bivariate normally distributed. Assuming a bivariate normal distribution for two consecutive periods, we get the transition probability by using changes in this average value as the change in the common factor X_t. We expect this bivariate normal distribution to show strong positive correlation with the transition probability, because the greatest probability is of the rating remaining in the same category and because the most common change for both upgrades and downgrades is a single notch, with double- and triple-notch changes rare.

Figure 4 shows three different cases of the marginal distribution of the bivariate joint distribution (the conditional probability distribution for the following period). To simplify, we use two rating categories. We also set the actual value of X_t in the previous period to 0. The three different cases of the bivariate joint distribution are that X_{t+1}, relative to the preceding period, is unchanged (distribution midpoint is (1)), increases (2), and decreases (3). At (2), the proportion of low ratings is small and upgrades outnumber downgrades. This can be confirmed by noting that the territory covered by the bivariate joint distribution in the "low rating this period, high

Figure 5 – Business cycle and common factor's cycle



rating next period" region is larger than that in the "high rating this period, low rating next period" region. The reverse of this occurs in (3), while in (1) the two cancel each other out, resulting in no change in the ratings composition in the following period.

In estimating the combination of common factors (E[X_t], E[X_{t+1}]) that provides the best fit with the observed transition probability matrix for each period, there is clearly a shift in the midpoint of the bivariate normal distribution, producing a pattern in which the transition probability changes over time. Figure 5 presents a conceptual overview of this pattern's relationship with the business cycle. The midpoint of the bivariate normal distribution at the point when the economy begins a recovery from neutral would likely be at point A. Point B, when the common factors flatten at a high level, represents the peak of the business cycle, while point C corresponds to the post-peak period. Point D is when the economy moves from neutral to contraction, point E is at the bottom of the cycle, point F is coming off the bottom, and then the full cycle is complete as the economy recovers on its way back to point A. This is a conceptual summary based on the assumption that movements in the economy and credit costs are highly synchronous. In the next chapter, we check to see whether the cycle we have described can be confirmed with actual observations.

Since the area above and to the left of the 45-degree line signifies average values of the common factor X_t that are higher in the following period than in the current period, this area indicates an excess of upgrades (positive ratings drift), while the area below and to the right indicates an excess of downgrades (negative ratings drift). Furthermore, even under the same level of upgrade excess (same distance from the 45-degree line), the rating categories in which the upgrades occur differ between an average positioned upward and rightward versus downward and leftward. In the former, the bulk of the upgrades are upgrades of highly rated issues, while in the latter, the bulk of the upgrades are of lower rated issues being upgraded to a relatively higher rating.

3.3. Estimation method

Step 1: Set threshold value G_k

Using the area of the standard normal distribution partitioned by the vector of threshold values $\{G_k\}$ makes its possible to find those values of $\{G_k\}$ that are a perfect match with the average ratings composition during the estimation period.

Step 2: Estimating ρ

The correlation coefficient of the bivariate normal distribution is given by ρ, which is constant during the period. Expressing the *m*th row and the *n*th column of the unconditional transition probability matrix using all samples within the estimation period as Z_{mni}, the cells of the matrix are given by[19]:

$$Z_{mni} = \Pr[G_m < A_{i(t)} < G_{m+1} \quad \text{and} \quad G_n < A_{i(t+1)} < G_{n+1}].$$

The placement of the time index t for $A_{i(t)}$ and $A_{i(t+1)}$ inside parentheses implies that the unconditional probability is constructed based on the average for the period.

19 *The placement of the time index* t *for* $A_{i(t)}$ *and* $A_{i(t+1)}$ *inside parentheses does not distinguish between (*t, t+*1) = (1st period, 2nd period) and (*t, t+*1) = (2nd period, 3rd period). In other words, it expresses the time homogeneity of the distribution of* A_{it}.

Since the bivariate standard normal probability distribution of A_i follows:

$$2ND\left[\begin{pmatrix}0\\0\end{pmatrix},\begin{pmatrix}1 & \rho\\ \rho & 1\end{pmatrix}\right].$$

The estimated value of ρ is the value that minimizes the sum of the squared errors for the estimated value $\hat{Z}_{mn}$ and the observed value Z_{mn}.

Step 3: Estimating E[X$_t$] and ρ

Letting Z_{mnt} represent the probability of the mth row and nth column in the transition probability matrix in period t, from $A_{it} = pX_t + \sqrt{1-p^2}X_{it}$, we get

$$\begin{aligned} Z_{mnit} &= \Pr[G_m < A_{it} < G_{m+1} \quad \text{and} \quad G_n < A_{it+1} < G_{n+1}] \\ &= \Pr\left[\frac{G_m - p\mathrm{E}[X_t]}{\sqrt{1-p^2}} < X_{it} < \frac{G_{m+1} - p\mathrm{E}[X_t]}{\sqrt{1-p^2}} \quad \text{and} \right. \\ &\qquad \left. \frac{G_n - p\mathrm{E}[X_{t+1}]}{\sqrt{1-p^2}} < X_{it+1} < \frac{G_{n+1} - p\mathrm{E}[X_{t+1}]}{\sqrt{1-p^2}}\right]. \end{aligned}$$

Since the joint distribution of the individual factors X_{it} and X_{it+1} follow a bivariate standard normal distribution, we estimate p and the time series value of E[X_t] by minimizing the sum of the squared error terms, the same method used in Step 2.

In the inequality above, the common factor X_t, in its expected value form E[X_t], serves the role of shifting the threshold values related to X_{it}. Z_{mnit} is expressed as a conditional probability given the common factors for the current period. The correlation p is not between the common factors X_t and X_{t+1}, but rather between the individual factors X_{it} and X_{it+1}. Stated another way, the common factors are probability variables independent of time, while the individual factors that determine the rating distribution are first-order Markovian probability variables expressed in a bivariate joint normal distribution. We consider this a natural assumption, since it is conceivable that changes in the rating distribution are sticky. Meanwhile, if the common factors reflect the business cycle to a strong degree, they could exhibit autocorrelation even when looking at annual data. Although the model does not reflect this, it is possible to observe the degree of autocorrelation from the value of E[X_t] that was estimated as time independent.

3.4. Extension to synthetic 2D normal distributions

The model above assumes a bivariate normal distribution, which means the conditional probability distribution in the following period given the rating categories in the current period will be vertically symmetrical. Nevertheless, in-house research by bank researchers analyzing the transition probabilities of obligor categories has found a strong degree of asymmetry between upgrades of at least two notches and downgrades of at least two notches. This analysis, made during a period when the banks were making progress in disposing of nonperforming loans, found almost no upgrades of two notches or more, but a relatively large number of downgrades two-notches or more. This led to a model extension that could handle this asymmetry in which the conditional probability distribution was skewed toward higher ratings (the tail on the lower-rated side was longer). In order to create a conditional probability distribution in which the downgrade direction had either a long tail or a second peak, the paper developed a synthetic 2D normal distribution (a probability density function created as a weighted sum of two bivariate normal distributions) and applied it to the joint distribution of ratings between two points in time. This research found that as the pace of nonperforming loan dispositions accelerated, the asymmetry of the transition probability matrix was caused by the combination of transition probabilities fluctuating with the business cycle and transition probabilities reflecting the downgrades in response to final dispositions, independent of the business cycle.

There is also a possibility that this asymmetry is related to how the banks assess credit risk and the characteristics of the business cycle. Normally, the economy contracts at a faster pace than it expands. If the criteria for assessing borrowers set by the bank or the Financial Inspections Manual (published by the Financial Supervisory Agency) looks at credit risk from a point-in-time view, it is conceivable that the asymmetry of the conditional probability distribution is a reflection of the characteristics of economic fluctuations noted above.

The transition probabilities for credit ratings being analyzed here, however, are based on ratings using the quasi through-the-cycle view, as noted in our survey of recent literature, and hence we have not observed a great deal of asymmetry. Accordingly, we have not applied a synthetic 2D normal distribution to our model. In the next chapter, where we show our estimation results, we examine the degree of skewness and kurtosis that varies depending on the errors in fit that develop between the actual transition probabilities and the values estimated from the model based on a bivariate normal distribution.

4. Results

4.1. Data

Our analysis uses R&I's ratings of long-term senior obligations. R&I (2005) defines its long-term senior obligation ratings as "R&I's assessment of an issuer's overall ability to repay debt, prior to taking account of the level of recovery on all financial obligations of the issuer." In its publication *"Choukisai Kakutsuke no Shiten – Juushi suru Pointo"* (Perspective and Critical Points Concerning Long-term Obligation Ratings), R&I describes its task as measuring default risk, which comprises business risk and financial risk, and projecting the sufficiency and stability of future cash flows relative to liabilities.[20] Regardless of the period of time until redemption of a bond, in principle the rating is based on an assessment that extends three to five years into the future. Additionally, it is noted in R&I (2005) that "ratings place an emphasis on the intermediate perspective covering the next three to five years. It is undesirable for ratings to be substantially affected by the short-term business cycle, and it is important to concentrate on structural changes in the ability to meet financial obligations and to accurately reflect such changes in the rating." It follows from this that R&I assigns its ratings of long-term senior obligations from a quasi through-the-cycle view, as is the case with Moody's and S&P.

We recorded the long-term senior obligation ratings awarded by R&I for individual firms over the period from fiscal 1993 until fiscal 2004 (until the end of calendar 2004), and by measuring the transitions between two consecutive points in time we estimated the one-year migration rate for each year. Figure 6(1) shows the unconditional transition probability using full-year sampling. The rating transition probability normally indicates the percentage of all issuers rated i in the current period that are rated j in the following period. Accordingly, the columns in Figure 6(1) sum to 100%. Displaying the information in this way winds up dropping information related to the distribution (composition) of ratings at the beginning and end of the period. Because our model estimates the joint distribution for two points in time, the transition probabilities can be expressed so that all of the cells in the entire matrix add up to 100%, as in Figure 6(2). The sum of each column represents the share of that rating at the beginning of the period, and the sum of each row the share of that rating at the end of the period.

To confirm that the transition probability is not time homogenous, we used the transition probabilities in Figure 6(2) and observed the negative drift (total probability of an upgrade minus the total probability of a downgrade)[21] over time (Figure 7). Furthermore, to see the difference between an upgrade and a downgrade, we divided the data into two groups based on the rating at the beginning of the period, those rated AAA to A and those rated BBB to B, and looked at the rating drift for each group. Both groups showed a pattern of cyclical change, moving in parallel with the business cycle variables – the real GDP growth rate and the *Tankan* DI (Figure 8). It is also evident that there was a one-period lag in the rating drift in fiscal 2001–02, and that rating drift lagged slightly behind the economy's decline in fiscal 1997. Rating drift showed more volatility for the higher ratings, and the substantial excess of downgrades in fiscal 1998 was particularly concentrated on the higher-rated issues. Furthermore, there were virtually no upgrades among the higher rated issues during the period of persistent downgrade excess in fiscal 1998–2003. In fiscal 2004, there was an increase in upgrades for both the higher and lower rated issuers, the number of downgrades declined for the third consecutive year, and overall the number of upgrades exceeded the number of downgrades for the first time since seven year ago, in fiscal 1997 (Exhibit 8).

When a new rating is initiated or a rating withdrawn, it is impossible to observe that rating for two consecutive periods. Furthermore, nearly all rating withdrawals coincide with bond

20 *The analysis covers collection risk in addition to default risk, and "when there is cause for concern over collection risk, the rating shall be lowered by a single notch in accordance with the degree of risk."*

21 *Rating drift is defined as (the number of upgrades minus the number of downgrades) divided by total number of ratings. In a transition probability matrix where all the cells add up to 100%, as in Figure 6(2), the total upgrade probability minus the total downgrade probability is effectively the same definition.*

Figure 6 – One year rating transition matrices: FY1994–2004 average

(1) Standard representation: transition from initial rating

Initial rating (%)

B+	BB−	BB	BB+	BBB−	BBB	BBB+	A−	A	A+	AA−	AA	AA+	AAA	Terminal rating
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0	88.5	AAA
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	4.3	82.7	11.5	AA+
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.7	83.1	13.3	0.0	AA
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.7	83.4	8.1	2.9	0.0	AA−
0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.3	4.2	85.0	9.8	2.0	0.6	0.0	A+
0.0	0.0	0.0	0.0	0.0	0.1	0.1	5.0	83.9	7.6	2.5	0.8	0.0	0.0	A
0.0	0.0	0.0	0.0	0.0	0.5	5.0	84.9	8.1	2.2	0.3	1.3	0.4	0.0	A−
0.0	0.0	1.7	0.6	0.6	5.3	84.2	6.3	2.3	1.1	0.3	0.0	0.0	0.0	BBB+
0.0	0.0	0.0	0.7	6.1	82.6	6.4	2.7	0.8	0.2	0.0	0.0	0.0	0.0	BBB
0.0	0.0	3.0	5.8	83.5	8.4	3.1	0.7	0.3	0.0	0.0	0.0	0.0	0.0	BBB−
0.0	0.0	11.2	73.2	6.3	2.5	0.3	0.0	0.2	0.0	0.0	0.0	0.0	0.0	BB+
0.0	7.8	61.7	11.8	1.7	0.4	0.3	0.0	0.2	0.2	0.0	0.0	0.0	0.0	BB
13.1	54.6	7.3	5.7	1.3	0.1	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	BB−
86.9	37.6	15.1	2.2	0.2	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	B+
100	100	100	100	100	100	100	100	100	100	100	100	100	100	sum of column

(2) Representation of conditional distribution of terminal rating given initial rating

Initial rating (%)

B+	BB−	BB	BB+	BBB−	BBB	BBB+	A−	A	A+	AA−	AA	AA+	AAA	sum of row	Terminal rating
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.9	2.9	AAA
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	2.8	0.4	3.4	AA+
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	3.9	0.5	0.0	4.6	AA
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	4.9	0.4	0.1	0.0	5.7	AA−
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.5	7.6	0.6	0.1	0.0	0.0	8.9	A+
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.9	10.3	0.7	0.1	0.0	0.0	0.0	12.1	A
0.0	0.0	0.0	0.0	0.0	0.1	0.6	14.3	1.0	0.2	0.0	0.1	0.0	0.0	16.3	A−
0.0	0.0	0.0	0.0	0.1	0.8	10.7	1.1	0.3	0.1	0.0	0.0	0.0	0.0	13.1	BBB+
0.0	0.0	0.0	0.0	0.6	13.0	0.8	0.4	0.1	0.0	0.0	0.0	0.0	0.0	15.0	BBB
0.0	0.0	0.0	0.2	8.4	1.3	0.4	0.1	0.0	0.0	0.0	0.0	0.0	0.0	10.5	BBB−
0.0	0.0	0.1	2.2	0.6	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.4	BB+
0.0	0.1	0.7	0.4	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.4	BB
0.1	0.5	0.1	0.2	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	BB−
0.9	0.3	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.5	B+
1.0	0.9	1.2	3.0	10.0	15.7	12.8	16.9	12.3	9.0	5.9	4.7	3.4	3.3	100	sum of column

Note: Total number of samples is 5,650 for 878 issuers including short-life ratings from 1993 March to 2004 December. One year migration is measured at the end of fiscal year, i.e. the transition from 1993 March end to 1994 March end is for FY1994 migration matrix. Issuers which migrated in non-rated category and were newly rated in a year are excluded in transition probability matrix in the relevant year. Average figure of matrices is a simple average of eleven one-year transition matrices.

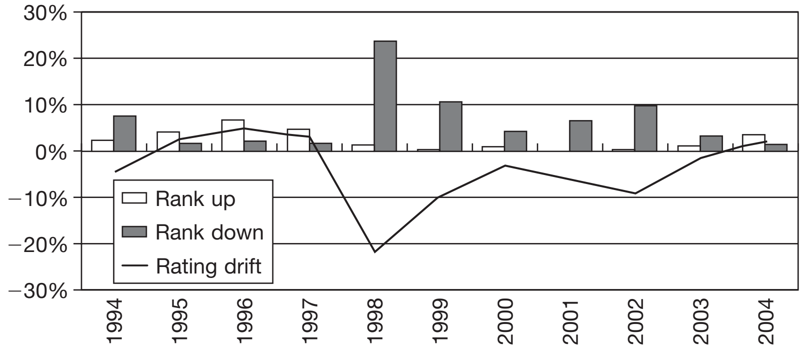
redemption and are unrelated to changes in credit risk.[22] Consequently, these instances were excluded from the calculation of transition probabilities. The same logic has been followed in the recent literature overseas, with Carty (1997) pointing out that because a rating is withdrawn due to events such as redemption and almost completely unrelated to changes in an issuer's credit status, the impact of that withdrawal must be omitted when analyzing transition probabilities.[23]

22 *A withdrawal of rating due to default almost never occurs in Japan. To deal with the problem of being unable to calculate the rate of default occurrence because of the diminished default sample size, R&I takes defaults broadly defined to include debt forgiveness and debt-equity swaps. The ratings agencies began disclosing data on this broader definition in 2000.*

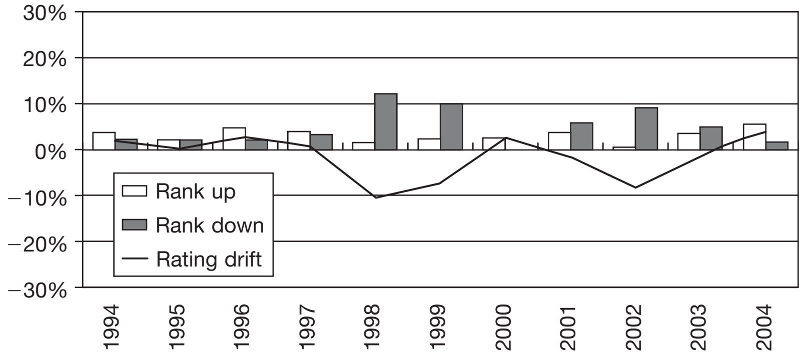
23 *When using a continuous time model with a survival analysis approach, it is possible to treat cases of rating downgrades as censored variables. Land and Skodeberg (2002) showed that, because this minimizes data loss, the accuracy of the analysis can be improved.*

Figure 7 – Rating drift

(1) Rating drift in the AAA–A categories at the beginning of period

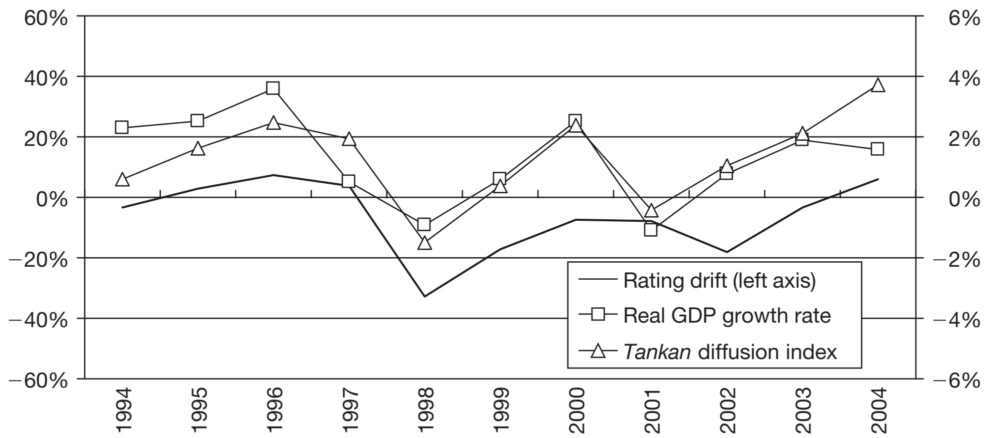


(2) Rating drift in the BBB–B categories at the beginning of period



Note: In Table 6(2), for those subjects with AAA–A ratings at the beginning of the sample period (BBB–B are below), the number of subjects whose ratings increased at the end of the sample period is summed, as is the number of subjects whose ratings decreased. The rating list is "the total probability of a ratings increase minus the total probability of a ratings decrease". When the sum of the absolute values of each calculated value is subtracted from 100, the remaining sum indicates the portion of subjects whose ratings have not changed (the cells of the diagonal line).

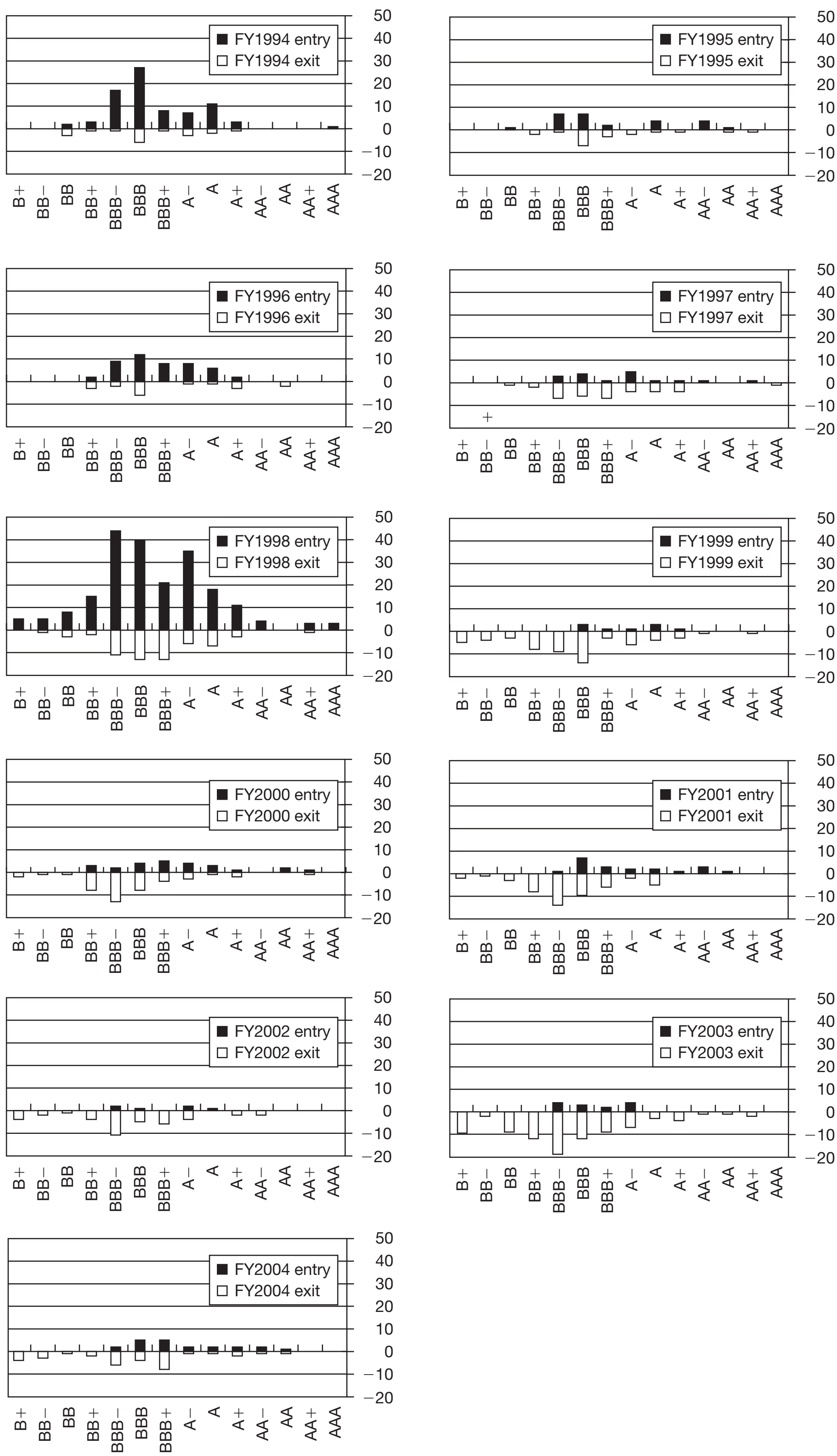
Figure 8 – Discontinuity of distribution by entry-exit effects



Note: The Tankan *fiscal year diffusion index average and the real GDP annual growth rate average and variance are standardized to become identical. For the FY2004 growth rate, the growth rate for Jan–Mar 2005 is considered to be zero (the Oct–Dec quarter reflects a secondary QE).*

To look at the impact on the ratings distribution from rating initiations and withdrawals (entry-exit), Figure 9 shows entry-exit by rating for each fiscal year. The figure shows an especially large number of entries in fiscal 1998, particularly for the relatively low debt ratings of BB– and BB. Because of substantial turnover in the sample of firms used to generate the transition probability and because of the changes in the shape of the ratings distribution that occurred around this time,

Figure 9 – Entry and exit: launch and termination of rating



Note: Almost all terminations of rating resulted from debt redemptions except a few defaults.

Figure 10 – Discontinuity of distribution by entry-exit effects (Difference between the end of FY1998 and the beginning of FY1999)

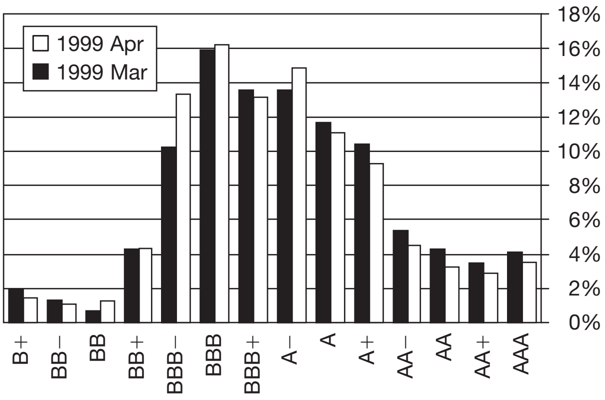


Figure 11 – Estimated coefficients

	Full sample	Sub sample	
	FY1999–2004	FY1994–98	FY1999–2004
p	0.2183	0.2279	0.2412
ρ	0.9974	0.9967	0.9977
Threshold			
AAA–AA	2.25	2.85	2.05
AA–A	1.51	1.84	1.32
A–BBB	0.12	0.22	0.04
BBB–BB	−0.95	−0.84	−1.06
BB–B	−1.86	−1.68	−2.08

Note: The thresholds for the ratings classification breakdowns are omitted.

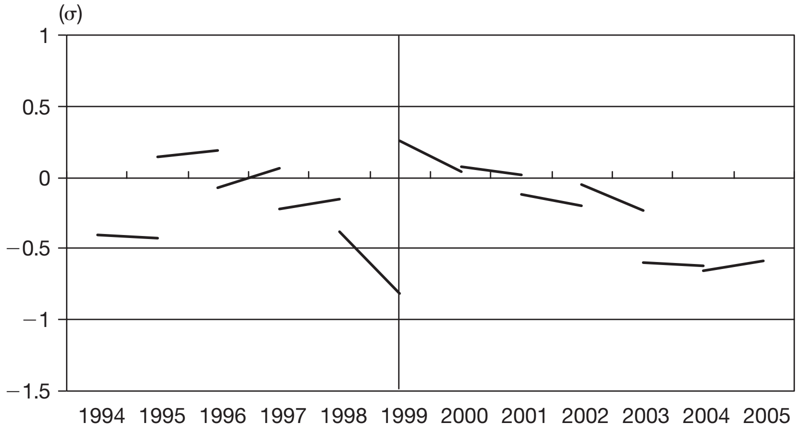
we estimated the model using two separate sub-samples, fiscal 1994–98 and fiscal 1999–2004. It can be seen in Figure 10, which shows the ratings distribution for each sub-sample period, that the distribution was skewed to the left in the earlier period, but in the later period the distribution became less asymmetrical as it moved somewhat toward a normal distribution. The figure also shows that the unnatural concavity of the A− category in the earlier period disappeared in the later period. Japanese banks restricted their lending in fiscal 1998, and this probably caused a rush to obtain ratings by those large companies capable of issuing corporate bonds. It follows that the companies with greater credit risk were more affected by this credit crunch. In the later period, there were more exits than entries, and rating withdrawals were more noticeable for the lower-rated companies than for the higher-rated companies. This can be interpreted as evidence that moves by firms to reduce debt also occurred in the bond market, and that this was particularly true of the lower-rated firms that suffered from excessive debt.

4.2. Estimation results

Figure 11 shows our estimation results from the full sample as well as the sub-samples. The threshold value differs considerably between the earlier and later period, which is consistent with the change in ratings distribution that occurred at the end of the 1990s (Figure 10). The bivariate joint distribution showed a very strong positive correlation, with a coefficient of determination close to 1, and it can be seen that many of the samples in the one-year transition probability matrix remained unchanged and above the diagonal line. Our estimated value for p, which shows the impact of common factors on ratings changes, was around 0.23 for both the earlier and later periods.

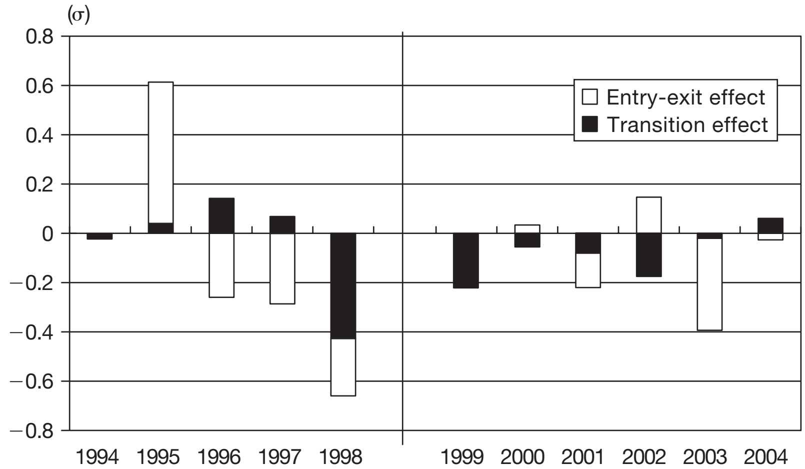
The expected value of the common factor $\{E[X_t], E[X_{t+1}]\}$ for each period t is estimated as a set. Accordingly, $E[X_t]$ for period t and $E[X_{t+1}]$ for period $t+1$ are not normally the same. This

Figure 12 – Development of E[X_t]: sub sample estimates



Note: The estimated value for FY1994, Time t in {E[X_t], E[X_{t+1}]}, is indicated by the straight line between 1994 and 1995 (marked on the horizontal axis). This same line and the line indicating the estimated value when Time t represents FY1995 (the line between 1995–96) do not connect. This is because, as a result of the Entry and Exit effect in the sample group, the estimated rate of ratings migrations for the sample during FY1994 and during FY1995 are not continuous. This lack of continuity suggests large differences in the ratings distribution for the end of FY1994 versus the beginning of FY1995.

Figure 13 – Decomposition of E[X_t] into migration effect and entry-exit effect

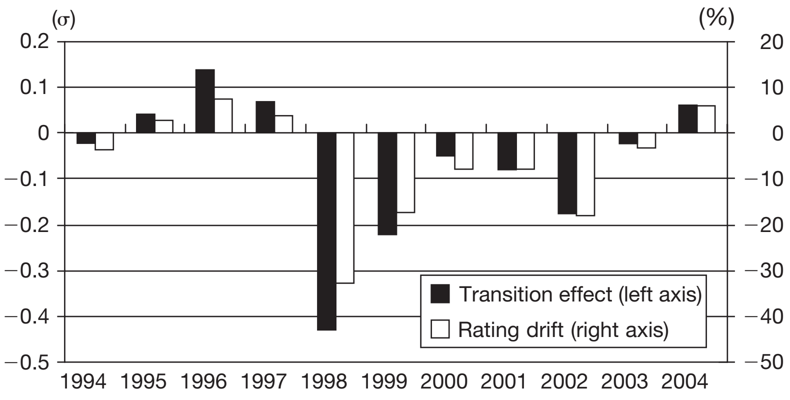


Note: The difference for both parties estimated at {E[X_t], E[X_{t+1}]}: E[X_{t+1}] − E[X_t] shows "Change due to ratings migrations". For example, the difference between E[X_{t+1}] at t=1994 and E[X_t] at t=1995, is indicated in FY1995 as the Entry-Exit effect. For the initial time periods in the sub-samples, FY1994 and FY1999, only change due to ratings migrations is shown.

is because of the differences in ratings distribution between the end of period t and the beginning of period $t+1$ that result from the entry-exit effect caused by the turnover of sample firms. The greater the turnover, the greater the discontinuity between period end and period beginning. A graphical depiction of the changes in the common factor's expected value estimated for each sub-sample indicates that the impact from sample firm turnover was greater than the impact from the rating change that occurred during the fiscal year (status of the transition probability matrix for that fiscal year), which is shown by the slope of each line segment (Figure 12). Particularly in the earlier period, when it can be inferred that the number of entries each year was large and the distribution's shape changed to a relatively large degree, there was a large discontinuity between period end and period beginning (see also Figure 9).

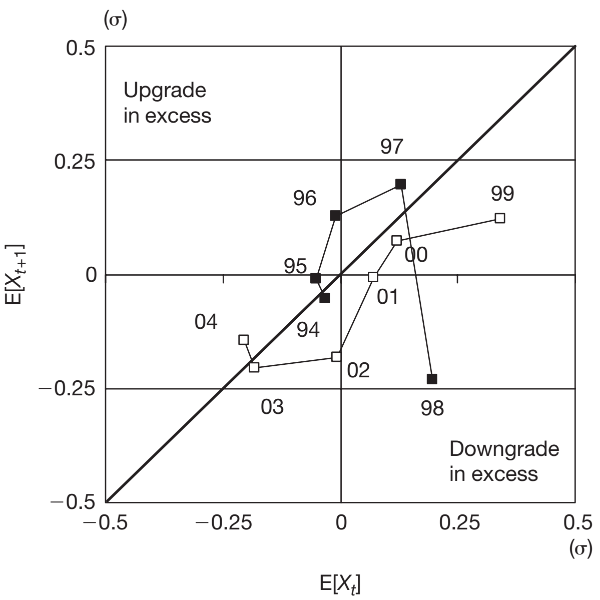
Because, as noted above, this turnover is not directly related to changes in a firm's credit, we separated the effects into changes in transition and effects from entry-exit (Figure 13). We separated the change from the beginning of period t until the beginning of period $t+1$ into two effects, the change due to transition (change from beginning of period t until the end of period t) and the entry-exit effect (the gap between the end of period t and the beginning of period $t+1$).

Figure 14 – Transition effect and rating drift



Note: Rating drift is defined by sum of up grading rates minus sum of down grading rates in figure 6(2).

Figure 15 – Development of E[X_t] in two dimensional plane



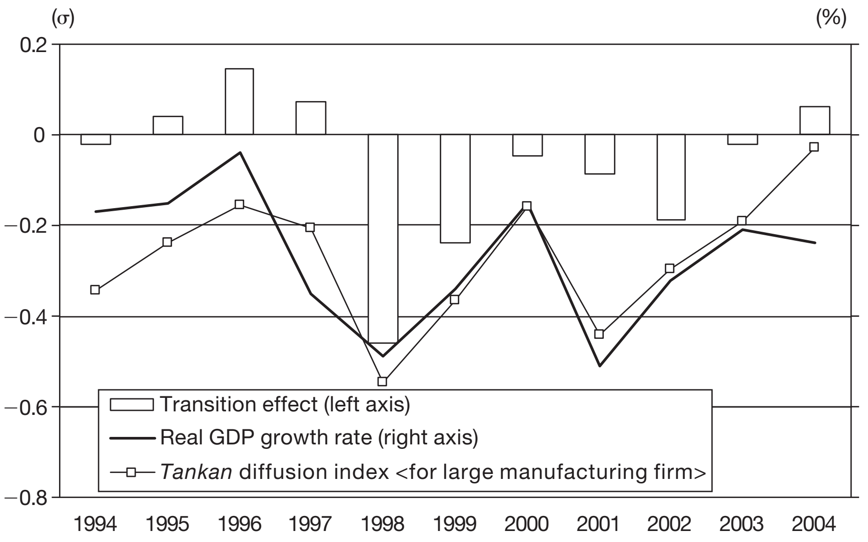
Note: In order to remove the Entry-Exit effect, we produced a time series that makes E[X_t+1](t=1994) the same as E[X_t](t=1995) so that they connect. We then plotted this series over two time periods, and adjust the time series data so that the average value during a time period is zero.

A comparison of the change due to transition with the ratings drift shows that the two nearly moved in parallel (Figure 14). It is impossible to construct a transition probability matrix from only the ratings drift, and some sort of model estimate estimation, such as that used in this paper, is required, but we believe the strong similarity in movement between the two validates our estimation results.[24]

Next, we confirm whether the cycle diagram shown conceptually in Figure 5 can be obtained using the change from transition of the estimated expected value of the common factor. We constructed time series data on the cumulative change from transition to connect the end of period t with the beginning of period $t+1$, which we call here the "transition index." We grouped the two periods adjacent to this transition index and then plotted them in planar space, as shown in Figure 15. The model is specified so that the expected value of the common factors including

24 *In order to obtain a transition probability matrix using the ratings drift taken from the transition probability as a proxy variable for the expected value of the common factor E[X_t], a threshold value and parameters ρ and p are needed. An estimation is required in this case since these parameters are different for each set of transition probability data. In the third step of the estimation algorithm shown in Chapter III, ratings drift is given as a proxy variable for E[X_t], and since it is possible to economize substantially on parameters by using only ρ as an estimation parameter, this could be an effective way to simplify.*

Figure 16 – Correlation between transition effect and business cycle



Note: The Tankan *fiscal year diffusion index average and the real GDP annual growth rate average and variance are standardized to become identical. For the FY2004 growth rate, the growth rate for Jan–Mar 2005 is considered to be zero (the Oct–Dec quarter reflects a secondary QE).*

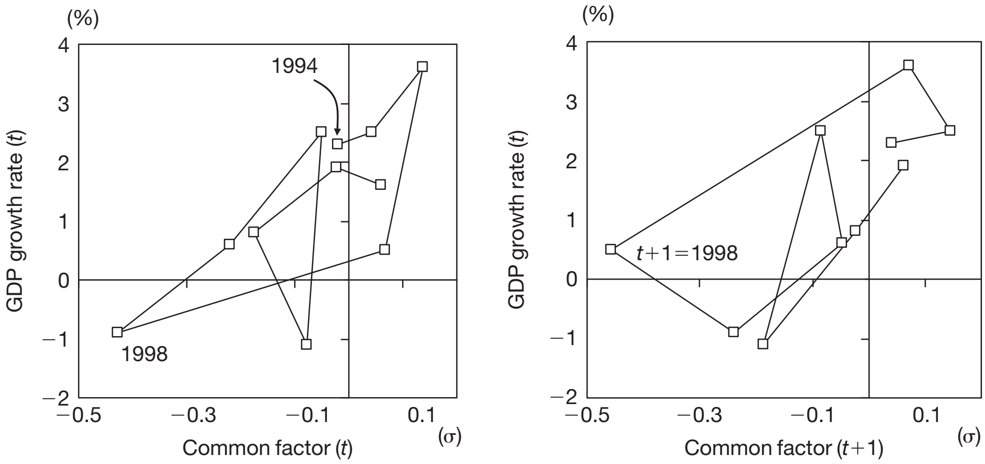
the entry-exit effect is zero on average, while the average value of the transition index is not necessarily zero. For this reason, the average value for the continuously consecutive periods is normalized to zero.

To begin with, in fiscal 1994, the transition index was situated roughly on the 45-degree line because of the small amount of change from transition during the year. In fiscal 1995 it moved slightly above and to the left of the 45-degree line as a trend toward upgrades emerged. In fiscal 1996, the difference between the ratings drift and the transition index (the "change from transition" described earlier) reached its highest point, and thus the distance between the transition index and the 45-degree line was at its greatest (in the upper left region). In fiscal 1997, although the rate of improvement slowed (the distance from the 45-degree line narrowed), improvement did continue, and the transition index remained above and to the left of the 45-degree line. The process so far has described a semi-circular movement in the upward left direction, which is consistent with the conceptual diagram showed in Figure 5. During fiscal 1998 there were considerably more downgrades than upgrades, and the transition index made a large jump to a position downward and to the right of the 45-degree line.

Because this excess of downgrades persisted from fiscal 1999, the transition index remained downward and to the right of the 45-degree line. And since the ratings distribution continued to change in a direction suggesting deterioration in credit quality, the transition index moved downward and to the left on the graph. During the economic recovery of fiscal 2000, the excess of downgrades became smaller and the transition index moved closer to the 45-degree line, but then once again began moving away from the 45-degree line entering fiscal 2002. It moved back closer to the 45-degree line in fiscal 2003, when credit improved to only a slight excess of downgrades, and then the excess of upgrades over downgrades in fiscal 2004 caused the transition index to cross the 45-degree line and move back into the upper left region for the first time in seven years.

Changes in the transition index are strongly linked to the business cycle (Figure 16). The correlation between the transition index differential (shown as "change from transition" in Figure 14) and the real GDP growth rate is either simultaneous or the transition index has a one-period lag, as shown in Figure 17. We think that the change from an upward sloping progression to nearly vertically downward in the simultaneous correlation that occurred in fiscal 1997 and 2001 can be attributed to the tendency of ratings change to lag the business cycle. In fiscal 2002 that slope changed to upward and leftward, but this is because the lag in ratings meant that the deterioration in ratings occurred at the same time as the economic recovery. This is in contrast to fiscal 2004, when ratings remained in an improving trend despite the growth rate having already peaked. This could also be attributed to the ratings lag, but unlike during the economic recovery of 2000, the improvement in credit quality since fiscal 2003 has coincided with an improvement in firms' financial position, thereby suggesting the possibility that factors apart from the business cycle contributed to the upgrades.

Figure 17 – Correlation between common factor and business cycle



Note: The chart shows correlation between FY growth rates and economic cycles. For the 2004 annual growth rate, the growth rate for Jan–Mar 2005 is considered to be zero (the Oct–Dec quarter reflects a secondary QE).

Figure 18 – Skewness and kurtosis

	Skewness	Kurtosis
Transition effect	−1.21	1.60
Real GDP growth rate	−0.33	−0.61
Tankan diffusion index	−0.39	0.01

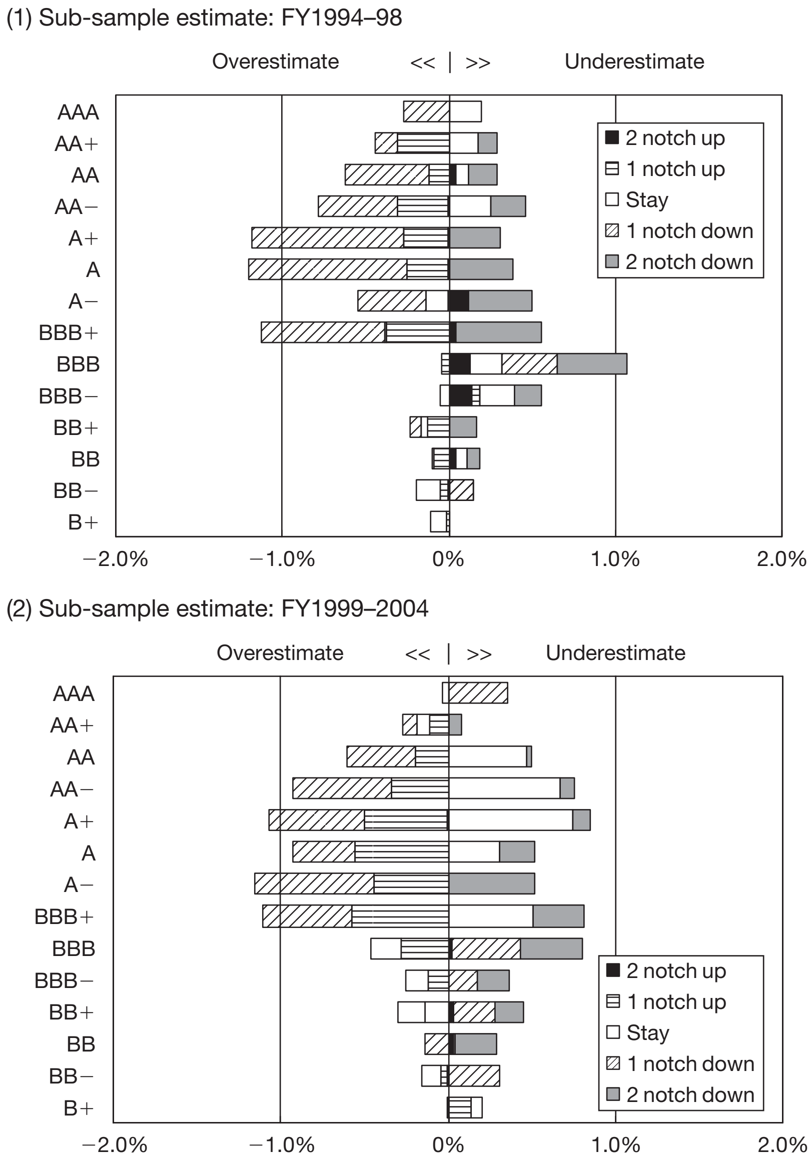
We can see from Figure 18 that changes in the real GDP growth rate and the *Tankan* DI are negatively skewed and that the economy contracts at a greater speed than it expands. The transition index is also negatively skewed, but to a greater degree than the economic variables. Since rating changes slightly lag the economy, this suggests that during economic contractions (when movements are faster), larger rating changes occur to the extent necessary to recover the lagged portion.

Lastly, we observed the characteristics of the model's estimation error. When averaging over the full period the estimation error of the transition probability for each initial rating and each magnitude of ratings change, it is clear that compared with the estimated values based on a normal distribution, on average there is a tendency to either overestimate or underestimate (Figure 19). This makes it possible to consider both skewness and kurtosis as compared against a normally distributed model. The skewness and kurtosis shown below is not the skewness/kurtosis of the ratings change caused by the change in transition index as described in the previous paragraph, but rather is aimed at verifying whether, based on a given change in the transition index, the inability to completely explain ratings change in a model based on a normal distribution can be attributed to the type of skewness and kurtosis that exists in the actual change.

Because the characteristics differ depending on whether the rating is above or below BBB+, we began by looking at the higher ratings. In both the earlier and later period, single-notch upgrades and single-notch downgrades were overestimated, while two-notch downgrades were underestimated. Additionally, in the later period the probability of no migration was underestimated. Based on this information, we constructed a conceptual diagram that contrasts the actual transition probability distribution with a normal distribution (Figure 20). We drew as examples the distribution of the transition probability for debt rated A+ and A in the earlier period and for debt rated AA to A+ in the later period. In both cases, kurtosis was greater than in the normal distribution, and the distribution's tail was only fat in the downgrade direction (it was skewed toward downgrade). The fit of the two-notch downgrade improves under large variance with a model based on normal distribution, but both upgrades and downgrades of a single-notch wind up being overestimated.[25] Conversely, when variance is small, the fit of the single-notch

25 *Variance of the bivariate normal distribution is normalized to 1. Here we refer to the width of the tail of the conditional probability distribution as variance, and it is actually determined by ρ, the coefficient of determination. When ρ is large, the tail of the conditional probability distribution widens.*

Figure 19 – Fit error: higher skewness at lower rating, higher kurtosis at higher rating



Note: We looked for errors in the estimated rate of migration for each fiscal year, and at the beginning of a time period, took an average value for the size of each rating upgrade or downgrade, throughout all time periods. In order to see the tendency to over or underestimate the rate of migration in each rating, we used a simple average, rather than a sum of squared errors or average of absolute values approach.

upgrades and downgrades improves, but two-notch downgrades wind up being underestimated. The estimation parameters strike a balance between these two.

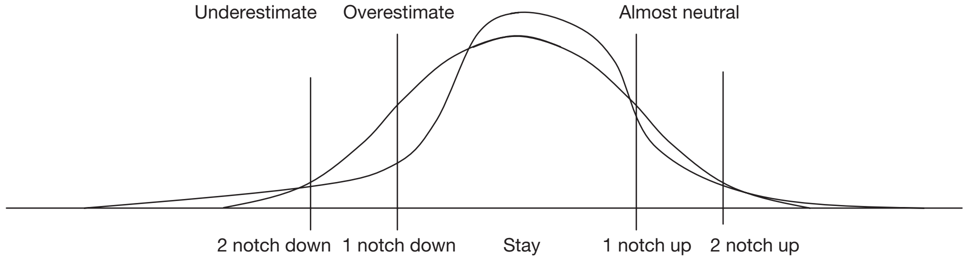
Estimation error is small for ratings of BBB− and lower, but this is because these ratings only account for a small proportion of the total (have a small weighting). When using an estimation error standardized on the initial weighting, the error remains small for BBB and BBB− ratings, while for the other ratings the large difference with higher ratings disappears.[26] The way this overestimation and underestimation plays out suggests that the higher the rating, the less clear the pattern becomes; although the two-notch and single-notch downgrades are underestimated, there is a discernable trend toward overestimation of the single-notch upgrades and no migration. This suggests that the midpoint of the distribution is skewed in the downgrade direction, rather than that the tail is fat in the downward direction.[27]

26 *For ratings BB and lower in the earlier period, the estimation error become extremely large when normalized, but this is because of their small weighting.*

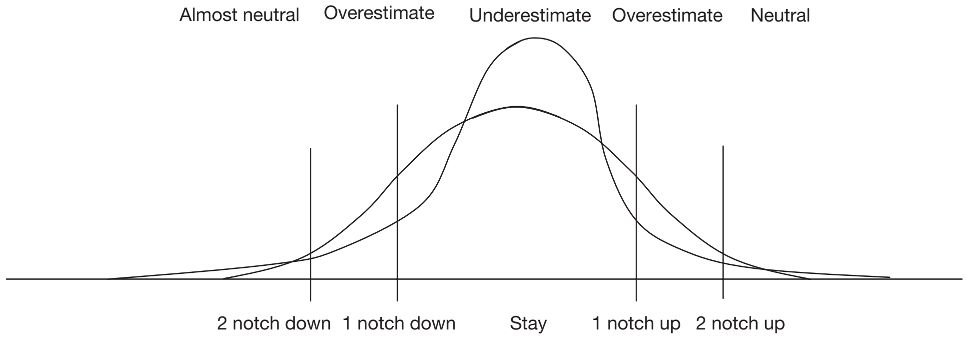
27 *Because the sum of the squared errors from all cells in the transition probability matrix is minimized, there is no guarantee that the average error for each rating is unbiased.*

Figure 20 – Difference from the normal distribution

(1) Sample period FY1994–98, rating A+ and A at the initial status



(2) Sample period FY1999–2004, rating AA and A+ at the initial status



5. Summary and model review

We have shown that ratings transition probabilities are not time homogenous but have a strong degree of pro-cyclicality, that a dynamic version of a single-factor model can be employed, and that the transition index resulting from this model, which represents changes in a firm's credit quality, is either simultaneous with, or lags slightly, the business cycle. This transition index is a useful indicator for understanding trends in aggregate credit risk, and with the future path of this credit risk given exogenously, it is possible to forecast changes in future transition probabilities. Our conclusions suggest that a bank's credit costs vary with changes in the business cycle and can be quantitatively assessed and forecast using the transition probability model in this paper.

As noted in chapter II, the ratings agencies, including not only R&I but also Moody's and S&P, issue a rating change when they deem that there has been a non-temporary change in creditworthiness (a change in default risk from a long-term perspective). In this paper, we refer to a view of credit that takes account of only permanent shocks to credit and ignores the impact of the short-term business cycle as a quasi through-the-cycle view. Such a view is not necessarily inconsistent with the strong pro-cyclicality of the transition index. For example, in the Merton model on defaults, the stochastic process of asset values follows a Brownian motion. In such a case, because the probability shock remains permanently, all shocks have an impact on the default rate, a number that is determined by the gap between the value of liabilities, which are fixed at book value, and the value of assets, which vary randomly. Considering that the stochastic process of asset values includes not only permanent shocks but also temporary shocks that eventually fade, an assessment of default rate that excludes the latter would be a quasi through-the-cycle view. In this case, if the former is positively correlated with the business cycle, the result is pro-cyclicality.

Since our model assumes the common factor follows a first-order Markovian process, it only takes account of permanent shocks. Accordingly, the model must be extended in order to distinguish from temporary shocks. Additionally, although we have considered only the permanent shocks to the economy, when observing both improvements and deterioration in firms' financial positions on an aggregate basis and assuming that these changes have an impact on creditworthiness, one conceivable approach would be to add a second common factor to the model. This can be done by extending the single factor model to a multifactor model and including temporary shocks as another common factor.

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Measuring interest rate risk in the banking sector: the Swiss experience[1]

Robert Bichsel (Swiss National Bank)

1. Introduction

Banks traditionally finance long term assets (loans) through short term debt (deposits). One consequence of this maturity transformation function is to expose banks to interest rate risk. This risk arises from the mismatch between the repricing maturities of assets and liabilities, e.g. whenever the interest rates on a bank's assets is fixed for a longer period than on its liabilities. Under such a constellation, a rise in interest rates will reduce the present value of the bank's assets more than the present value of its liabilities, thus reducing its net present value.

While most regulators and/or central banks have access to information regarding the banks' exposures to other typical risk categories – like credit and market risk – they usually lack data on interest rate risk exposures. This might in particular reflect the fact that interest rate risk (in the banking book) are not explicitly addressed by the Basel I capital standards. Under Basel II, however, interest rate risk exposures will be taken into consideration (pillar II).[2]

In Switzerland, statistics on the interest rate risk exposure have been implemented in 2000. These statistics provide data on a quarterly basis which can be used to infer the individual banks' – as well as the banking sector's – exposure to interest rate risk. Hence, these statistics play a major role in the assessment of vulnerabilities in the banking sector from a systemic perspective – i.e. from the perspective the Swiss National Bank (SNB) – as well as from a micro-prudential perspective – i.e. from the perspective of the banking regulator, the Swiss Federal Banking Commission (SFBC).

This note briefly describes the characteristics of this interest rate risk statistics and highlights its contribution to the assessment of vulnerabilities in the banking sector from a systemic perspective.

2. The Swiss interest rate risk statistics

The SNB and the SFBC have set up a reporting system on interest rate risk in the banking book.[3] Each bank has to report detailed information on the characteristics of its banking book enabling the computation of the bank's net present value (NPV) under different interest rate scenarios. By extension, this enables the computation of the sensitivity of each bank – the sensitivity of its NPV – to changes in interest rates.

To be more specific, banks have to report each (on- and off-balance sheet) banking book position in one of the following four categories:

- Category I positions for which the repricing maturity[4] is explicitly defined (e.g. time deposits or fixed-rate loans). For this category, banks report their expected cash-flows for each position and time bucket.
- Category II positions for which no explicit repricing maturity is defined (savings or sight deposits, variable rate mortgages). For each of these positions, banks report the value of the position as well as the banks' assumptions regarding interest rate adjustment constraints.
- Category III positions for which the repricing maturity is arbitrary (e.g. participations or real-estate objects). For each position pertaining to this category, banks report the value of

1 *This note is a contribution to the "Data Requirements for Analysing the Stability and Vulnerability of Mature Financial Systems" workshop, hosted by the Bank of Canada and the Irving Fisher Committee on Central Bank Statistics in 2005.*

2 *See Art 762–764, International Convergence of Capital Measurement and Capital Standards: a Revised Framework, BIS, 2005.*

3 *Interest rate risk in the trading book is not considered. It is addressed by an explicit capital requirement for market risk.*

4 *The repricing maturity is the time interval before the next interest rate adjustment.*

the position and, to the extent possible, the banks' assumptions regarding interest rate constraints.
- Category IV positions include the various capital components and in particular subordinated debt. For each position pertaining to this category, banks report the value of the position and, to the extent possible, the banks' assumptions regarding interest rate constraints.

In addition to these raw data, banks also answer a set of questions regarding their methodology and report (i) their internal interest risk exposure indicator as well as (ii) a set of control variables serving for quality control purposes.

Based on the raw data, the SNB computes various interest rate risk indicators. One of the main indicators is the variation of the NPV of a bank resulting from a +/−200 bp interest rate parallel shock. This indicator, when put in relation to a bank's available stock of capital, provides a metric of its resilience to interest rate shocks. We proceed as follows:

First, the cash-flows for categories II and III are generated using the bank's assumptions regarding interest rate constraints. And second, the bank's total cash-flow is computed – by taking the sum of category I to IV cash flows – for each time-bucket.[5] These figures can then be used to compute a bank's NPV under different interest rate scenarios. A bank's interest rate sensitivity is given by the difference of its NPV under the current spot interest rates curve (the baseline NPV) and a hypothetical interest rate curve (e.g. the current spot rates curve +/−200 bp).

3. Contribution of the interest rate sensitivity statistics to the assessment of the overall vulnerability of the banking sector

The interest rate risk statistics do serve many purposes. First, at the micro-prudential level, they allow the identification of "outlier" banks, based on the size of their exposure to interest rate risk. In Switzerland, such outlier banks which are characterized by exposures to a 200 bp interest rate shock which is in excess of 20% of their capital base are expected to reduce their exposure, to hold a specific additional amount of capital or some combination of the two. A similar treatment of outlier banks is expected under Basel II.[6] Second, the statistics provide useful information in the context of monetary policy. They can be used to improve the understanding of the transmission mechanism of monetary policy by allowing a better assessment of the impact of a monetary policy shock on the shape of the banking sector and hence, indirectly, on output and inflation. Third – and most relevant in the context of this Workshop – the statistics contribute to the assessment of the vulnerability of the banking system as a whole. This can best be illustrated by the following results.

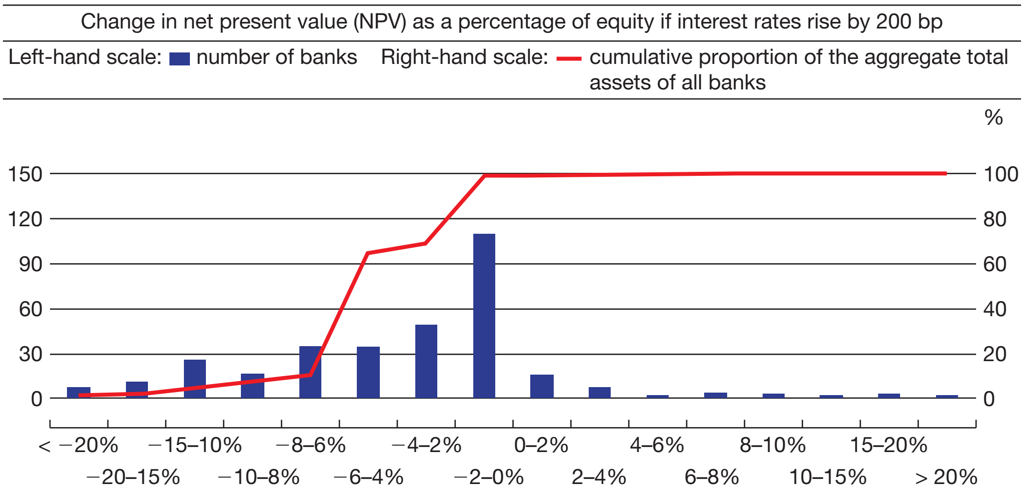
Figure 1 shows the banks' distribution according to their sensitivity to a +200 bp parallel interest rate shock (December 2004 figures). To measure a bank's sensitivity to interest rate risk, we divide each bank's change in NPV due to the interest rate increase by its capital base. Note that the relationship between the size of a shock and a bank's exposure is approximately linear, i.e. the impact of a 100 bp shock on equity NPV is approximately half that of the impact of a 200 bp shock.

These figures enable both micro- and macro-level analyses. At the micro level, the number of banks suggests that a few banks would qualify as outliers, i.e. are characterized by exposures to a 200 bp interest rate shock which is in excess of 20% of their capital base. At the macro level, the cumulative distribution, total assets suggests that (i) the Swiss banking sector as a whole is exposed to positive interest rates shock – the NPV of the banking sector would decrease in response to a interest rate increase – but (ii) that this exposure is relatively low, i.e. the Swiss banking system as a whole is relatively well hedged against the risk of changes in interest rates. The vast majority of banks are not materially exposed to interest rate risk: most banks' exposure represents less than 8% of their capital base. In addition, these banks are relatively small, i.e. account for only about 10% of the assets of the banking sector

5 *For category IV only subordinated debt is taken into account.*

6 *Under Basel II, banking regulators will be expected to be able to identify such outlier banks: "If supervisors determine that banks are not holding capital commensurate with the level of interest rate risk, they must require the bank to reduce its risk, to hold a specific additional amount of capital or some combination of the two. Supervisors should be particularly attentive to the sufficiency of capital of 'outlier banks' where economic value declines by more than 20% of the sum of Tier 1 and Tier 2 capital as a result of a standardised interest rate shock (200 basis points) or its equivalent, as described in the supporting document Principles for the Management and Supervision of Interest Rate Risk." Source: Art. 764, International Convergence of Capital Measurement and Capital Standards: a Revised Framework, BIS, 2005.*

Figure 1 – Interest-rate risk



Sources: SNB, SFBC.

on an aggregate basis (red line). The Swiss banking system as a whole would experience a decrease in its NPV corresponding to about 5% of total capital.

Since banks generally finance long-term lending through short-term borrowing, the low level of interest-rate risk in the Swiss banking sector seems surprising. The explanation is that although the banks grant long-term loans, interest rates are only fixed for short periods. Variable-rate mortgages are the best example. At the same time, banks are not simply financed through sight deposits. A considerable proportion of their financing comprises long term debt papers (for example, bonds and mortgage backed securities). The discrepancy between the effective maturities of assets and liabilities is therefore low. Finally, banks hedge some of their interest-rate risk through derivatives (e.g. interest swaps).

4. Limitations

As illustrated in the previous section, the interest rate risk statistics enable us to assess the vulnerability of the banking sector as a whole to an interest rate shock. In this sense, these statistics constitute a key contribution to the overall assessment of the stability of the banking sector.

It should be noted, however, that these statistics do not provide a full picture of the banking sector's exposure to interest rate shocks. Beyond their *direct* exposure – which is captured by our statistics – banks also face an *indirect* exposure to interest rates movements. The latter reflects the credit risk component of the interest rate risk: A rise in interest rates may lead to a deterioration of the credit standing of borrowers which in turn may lead to higher provisioning and write-down requirements for banks. Our estimations suggest that these *indirect* interest rate risks, which are not captured by our statistics, outweigh the *direct* interest rate risk.

Furthermore, it should be noted that our statistics rely on the banks' own hypotheses regarding the extent to which interest rates fluctuations can be passed on to their clients. This degree of freedom can be systematically exploited by banks, i.e. banks can provide figures that underestimate their true interest rate risk by adopting overly optimistic assumptions regarding pass on possibilities. Indeed, the data suggest that banks facing higher levels of exposure to interest rates movements indeed tend to adopt more optimistic pass on assumptions. Fortunately, the size of this bias can be assessed: our data enable the computation of the exposure using our own rather than the banks' assumptions regarding pass on possibilities. As it turns out, the bias appears to be relatively small.

Robert Bichsel (Swiss National Bank)

Enhancements to the BIS international banking and financial statistics

Philip Wooldridge (BIS)

The BIS, in cooperation with central banks and monetary authorities worldwide, compiles and disseminates statistics on international banking and financial market activity.[1] Each quarter, the BIS publishes data on: banks' international positions on both a consolidated and unconsolidated basis; issuance in money, bond and syndicated loan markets; international equity offerings; and turnover and open interest in exchange-traded derivatives markets. Twice a year, statistics are released on notional stocks and market values of over-the-counter (OTC) derivatives. And every three years, data are made available on turnover in foreign exchange and OTC derivatives markets.[2]

The BIS statistics have evolved with the changing policy concerns of monetary and financial authorities and the changing structure of banking and financial markets. This note outlines recently implemented and planned improvements to the statistics, focussing in particular on the expansion of the consolidated banking statistics to better capture banks' country risk exposures.

Concentration measures

The BIS has since December 2004 published concentration measures for OTC derivatives markets. This was motivated by questions about the risks that concentration among dealers might pose to the smooth functioning of derivatives markets. Herfindahl indices are calculated for interest rate, foreign exchange and equity-linked derivatives, broken down by counterparty, currency and contract type. The indices are backdated to December 1998 and published together with the regular press release on activity in OTC derivatives markets.

The Herfindahl indices indicate that, between 1998 and 2004, concentration in OTC derivatives markets either remained stable or increased slightly (Graph 1). Concentration levels in the largest derivatives markets were lower and more stable than those in smaller markets. Furthermore, based on Herfindahl indices for contracts between reporting financial institutions, concentration in the interdealer segment seems to be similar to, or slightly higher than, concentration in the overall market.

One limitation of the published concentration measures is that they are based on notional amounts outstanding. Therefore, they provide a snapshot of the historical average involvement of dealers in derivatives markets but do not capture the current market-making structure. In addition, they do not provide information about the concentration of counterparty risks. For example, they do not take into account linkages between market participants and the use of collateral.

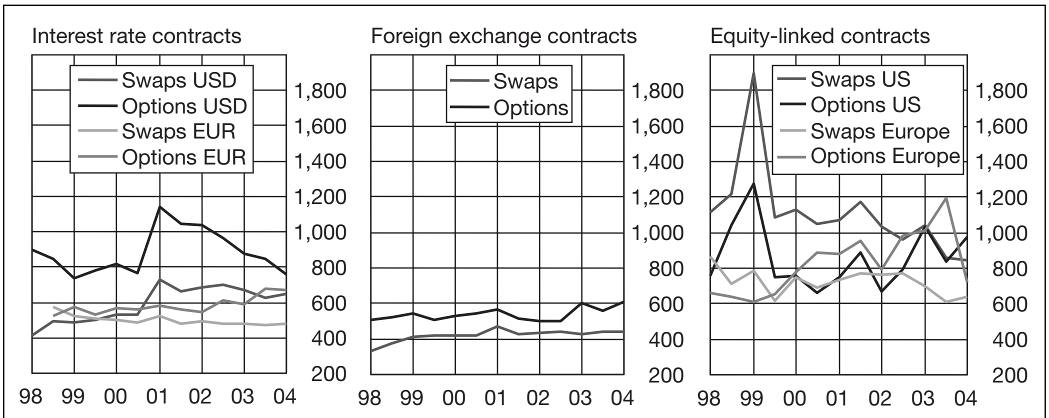
Credit derivatives

Detailed data on credit default swaps (CDS) were first published in May 2005, in the regular BIS press release on activity in OTC derivatives markets. Data on credit derivatives were collected in the last two triennial central bank surveys of foreign exchange and derivatives

1 *The BIS statistics are available in the* BIS Quarterly Review *or can be downloaded through the BIS website: www.bis.org/statistics/index.htm*

2 *For a brief description of the data compiled by the BIS, see BIS:* Guide to the international financial statistics, *BIS Papers, no 14, February 2003. See also P Wooldridge: "Uses of the BIS statistics: an introduction",* BIS Quarterly Review, *March 2002, pp 75–92.*

Graph 1 – Herfindahl indices for global OTC derivatives markets
(All reported contracts)



Sources: National data; BIS.

market activity, referring to notional amounts outstanding as well as gross market values in June 2001 and June 2004. Data on protection bought and sold for single- and multi-name CDS contracts will now be published every six months, with a breakdown by counterparty and maturity. Next year, a finer counterparty breakdown will be made available, as well as breakdowns by rating category and sector of the reference entity.[3]

At the end of 2004, the notional amount outstanding of credit default swaps bought and sold was $6.4 trillion (Table 1). Of this amount, almost 50% comprised contracts with financial institutions such as insurance companies and hedge funds. Contracts between reporting dealers accounted for 43% and contracts with non-financial customers 8%. Dealers bought net protection from non-dealers amounting to $178 billion, mainly in the form of multi-name contracts. Regarding the maturity of outstanding contracts, 73% had a maturity between one and five years, 19% a maturity over 5 years and only 8% 1 year or less. The gross market value of all outstanding contracts at the end of 2004 was $134 billion.

Country risk exposures

The BIS has for several decades compiled and disseminated data on the positions of internationally active banks. A number of improvements have been made to these data over the years, including an expansion of the reporting population and an increase in the frequency of publication of the consolidated banking statistics. At present, 38 countries contribute to the locational banking statistics and 30 countries to the consolidated banking statistics. In the near future, Cyprus, Korea, Malaysia, Russia and several offshore financial centres will join the reporting population.

A major expansion of the consolidated banking statistics is currently being implemented, as recommended by the Committee on the Global Financial System following the Asian financial crisis.[4] The aim is to provide statistics that better capture the country risk exposures of internationally active banks and, more generally, to provide aggregate information compatible with individual banks' own risk management practices.

The expanded data cover all relevant aspects of reporting banks' country risk exposures, including contingent and derivative exposures. The data capture the exposures of reporting banks' offices worldwide, including their foreign offices' exposures vis-à-vis residents of the countries where the offices are located. Positions are reported on a consolidated and ultimate risk basis, i.e. inter-office positions are netted out and positions are allocated to the country where

3 *Notional amounts outstanding will be broken down by: rating (investment grade, high yield and unrated); remaining maturity (one year or less, one to five years and over five years); sector of the underlying reference entity (sovereign and non-sovereign); and counterparty (reporting dealers, other banks and securities firms, insurance companies, other financial institutions and non-financial customers).*

4 *See Committee on the Global Financial System:* Report of the working group on the BIS international banking statistics, *BIS, September 2000.*

Table 1 – Credit default swaps (Amounts outstanding, in billions of US dollars[1])

31 December 2004	Notional principal						Gross market value[2]
	Bought	Sold	Total[2]	≤1yr[2,3]	>1yr ≤5yr[2,3]	>5yr[2,3]	
All instruments							
All counterparties	4,644	4,486	6,386	490	4,653	1,244	134
Reporting dealers	2,733	2,755	2,744	173	2,093	479	49
Other financial institutions	1,634	1,485	3,119	267	2,229	623	73
Non-financial institutions	276	247	523	50	331	142	12
Single-name credit default swaps							
All counterparties	3,725	3,691	5,110	426	3,838	844	113
Reporting dealers	2,292	2,323	2,308	160	1,828	319	44
Other financial institutions	1,234	1,191	2,425	227	1,759	439	60
Non-financial institutions	200	177	377	39	251	86	9
Multi-name credit default swaps							
All counterparties	918	795	1,277	65	814	398	23
Reporting dealers	441	431	436	13	265	159	5
Other financial institutions	401	294	695	41	470	183	14
Non-financial institutions	76	70	146	11	79	56	4

1 *Reported on a worldwide consolidated basis by dealers in the G10 countries; transactions between affiliates of the same dealer are excluded.*
2 *Calculated as the amount outstanding of all contracts bought and sold minus half of the amount outstanding of contracts bought and sold between reporting dealers.*
3 *By remaining maturity; calculated as the difference between the reporting date (as opposed to the settlement date) and the expiration date.*

the final risk lies.[5] Guarantees and credit commitments are reported to the extent that they represent the unutilised portions of binding contractual obligations or any other irrevocable commitments. Derivative exposures refer to the positive market value of outstanding contracts after taking account of legally enforceable bilateral netting arrangements.

A minority of countries has already reported consolidated data under the new guidelines, and the BIS expects the coverage and quality of the new data to be sufficiently high to allow publication before the end of 2005. Data from a small sample of countries are reported in Tables 2 and 3, illustrating exposures by nationality of reporting bank and by residency of immediate borrower, respectively.

As can be seen from Table 2, risk transfers, derivatives and contingent facilities can have a large impact on banks' country risk exposures. Taking foreign claims on an immediate borrower basis as the baseline, risk transfers reduce euro area banks' claims by 18% but increase UK banks' claims by 6%. Derivative exposures increase euro area banks' claims by 19% but Japanese banks' claims by only 2%. Undisbursed credit commitments amount to as much as 55% of US banks' foreign claims.

5 *Consistent with the risk reallocation principle for measuring country risk exposures recommended by the Basel Committee on Banking Supervision, the country of ultimate risk is defined as the country in which the guarantor of a financial claim resides or the country in which the head office of a legally dependent branch is located. Collateral may be considered an indicator of where the final risk lies to the extent that it is recognized as a risk mitigant under the Basel II capital adequacy framework.*

Table 2 – Country risk exposures of BIS reporting banks (By nationality of reporting bank, as a percentage of foreign claims)

31 December 2004	All banks[1]	Euro area banks[2]	UK banks	Japanese banks	US banks
Claims on an immediate borrower basis					
International claims[3]	66.7	71.2	48.8	86.0	53.2
+ Local claims[4]	33.3	28.8	51.2	14.0	46.8
= Foreign claims	100.0	100.0	100.0	100.0	100.0
Claims on an ultimate risk basis					
+ Net risk transfers	−10.4	−17.6	6.1	−9.9	−1.6
+ Derivatives exposures	15.5	19.0	16.4	2.1	12.7
= Aggregate exposures	105.2	101.4	122.5	92.2	111.2
+ Contingent exposures	25.4	23.1	29.8	12.6	54.8
Guarantees extended	5.0	6.6	4.1	2.7	0.0
Credit commitments	20.4	16.5	25.7	9.8	54.8
= Maximum exposures[5]	130.5	124.5	152.4	104.8	166.0
Memo: Foreign claims, in USD bns	$11,748	$6,777	$2,118	$1,482	$1,013

1 *Sum of Australian, euro area, Japanese, Taiwanese, UK and US banks.*
2 *Sum of Dutch, French, German and Italian banks.*
3 *Cross-border claims denominated in all currencies plus claims of local affiliates denominated in foreign currencies; for US banks, cross-border claims.*
4 *Claims of local affiliates denominated in local currencies; for US banks, local claims denominated in all currencies.*
5 *Exposures to exceptional circumstances.*

Table 3 – Country risk exposures of BIS reporting banks[1] (By residency of immediate borrower, as a percentage of foreign claims)

31 December 2004	Offshore centres	Bermuda	Developing countries	Thailand	Brazil
Claims on an immediate borrower basis					
International claims[2]	76.0	97.2	57.9	46.9	44.6
+ Local claims[3]	24.0	2.8	42.1	53.1	55.4
= Foreign claims	100.0	100.0	100.0	100.0	100.0
Claims on an ultimate risk basis					
+ Net risk transfers	−23.6	−13.0	−10.3	−17.4	−3.5
+ Derivatives exposures	5.0	8.4	4.4	22.3	4.5
= Aggregate exposures	81.4	95.4	94.1	104.9	100.9
+ Contingent exposures	30.6	77.8	19.7	20.7	5.1
Guarantees extended	6.7	25.2	7.2	11.7	2.1
Credit commitments	24.0	52.6	12.5	9.0	3.0
= Maximum exposures[4]	112.0	173.3	113.7	125.6	106.0
Memo: Foreign claims, in USD bns	$1,009	$40	$1,250	$30	$79

1 *Sum of Australian, Dutch, French, German, Italian, Japanese, Taiwanese, UK and US banks.*
2 *Cross-border claims denominated in all currencies plus claims of local affiliates denominated in foreign currencies.*
3 *Claims of local affiliates denominated in local currencies.*
4 *Exposures to exceptional circumstances.*

Turning to the impact from the perspective of borrowers, claims on borrowers in offshore centres and emerging markets are typically lower on an ultimate risk basis than on an immediate borrower basis, owing to the use of collateral and provision of guarantees by borrowers' parent companies headquartered elsewhere (Table 3). Derivatives, on the other hand, substantially increase banks' exposure to some countries, for example by as much as 24% in the case of Thailand. Contingent exposures can also be sizable, exceeding 75% of foreign claims on an immediate borrower basis in the case of Bermuda (where many insurance companies are located). The impact across borrowers varies considerably, however. For example, banks' maximum exposure to Brazil is only 6% higher than foreign claims on an immediate borrower basis, even after including derivative and contingent exposures.

Philip Wooldridge (BIS)

Effects on the usefulness of ordinary banking statistics from cross-border consolidation – experiences from a small open economy with a concentrated financial sector

Jan Schüllerqvist[1] *(Sveriges Riksbank)*

Sweden has a concentrated financial sector with a few large financial institutions. These institutions are also quite active in the whole Nordic area, especially the Nordea Group. This creates certain challenges for the central bank when analysing the banks and the financial sector, using ordinary banking statistics.

1. Data for financial stability analysis

In order to assess financial stability in a proper way, different types of data are needed. They include (i) macroeconomic data, (ii) market information, (iii) borrower information, (iv) detailed bank data and (v) qualitative information. *Macroeconomic data* describe the state of the world with series and forecasts of e.g. GDP, inflation, unemployment and disposable income. The data can be input in macro stress testing, modelling of bankruptcies. *Market information* covers both information of prices and of products used in the market. The information content might vary over time due to regulatory and structural changes as well as new products introduced. *Borrower information*, for the non-financial corporate sector, the household sector as well as for the commercial real estate sector, aims at providing indicators for performance, risks and ability to pay. Risks focus on credit risk but might also include market and/or liquidity risks. The borrower information needs to be both forward looking and backward looking and structural changes must not be forgotten. *Qualitative information* needs to cover e.g. changes in regulation and the institutional set-up, financial innovations, relevance of the safety net and competition. The *detailed bank data* is of course an essential data source, and this note will focus on that type of data.

2. Detailed bank data

There are huge amounts of such data available and, in my experience, relatively little of it is actually used. In some cases it might be in an inadequate format, and the user must know what he is looking for. The production of statistics should be determined by analytical need, but bearing in mind that the reason for collecting the statistics in the first place might, at least in the past, not have been analytical but rather regulatory control of accounts.

In analysing financial stability there are three main interests: (i) links to the real economy, (ii) risk and solvency of the banks and (iii) the market structure. With regard to *links to the real economy*, one example of such a link is credit and deposit growth linked to the business cycle, measured as e.g. investment and consumption. Another is leverage and indebtedness, both for households and companies. It is also important to connect the analysis of the banking sector with analysis of other sectors.

In analysing the risk and solvency in banks there are a number of issues. One is the issue of *consolidated versus unconsolidated data*. Regulatory data is normally based on legal entities, but

1 *The author benefited from substantial contributions from Mr. Martin Noreus in the Financial Stability Department of the Riksbank.*

banks operate and take risk on a consolidated basis. There is also an issue of *income data versus balance sheet data*. It might be true that the balance sheet is of most importance for analysing solvency, but profitability matters and data on income can give additional information on the bank. Income data is essential in order to do stress tests on individual banks. A third issue is *regulatory versus public reporting*. Here "regulatory reporting" means monetary institutions monthly reporting of balance sheets to the central bank. The regulatory reporting is more detailed, but the public reporting is often more useful from a stability perspective due to the fact that it gives a more comprehensive picture of bank. The public reporting covers the bank on a consolidated basis, with information on both income and balance sheet, and often with a description of different types of risks, credit risk, market risk and liquidity risk.

A fourth and current issue is *accounting data versus market data*. Accounting data are backward-looking, while market data are forward-looking, so one might argue that market data could be preferable for analysing financial stability. However, the two data sets might not be uncorrelated. The market relies to a high degree on accounting data when making its assessment. Hence it is important for the central bank to be able to make an independent assessment of the underlying accounting. Another issue is *global data versus domestic data*. On one hand central banks and supervisory authorities have a domestic responsibility but on the other, there might be contagion from the global activities to the domestic business. So in practice it could be hard to isolate the domestic business from the global business, or even define what the domestic business actually is.

Another area where this latter issue could be realised is with regard to data on *market structure*. Such data is of importance in order to analyse e.g. competition and pricing. Leaving weaknesses in the price information, where aggregate or average figures actually might be misleading, aside, the question here is whether the domestic data is relevant. In theory there should be available domestic data for what within the European Union is called Monetary Financial Institutions. But is this data actually the true data on the market? If there exist cross-border borrowing/lending and these activities are substantial in relation to the total market, the domestic data might even be misleading. In Sweden this is the case. In order to understand that situation, a closer look at the Swedish banking market is needed.

3. The Swedish banking market

The Swedish banking sector is very concentrated with four dominant banking groups. The aggregated non-consolidated assets of these four banks account for about 80 per cent of total assets for Swedish Banks. All banks are universal banks, and all have large subsidiaries active in housing finance (mortgage companies). Some of them are also active in insurance business.

All of the large banks are active in other Nordic-Baltic markets, e.g. Föreningssparbanken (internationally known as Swedbank) and SEB dominates the banking market in the three Baltic countries. SEB also has a substantial business in Germany. Handelsbanken is active in Finland, Denmark and Norway as well as in the UK. However, the most significant cross-border is the Nordea Group.

Nordea was founded in 1997 as a merger between the then largest Finnish bank, Merita, and the then fourth largest Swedish bank, Nordbanken. It was organised with a Swedish listed holding company with a Finnish bank subsidiary. The Swedish bank was at that time a subsidiary of the Finnish Bank. In 2000 Nordea merged with the second largest Danish Bank, Uni Bank, and in 2001 with the second largest Norwegian bank, Christiana Bank og Kreditkasse. Both banks became subsidiaries to the Finnish bank.

In 2003 the Swedish holding company acquired the three banking subsidiaries from the Finnish subsidiary, and in 2004 the Swedish holding company merged with the Swedish Bank. Hence, the present legal set-up is a Swedish bank with a Finnish, a Danish and a Norwegian bank as subsidiaries. The aim is to become one single entity, a European company "Societæs Europea" ("SE"), but this will take some time.

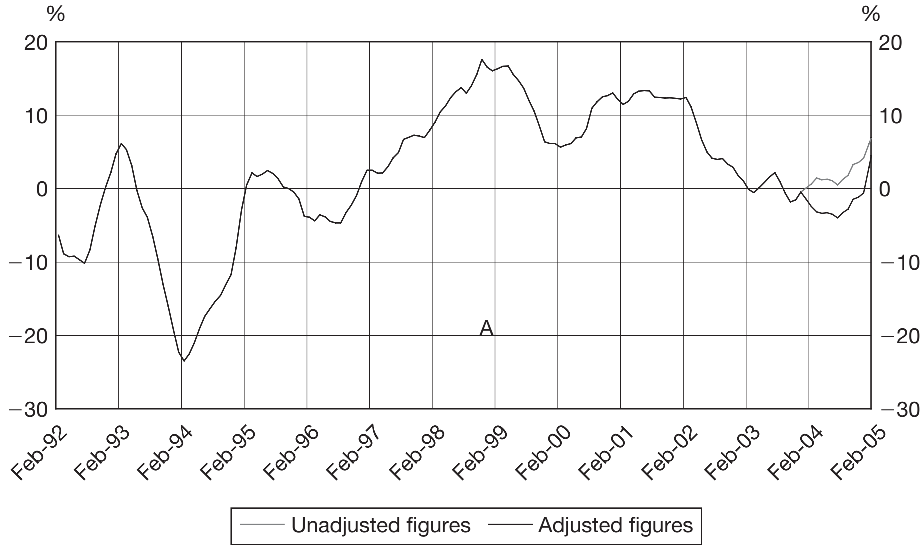
Nordea is one of the 20 largest banks in Europe. By end of 2004 the total assets of the Nordea Group was EUR 276 billion, of which the Swedish parent company (a bank) accounted for 68 billion. In non-consolidated terms, Nordea accounts for about 14 per cent of the non-consolidated Swedish banking market (banks, mortgage institutions and other credit institutions). Hence, changes in the balance sheet structure of the Swedish parent bank can have substantial impact on the aggregated Swedish data.

As a multinational company, the Nordea Group has organised its activities not mainly from a national or legal perspective, but rather from a business perspective. For example, a substantial part of the derivatives portfolio is booked in the Finnish subsidiary; most part of fixed income trading is operated and booked in Denmark and most of the oil and shipping portfolio is booked in the Norwegian subsidiary.

4. Cross-border issues and how to mitigate them

If the customer or counterparty of Nordea in business areas which are managed outside Sweden is domiciled in Sweden, lending to or borrowing from such a customer/counterparty is an activity in the Swedish market, regardless of where Nordea chooses to book its transactions. However, in traditional banking statistics this will not be recorded as such. It could, for example, be recorded as Finnish bank lending to foreigners. Hence the financial market statistics would not properly correspond to the actual financial market activities and the real economy. If, at a certain moment, which has been the case in Sweden, a substantial portfolio is transferred across the border, a substantial drop in volume will be recorded in traditional statistics.

Diagram 1 – Non-financial corporate borrowing from major Swedish banks
(change in per cent over 12 months)



Another implication of the cross-border activity relates to the intra-group positions. Since normally in a group the parent bank raises most of the external funding and then lends to the subsidiaries, this gives rise to substantial intra-group positions, widely exaggerating the size of the inter-bank market. Also, every time when there is a legal reorganisation (which happens quite frequently), this changes the whole aggregate – for example transforming Sweden from a net borrower to a net lender in international banking markets.

How can these problems be resolved? There are mainly two approaches. The first approach is to increase the statistics exchange between the central banks. For example, the Riksbank should share with the Danish central bank, the Nordea parent bank's direct lending to the Danish public. This can of course be quite cumbersome. The other approach consists in adding extra reporting requirements for the Nordea Group. These requirements include consolidated information on inter alia deposits from the public broken down on category (households, companies and other), currency and type (maturities, etc.), lending to the public broken down in category (households, companies and other), currency and type (maturities, etc.), but also some interbank and securities positions.

Since the parent company is a Swedish entity, the information will be collected by the Riksbank, which shares the information with the other central banks and supervisors. This approach is in fact being implemented. The new reporting requirement will be effective from 2006. Sharing of information between central banks is in line with a Memorandum of Understanding relating to the Nordea Group between the concerned four central banks.[2]

2 *That MoU is in turn a "sub-MoU" to an MoU on Management of a financial crisis in banks with cross-border establishments between all Nordic central banks – Danmarks Nationalbank (Denmark), Suomen Pankki (Finland), Sedlabanki Íslands (Iceland) however not a party to the Nordea MoU, Norges Bank (Norway) and Sveriges Riksbank (Sweden).*

5. Conclusions

Clearly, understanding the structure of the financial institutions is important in order to understand and assess the banking statistics. Depending on the purpose of the analysis, different perspectives covering different legal and market structures are needed. Hence globally consolidated information, as well as domestically consolidated and domestically unconsolidated information is needed. When necessary from a systemic point of view, that might imply additional reporting requirements for some institutions. In order to get relevant information, central banks and supervisors need to cooperate.

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Banks and systemic problems: a review of selected literature

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The literature addressing banking crises and systemic problems is extensive. It encompasses theoretical work, case studies, and multivariate statistical studies. Much remains to be done however. A generally accepted paradigm to explain bank contagion has yet to emerge. Case studies and multivariate statistical work have provided useful insights into many aspects of bank crises, but little with respect to contagion.

Three recent papers provide comprehensive reviews of the literature prior to 2000, one by de Bandt and Hartmann, one by Kaufman and Scott, and one by Bell and Pain. The material in section one is taken largely from Kaufman and Scott, and is supplemented with the views of de Bandt and Hartmann and Bell and Pain where indicated.

Section two is based on work that has appeared after 2000.

1. Review of the literature before 2000

Basic questions

What are the characteristics of banks that make them fragile?

1. low capital-to-assets ratios, relatively high leverage
2. the assets backing short-term debt obligations are longer-term, and therefore less liquid, than their liabilities (more precisely, demand deposits). Illiquid assets cannot be sold quickly at fair value.

In what ways are banks closely interconnected?

1. depositing funds with each other
2. lending to and borrowing from each other (interbank balances)
3. making and receiving fund balances from each other in the process of clearing payments due to or from other banks (interbank transfers)
4. participation in syndicated loans

What is bank failure?

A bank fails economically when the market value of its assets falls below the market value of its liabilities. The result is that the market value of its capital is negative, and consequently the bank cannot expect to pay all of its depositors in full and on time.

What is systemic risk?

Kaufman and Scott state that s*ystemic risk* refers to the risk or probability of breakdowns in an entire system, as opposed to breakdowns in individual parts or components, and is evidenced by co-movements (correlation) among most or all the parts. Thus, systemic risk in banking is evidenced by high correlation and clustering of bank failures in a single country, in a number of

* *The views expressed in this paper are those of the author and not necessarily those of the Office of the Superintendent of Financial Institutions.*

countries, or throughout the world. Systemic risk also may occur in other parts of the financial sector – for example, in securities markets as evidenced by simultaneous declines in the prices of a large number of securities in one or more markets in a single country or across countries. Systemic risk may be domestic or transnational.

A search of the literature reveals three frequently used concepts. The first refers to a "big" shock or macroshock that produces nearly simultaneous, large, adverse effects on most or all of the domestic economy or system. Here, *systemic* refers to an event having effects on the entire banking, financial, or economic system, rather than just one or a few institutions. Likewise, we can define systemic risk as the likelihood of a sudden, usually unexpected, event that disrupts information in financial markets, making them unable to effectively channel funds to those parties with the most productive investment opportunities. How the transmission of effects from a macroshock to individual units, or contagion, occurs and which units are affected are generally unspecified.

The other two definitions focus more on the microlevel and on the transmission of the shock and potential spillover from one unit to others. For example, according to the second definition, systemic risk is the probability that cumulative losses will accrue from an event that sets in motion a series of successive losses along a chain of institutions or markets comprising a system; that is, systemic risk is the risk of a chain reaction of falling interconnected dominos. This definition is consistent with that of the Federal Reserve. In the payments system,

> systemic risk may occur if an institution participating on a private large-dollar payments network were unable or unwilling to settle its net debt position. If such a settlement failure occurred, the institution's creditors on the network might also be unable to settle their commitments. Serious repercussions could, as a result, spread to other participants in the private network, to other depository institutions not participating in the network, and to the nonfinancial economy generally. (Board of Governors of the Federal Reserve System, Policy Statement on Payments System Risk, Docket No. R-1107, 2001, p. 2)

Note that in this second definition, unlike in the first macro-shock definition, only one bank need be exposed in direct causation to the initial shock. All other banks along the transmission chain may be unexposed to this shock. The initial bank failure sets off the chain or knock-on reaction.

The smaller a bank's capital-asset ratio – the more leveraged it is – the more likely it is that it both will be driven into insolvency by insolvencies of banks located earlier on the transmission chain and will transmit losses to banks located later on the chain.

A third definition of systemic risk also focuses on spillover from an initial exogenous external shock, but it does not involve direct causation and depends on weaker and more indirect connections. It emphasizes similarities in third-party risk exposures among the units involved. When one unit experiences adverse effects from a shock – say, the failure of a large financial or nonfinancial firm – that generates severe losses, uncertainty is created about the values of other units potentially also subject to adverse effects from the same shock. To minimize additional losses, market participants will examine other units, such as banks, in which they have economic interests to see whether and to what extent they are at risk. The more similar the risk-exposure profile to that of the initial unit economically, politically, or otherwise, the greater is the probability of loss, and the more likely it is that participants will withdraw funds as soon as possible. This response may induce liquidity problems and even more fundamental solvency problems. This pattern may be referred to as a "common shock" or "reassessment shock" effect and represents correlation without direct causation (indirect causation).

A distinction is often made between rational or information-based, directly or indirectly caused systemic risk and irrational, non-information-based, random, or "pure" contagious systemic risk. Rational or informed contagion assumes that investors (depositors) can differentiate among parties on the basis of their fundamentals. Random contagion, based on actions by uninformed agents, is viewed as more frightening and dangerous because it does not differentiate among parties, affecting solvent as well as insolvent parties, and therefore is likely to be both broader and more difficult to contain.

What information is needed to analyze a banking crisis?

Identification of the initial shock – of the extreme event – and its magnitude; the risk exposures of each unit potentially at risk; transmission of impact(s) mechanism(s); rate at which credit quality deteriorates; cost and quality of information throughout crisis from onset of crisis to resolution.

Table 1 – Systematic events in the financial system

Type of initial shock	Single system events (affect only one institution or one market in the second round effect)		Wide systemic events (affect many institutions or markets in the second round effect)	
	Weak (no failure or crash)	Strong (failure of one institution or crash of one market)	Weak (no failure or crash)	Strong (failures of many institutions or crashes of many markets)
Narrow shock that propagates				
– Idiosyncratic shock	✓	✓ contagion	✓	✓ contagion leading to a systemic crisis
– Limited systemic	✓	✓ contagion	✓	✓ contagion to a shock systemic crisis
Wide systematic shock			✓	✓ systemic crisis

Source: De Bandt and Hartmann

What have we learned from theoretical work?

First, a considerable number of theoretical studies have now directly addressed the subject of bank contagion. Although a generally accepted paradigm has not yet emerged, these models have greatly enhanced our understanding of the potential propagation of problems in the banking and payment system. Second, an important theoretical development in the area of systemic risk is the development of "third-generation" models of currency crises, addressing both "pure" and "information-based" contagion effects. In contrast, the theoretical literature on contagion in other financial markets is still progressing, in particular regarding the distinction between inefficient but "normal" price propagation and real crisis situations. (de Bandt and Hartmann)

What have we learned from empirical work?

Kaufman and Scott conclude that clusterings of bank failures occur frequently, but do they reflect systemic risk? The empirical evidence depends on the definition of *systemic risk* used. Almost tautologically, systemic risk is observed most frequently when it is defined as a big, broad shock. This definition is silent on the existence or transmission of contagion. Common-shock systemic risk, particularly in the short term, appears to be more frequent than chain-reaction systemic risk. Systemic risk, when it does occur, appears both to be rational and to be confined primarily to "insolvent" institutions and not randomly to affect solvent banks fatally.

With respect to banks, at least in the United States, there is little if any evidence of contagious systemic risk that causes economically solvent banks to become economically or legally insolvent. Except for fraud, clustered bank failures in the United States almost always are triggered by adverse conditions in the regional or national macroeconomies or by the bursting of asset-price bubbles, especially in real estate, and not by exogenous "sunspot" effects.

De Bandt and Hartmann point out that the overwhelming part of existing econometric tests for bank contagion effects is still limited to data for the United States. Event studies of bank equity returns, debt risk premiums, deposit flows or physical exposures for European, Japanese or emerging market countries are rare or virtually absent. Clearly, more empirical research is needed about the actual importance and character of bank contagion, but this agenda will not be easy to fulfill due to the presence of safety nets in many countries. Similar reservations about the empirical importance and character of securities market contagion are also advisable, but with less direct policy implications.

They conclude: On the empirical side a few valuable developments on the explanation of banking crises across countries have recently taken place, but insights into payment system contagion remain scarce, particularly outside the US and on other than net settlement systems. Whereas the empirical literature has provided some evidence of the existence of systemic risk, in particular in the "broad" sense, it is more puzzling that many tests for bank contagion do not control for all the macroeconomic factors that might be behind the observation of joint bank failures in history.

Bell and Pain draw similar inferences from the empirical work:

> . . . for the time being the models are subject to some serious weaknesses and limitations, especially as potential tools for policymakers. . . . A particular weakness of the models relates to the way in which they capture the notion of contagion. Few, if any, variables are included in the macro-type studies to represent such effects, and the micro approaches make use of very crude proxies. . . . A key problem for the empirical studies of banking crises is the lack of a generally accepted measure of fragility which can be determined prior to a crisis occurring. The approaches so far adopted have tended implicitly to assume that a period of fragility is simply a less severe version of a crisis, i.e., that the three points 'no problems', 'fragility', and 'full-blown crisis' lie on the same continuum. In practice, however, this may not be the case. We might view 'fragility' as relating to the structure of the financial system, and 'crisis' as the results of the interaction between that fragility and some exogenous shocks.

How should we deal with systemic risk?

Kaufman and Scott argue that the analysis clearly indicates that private-market incentives can and do play a major role in limiting systemic risk and that the government should always be highly sensitive to whether its actions are undermining or reinforcing the private mechanisms.

De Bandt and Hartmann conclude: difficulties in identifying empirically the importance of contagion as opposed to joint banking crises as consequences of macro shocks is not innocuous, since it has some implications for crisis management polices. Bank crises emerging from contagion could be stopped at an early stage at the individual bank level through emergency liquidity assistance, if identified in a timely manner, whereas macro problems would normally be addressed through more standard stabilisation policies, such as open market operations. In other words, the current empirical literature cannot resolve the old policy debate about emergency lending to individual institutions versus lending to the market.

And Bell and Pain state: many of the empirical models proposed in the literature are based on coincident correlations between the dependent and explanatory variables. They are designed, therefore, to explain crises rather than to forecast or predict them. And the lagged values of many of the variables, rather than contemporaneous observations, are often not significant when introduced into the regressions. The practical use of such empirical models as leading indicators is therefore restricted by the necessity to be able accurately to forecast values for the explanatory variables. . . . there is a need for caution, given that these models do not necessarily capture causal relationships. As in the monetary stability sphere, policymakers can use leading-indicator models to inform their decisions about prospective systemic problems in their banking sectors. But they should be used in conjunction with other indicators to assess and understand what potential shocks and vulnerabilities are important in the current conjuncture and why.

2. Review of the literature after 2000

Case studies provide greater in-depth analyses of specific banking crises. An April 2004 BIS Working Paper, for example, covers bank failures in eight countries: Germany, Japan, Norway, Spain, Sweden, Switzerland, the United Kingdom and the U.S. The authors of each chapter examine the reasons for the failures, how the failures were resolved, and what regulatory changes followed from the crisis.

> The majority of banking difficulties were manifest as credit problems and sometimes as operational risk. Market risk was rarely a significant problem. Management and control weaknesses

> were significant contributory factors in nearly all cases. However, 90% of the banks reported capital ratios about the regulatory requirement when difficulties emerged. . . . this suggested loss provisioning did not accurately reflected asset impairment and thus capital ratios were overstated. And more generally, even where asset impairment had been properly measured, such quantitative measures might not capture qualitative problems, such as poor management. The key role played by poor management in crises has also been highlighted by various academic studies. [And other studies] found that a combination of macroeconomic and microeconomic factors was usually responsible. In particular, on the macroeconomic side, recession and terms of trade were found important. Also, on the microeconomic side, poor supervision and regulation and deficient bank management were often significant. (p.1)

Based on the bank failures in the eight countries studied:

> Some patterns stand out. Credit risk, particularly real estate lending, led to widespread banking problems in Switzerland, Spain, the United Kingdom, Norway, Sweden, Japan and the U.S. Market risk was the principal cause of failure in the isolated failure of Herstatt (Germany). Market risk also caused the first stage of the U.S. Savings and Loan failures. Financial liberalisation (deregulation) was a common feature of major banking crises often combined with supervisory systems that were inadequately prepared for the change. Credit concentration risk, usually in real estate, was cited in nine out of the 13 episodes.
>
> The widespread banking crises that involved credit risk were remarkably similar. A period of financial deregulation resulted in rapid growth in lending, particularly in real estate related lending. Rapidly rising real estate prices encouraged more lending, abetted by lax regulatory systems in many cases. When economic recessions occurred, inflated real estate prices collapsed, leading directly to the failures. (p.72)

While case studies are invaluable in getting into the details of specific situations, multivariate statistical approaches enable hypothesis testing, and hold out the hope of ‘prediction’. There are still many issues to be resolved however. Santor, for example, points out that while data selection, the definition of banking crises, and the question of which set of macro variables best quantify impending banking-system stress have been addressed in the literature, the issue of sample selection is largely ignored.

> The importance of choosing an appropriate control sample should not be underestimated. . . . In terms of the banking-crisis literature, whether the crisis countries are sufficiently similar to the control group in terms of their characteristics must be considered. That is, do the respective countries in the crisis and control groups share similar institutional and macroeconomic features that would render them comparable when exposed to a shock that could induce a banking crisis? If the latter group is not sufficiently “close,” then estimation may be biased. (14)

To address this issue, Santor utilizes matching methods to construct a suitable set of control-group countries. He constructs an empirical model of banking crises and contagion based on the work of Chen. Chen suggests that contagion may be the result not of real linkages between banking systems, but of information flows between the two systems. Investors in one country receiving information that a banking system elsewhere has failed may believe that their own system is vulnerable and may then initiate a run on their own system. This is informational contagion.

He concludes:

> The empirical evidence indicates that information contagion may play an important role in predicting future banking crises. Interestingly, it is only the occurrence of a banking crisis that leads to information contagion; currency crises do not provoke contagious banking-crisis events. This is consistent with previous evidence that suggests that banking crises and currency crises are either concurrent events or that currency crises are preceded by banking crises. (28)

In one of the most ambitious empirical efforts, James Barth and various colleagues have collected a vast array of data on bank regulations and supervisory practices. Using this data, Barth, Caprio, and Levine (2004) have estimated a number of logit regressions that examine the relationship between banking crises and bank regulation and supervision.

> The results . . . indicate that restricting bank activities is associated with an increase in the likelihood of suffering a major crisis. In the full sample, we find a weak, positive relationship between the likelihood of a crisis and restricting bank activities. The ability of banks to stabilize income flows by diversifying activities, however, may only work in countries with sufficient securities market development. When restricting the sample to countries for which the World Bank has been able to collect at least some data on stock market transactions, we find

> that greater regulatory restrictions are indeed strongly, positively associated with the likelihood of suffering a crisis. Somewhat anomalously, regulatory restrictions on bank activities are not positively associated with non-performing loans. . . . while recognizing this result on nonperforming loans, the crisis regressions are consistent with the view that diversification of income through nontraditional activities is positively associated with bank stability, especially in economies with active nonbank-financial markets. . . . in several regressions the likelihood of a major banking crisis is positively associated with greater *limitations on foreign bank entry/ownership*. . . . These results do not suggest that bank capital is unimportant for bank fragility. They do, however, suggest that there is not a strong relationship between the stringency of official capital requirements and the likelihood of a crisis after controlling for other features of the regulatory and supervisory regime. . . . We find a positive association between the generosity of the deposit insurance scheme and bank fragility. . . . while many stress tighter official supervision and more stringent capital requirements as the antidote to generous deposit insurance, we find little evidence to support this advice. . . . Official supervisory powers – and the assortment of Official Supervisory Action Variables and Official Supervisory Experience and Structure Variables defined above – are not statistically related to the probability of suffering a systemic crisis. . . . In terms of crises, there is no significant association between private-sector monitoring and the likelihood of a banking crisis when controlling for other variables.[1]

What have we learned?

Banks do better in a healthy economy (real economic growth, inflation moderate); banks do better if their loan portfolio is diversified. Beyond these observations, there are many other factors at work: bad luck, fraud, mismanagement, inadequate capital and more. Beyond the issue of bank failure, it is not clear what factors create systemic stress. At the Central Bank Research Conference at the BIS in 2002, it was argued that "any comprehensive analysis of systemic risk must go beyond the narrow confines of the banking system, to cover the interrelations between the banking system, financial markets and the real economy. Indeed, one of the recurring themes of the conference was that much of the literature on banking crises and contagion, the topics of the first two conference sessions, remained overly focused on a set of specific assumptions and modelling conventions. As a result, while being more tractable, these models have provided only limited analytical assistance to the policy community." (Committee on the Global Financial System, p. 2)

Fed Vice Chairman Andrew Ferguson has nicely illustrated the dilemma facing policymakers who must deal with systemic issues but whose theoretical toolkit is not up to the task.

> . . . recessions that are preceded by asset-price booms and busts may also be associated with problems in the banking industry. In such episodes, the ensuing loss of intermediation may serve as an additional force acting to prolong and deepen what might otherwise have been a milder recession.
>
> The word bubble is sometimes employed to describe any quick and large increase in asset prices, but a more precise definition would associate bubbles with only those increases in asset prices that are not due to economic fundamentals. Under such a definition, a bubble is present when investors buy assets at prices above their fundamental values in the expectation of being able to sell them at even higher prices in the future. To be sure, such departures from fundamentals may start small, but over time they could grow explosively. The fundamental price of an asset typically is defined in terms of the discounted present value of the income stream or equivalent services that the asset is expected to provide over time. For stock prices, for example, this is the present discounted value of dividends; for real estate, it is the discounted value of the rents or services that are expected to accrue to the owner over time. In theory, the existence of bubbles, defined in this way, is possible in standard asset-pricing models and may even be consistent with rational, profit-maximizing behavior.
>
> Ascertaining the existence of bubbles in practice is a very different matter. An immediate difficulty is that the theoretical notion of the fundamental price does not have an easily measured

1 *In a recent paper, Gonzalez uses a panel-database of 324 banks in 37 countries to study the effect of regulatory restrictions on banking activities on the bank charter value and risk-taking of banks. The database comes from Worldscope, which provides financial data on stock-exchange listed banks. Credit risk is measured as the ratio of non-performing loans to total bank loans; overall bank risk, the standard deviation of daily bank stock returns for each year. Bank charter value is measured as Tobin's Q. The results indicate that regulatory restrictions increase banks' risk-taking incentives by lowering their charter value. These results are in line with the negative relation between regulatory restrictions in banking and the stability of the banking system found by Barth and his co-authors.*

empirical counterpart. In part as a result of this measurement problem, statistical tests using historical data cannot easily distinguish bubbles from failures of the standard asset-pricing model in some other dimensions, or no failure of the model at all. Indeed, for every study of historical data that finds evidence of a bubble, often another shows that the findings could be explained by an alternative specification of the fundamentals in the absence of bubbles. That is, even with the benefit of hindsight, statistical tests attempting to confirm the existence of bubbles in historical episodes can remain inconclusive.

Of greater relevance for policy discussions, however, is not whether economists can identify a bubble long after it occurs, but whether the presence of a bubble could be detected in real time, when the information might be useful for policy decisions. Unfortunately, detection of a bubble, which is problematic even ex-post, is an even more formidable task and arguably becomes virtually impossible in real time. Indeed, in real time, it is not uncommon for economists and market participants to fail to recognize important shifts in underlying trends that may subsequently be viewed as the source of significant changes in market fundamentals. Current statistical methods are simply not up to the task of "detecting" asset-price bubbles, especially not in real time, when it matters most. "Detecting" a bubble appears to require judgment based on scant evidence. It entails asserting knowledge of the fundamental value of the assets in question. Unsurprisingly, central bankers are not comfortable making such a judgment call. Inevitably, a central bank claiming to detect a bubble would be asked to explain why it was willing to trust its own judgment over that of investors with perhaps many billions of dollars on the line. . . .

. . . sweeping generalizations regarding asset-price-bust recessions and subsequent recoveries are not easily made. Idiosyncrasies dominate comparisons in the historical data. As such, each recession-and-recovery episode would seem to call for its own tailor-made policy response.

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SESSION 4

What are the data gaps regarding non-bank financial institutions and how can they be narrowed?

Chair's summary:	Mr. David Fanger (Moody's Investors Service)
Papers:	**Assessing threat to financial stability from non-bank financial sectors** Mr. Christian Hawkesby (Bank of England) **Data for the financial stability analysis of the insurance sector and financial conglomerates** Mr. Pim Lescrauwaet (National Bank of Belgium) **A securities regulator's perspective** Mme. Ann Leduc (Canadian Securities Administrators) **Data requirements and availability regarding hedge funds** Mr. Miville Tremblay (Bank of Canada)

Chair's summary

David Fanger (Moody's Investors Service)

The focus on the session was an assessment of the core requirements and the current quality of data with respect to non-bank financial institutions. The discussions covered the systemic importance of non-banks, both from the point of view of their size as individual institutions and their role and function as a sector.

The chair of the session expressed the view of ratings agencies that central bankers and regulators play a key role in minimizing systemic risk and contagion risk. They must be prepared to take aggressive action to head off a systemic crisis in the event of the insolvency of a large financial conglomerate, including rescuing such a firm. Market discipline is essential but it cannot solve all problems. In his view, stability concerns should take precedence over efficiency issues.

The four interveners each brought a unique perspective on the question. **Christian Hawkesby** from the Bank of England described the work the Bank of England has done on identifying which non-bank financial sectors pose the greatest risks to financial stability. **Pim Lescrauwaet** talked specifically about the data challenges involved in the macro-prudential analysis of insurance companies and financial conglomerates. **Ann Leduc** from the Canadian Securities Administrators highlighted some of the data challenges involving securities firms. And **Miville Tremblay** from the Bank of Canada discussed the challenges in conducting data surveillance on hedge funds.

The discussions underlined that the non-bank financial sector are an eclectic group, each with its own unique data challenges. How does one go about determining if these sectors are of systemic importance or not? From an efficiency point of view one might look at the importance of the services they provide and the concentration of service provision. From a stability point of view, one might examine links to the banking system and financial markets. This implies the need for a better understanding of the nature of these linkages – i.e. counterparty exposures, ownership, impact on market confidence, and so on, to assess the channels of transmission.

The actual information sources would include the regulatory returns, public disclosure, market indicators and market intelligence. Each information source has its own pros and cons. For example, market intelligence has the advantages of timeliness, flexibility and compatibility. On the negative side, it may suffer from lack of precision and materiality. Regulatory returns have the advantages of comparability and low marginal cost. On the other hand they impose conformity, are less timely and requiring them may create moral hazard issues.

It was generally agreed that the quality and reporting frequency of *insurance company* data needs to be improved in most nations. Insurance accounting tends to be opaque, public disclosure inadequate (at least compared to banks) and many of the detailed regulatory returns are only available on an annual basis. There is a need in various nations for more risk-based solvency reporting, additional information on the implications of reinsurance for solvency and profitability, and more information on off-balance sheet and derivatives data. As insurance companies – at least the large ones – adopt the risk management (ALM) framework, this should be reflected in their regulatory and public reporting.

The long-term nature of insurance company liabilities makes them unlikely candidates for a liquidity run. However, the occasional insurance firm with atypical liability structures has had problems. In addition, the linkages between insurance firms and their bank affiliates are often not well disclosed or understood.

Later in the session, it was noted there has been increasing debate in the financial stability literature on whether large and complex financial conglomerates (groups including both bank and non-bank businesses) pose unique risks for the system. One author has recently referred to "conglomeration risk" which can lead to various degrees of contagion within the conglomerate from events affecting the reputation of the entity. For example, this could give rise to contagion between bank and insurance sectors directly through bank-insurance groups and indirectly through financial markets. There was some discussion about the need to develop indicators for measuring "conglomerate risk" since supervisory data typically focuses on solvency of individual regulated institutions. Information on intra-group transactions and exposures that could reveal the risk of contagion is often lacking. Market measures such as CDS spreads, “distance to default” and subordinated debt spreads were suggested.

The role of market intermediaries (i.e. *securities dealers*) has come under greater scrutiny of late (for example, a recent IOSCO report was cited). In Canada and elsewhere, securities regulators have been trying to address the information asymmetry problems inherent to securities markets by holding underwriters and dealers legally responsible for inaccurate or incomplete disclosure documents.

Hedge funds globally have grown ten times in size of total assets since the LTCM incident. But the largest hedge funds today are much smaller than LTCM was at its peak and less leveraged. A number of participants felt that the systemic risk posed by a hedge fund collapse was limited. However, they can be important operators in markets at various times. Some have argued that they provide a valuable liquidity role in markets by taking “contrary” positions to mainstream institutions. On the other hand, it has been suggested that they also at times contribute to the “herding” effect when hedge funds of the same style step in to the market to implement the same strategies. Banks are getting increasingly involved with and exposed to hedge funds through prime brokerage arrangements. Banks are also emulating hedge fund strategies through their own proprietary trading desks, increasing their effective exposures. By transmitting risk to other financial sectors, these trends could increase the systemic risk if a hedge fund were to collapse.

Hedge funds offer unique challenges from a data collection and monitoring perspective. The various proprietary private sector databases which are available tend to be more of a marketing tool and may not be sufficient for risk analysis. It was proposed in the session that hedge fund administrators might be a promising source of information as each hedge fund tends to use only one administrator. This could make them a better information source than prime brokers; most hedge funds deal with more than one prime broker which could make it more difficult to get the complete picture on any hedge fund from these entities.

Assessing hedge fund information can be particularly problematic. They frequently don’t report their leverage factor, they operate in multiple national markets (80 per cent of all hedge funds are headquartered in the Cayman Islands), and they are almost completely unregulated, although the US is considering some limited proposals in this respect. But even if they were required to file periodic reports, since their portfolios often have very high turnover and they can change their net exposures “on a dime”, period-end reports could prove useless as a risk monitoring tool after just a few days. There may be a role for the public sector in bringing hedge fund data together. For example, in Canada *the Hedge Fund Market Activity Working Group* (Bank of Canada/OSFI/OSC) is working on the problem as is a BIS working group in the global context. However, opinion during the session was mixed on whether significant additional resources should be expended in gathering hedge fund data.

David Fanger (Moody’s Investors Service)

Assessing threat to financial stability from non-bank financial sectors

Christian Hawkesby (Bank of England)

Gauging the strength of the banking sector plays an integral role in the macro-prudential surveillance undertaken by central banks. Banks fulfil an important function in the financial system as deposit takers, lenders, and payment providers; are vulnerable to liquidity risk, given their unique liquidity transformation role; and can act as conduits of financial shocks, through interlinkages in the interbank market and payment and settlement systems. By contrast, assessing threats from non-bank financial sectors has typically played a smaller role within central banks. This paper briefly summarises a presentation made to the Bank of Canada on data requirements for non-bank financial sectors, such as insurers, securities dealers, and hedge funds.

Definitions of financial stability

Before determining data requirements for non-bank financial sectors, it is important to first determine which non-bank financial sectors are important in maintaining financial stability. The answer to this will depend, in part, on how financial stability is defined, and there is currently no consensus across central bankers or academics.

At one end of the spectrum, traditional definitions of financial stability tend to emphasise the special nature of banks (George 1993), as discussed above. These types of definitions suggest that a non-bank financial sector is systemically important if it has strong links to the banking sector or the financial markets that banks operate within. At the other end of the spectrum, some more recent efforts to define financial stability are based on the ability of the financial system to help consumers to smooth consumption over time and different states of nature (Haldane et al. 2004). These types of definitions suggest that the size and concentration of non-bank financial sectors are important selection criteria.

This spectrum of definitions can broadly be distilled into three selection criteria for a non-bank financial sector's systemic importance:

- Links to banks, through counterparty and ownership links.
- Links to capital markets, through large holdings and rapid reallocation of financial assets.
- Links to the real economy, through provision of key financial services.

A framework to assess non-bank financial sectors

A thorough assessment of the systemic importance of UK-resident non-bank financial sectors can be found in Corder (2004). Table 1 below provides a highly stylised assessment of UK-resident non-bank financial sectors, applying the criteria discussed above – black represents relatively strong links; grey weak links; and white in between – and is summarised below.

Non-life insurers have limited counterparty links to UK banks, and relatively small holdings of financial assets, but the sector is relatively concentrated and provides a financial service that in some cases is compulsory. Life insurers have some counterparty links with UK banks (mostly through ownership), the size of the sector's balance sheet is much larger than the non-life insurance sector, and life insurers provide a key vehicle for long-term savings. The systemic importance of hedge funds is well documented, and the potential for counterparty links and capital market linkages was well illustrated in the collapse of the hedge fund LTCM in 1998. Securities dealers are also active in capital markets, and have material links to banks through their role as counterparties in a number of financial markets.

Table 1 – Systemic importance: a rough UK-resident assessment

	Non-life insurers	Life insurers	Hedge funds	Securities dealers	Banks
Links to banks					
Links to markets					
Links to real economy					

Table 2 – Closing information gaps: advantages and disadvantages of sources

	Public disclosure	Regulatory returns	Market intelligence
Advantages	Coverage Discipline Limit moral hazard	Comparability Improve risk management Low "marginal" cost	Timeliness Flexibility Compatibility
Disadvantages	Confidentiality Comparability Timeliness	High "fixed" cost Imposing conformity Timeliness Moral hazard	Accuracy Materiality

Information sources for non-bank financial sectors

To gauge threats to financial stability posed by non-bank financial sectors, there are a number of alternative information sources to draw from. These can to split into four broad categories (with some examples provided):

- *Public disclosures*: profits, capital, asset allocation.
- *Markets indicators*: share prices, implied volatilities, credit default swap premia.
- *Regulatory returns*: capital, liquidity, counterparty links.
- *Market intelligence*: derived from market participants.

In the UK, information on the insurance sector comes from a range of these sources. However, a lack of comparability in regulation and accounting rules for insurance firms (and central banks' fewer direct dealings with the sector) make disclosures difficult to interpret. The majority of large UK-resident securities dealers are subsidiaries of global US-owned institutions. As a result, there are few public disclosures or market indicators for this sector, separate from the global group. In the case of the hedge fund industry, the limited nature of regulation and disclosure means that market intelligence plays an integral role in monitoring risks from this sector.

When it comes to closing gaps in central banks' understanding of threats from non-bank financial sectors, there are advantages and disadvantages to the four types of information sources described above (Table 2). In recent years, the Bank of England has placed more emphasis on using market intelligence, both to gauge threats to the financial system and understand the channels through which a shock might affect financial stability.

Summary

Within the UK-resident context, hedge funds and securities dealers have strong links to both banks and capital markets. In recent years, the Bank of England has placed particular emphasis on market intelligence to gauge threats from these sectors. However, without a definitive definition of financial stability, the question of which non-financial sectors are systemically important will always be open to some debate. The specific structure of the financial system in question is also a fundamental issue for the central bank to consider. London's role as an international financial centre, for example, will have an influence on the relevance of different sectors. As such, the assessment presented in this paper should be seen as a framework for thinking about threats from non-bank financials, rather than a benchmark for other countries or the global sector.

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Christian Hawkesby (Bank of England)

Data for the financial stability analysis of the insurance sector and financial conglomerates

Pim Lescrauwaet (National Bank of Belgium)

Central banks increasingly pay attention to the analysis of the financial system, in order to ensure, next to monetary stability, also financial stability. While the analysis of the developments within the banking sector are undoubtedly the main area of interest within this second mission of central banks, also other financial companies, such as insurance companies and financial holdings deserve close monitoring for several reasons. This short note describes in its first section the main differences and interactions between banks and insurance companies, on the basis of which the relevance of insurance companies and financial holding companies for financial stability is established. Further, the note focuses on the data that are currently used for the macro-prudential analysis of those sectors. It also points to some weaknesses in the current framework in place in Belgium and the ways in which those could be removed.

The Irving Fisher Committee Workshop on Data Requirements for Analysing the Stability and Vulnerability of Mature Financial System aims at examining the current and future challenges for meeting data requirements for financial system analysis and the steps to be taken to improve the availability of data in key areas.

While the analysis of the developments within the banking sector is undoubtedly the main area of interest in financial stability analysis, also other financial companies, such as insurance companies and financial holdings deserve close monitoring for several reasons. This note focuses on issues related to those two types of financial companies, which are especially relevant in the Belgian context.

The note first describes the main differences and interactions between banks and insurance companies, on the basis of which the relevance of insurance companies and financial holding companies for financial stability can be established. Further, the note focuses on the data that are currently used for the macro-prudential analysis of those sectors in Belgium. It also points to some weaknesses in the framework currently in place and the ways in which those could be removed.

1. Banks, insurance companies and financial groups and financial stability

1.1. Differences between banks and insurance companies

Insurance and banking activities have very different characteristics as regards their balance sheet composition, the nature of the risks accepted, their maturity structure and their sources of income, as summarized in Table 1.

First, credit granting is generally considered to be the primary source of risks in banking, while, in insurance, the main focus is traditionally on underwriting risk, i.e. the risk of underpricing insurance contracts and underestimating the adequate level of technical provisions. This difference of emphasis is mirrored in the different approaches adopted by regulators when fixing capital requirements. Those requirements are primarily established by reference to assets for banks and to liabilities for insurance companies.

Second, assets generally have a longer duration than liabilities in the case of banking, while the reverse is true in insurance, especially in life insurance. Moreover, maturities are generally longer in insurance than in banking, both on the assets' and the liabilities' side. This means that, broadly speaking, a rise in interest rates is favourable for insurance companies and harmful for banks. Next to that, the structure of banks' balance sheets make them more prone to liquidity risks than insurance companies, whose assets are generally more liquid than their liabilities.

As a result of these differences, combining banking and insurance activities might yield diversification benefits and lead to compensation of risks. Therefore, banks and insurance

Table 1 – Risk profile of banks and insurance companies

	Banks	Insurance companies
Basic risk	Credit (linked to assets)	Underwriting (linked to liabilities)
Interest rate risk	Assets have higher duration than liabilities	Liabilities have higher duration than assets
Liquidity risk	Potentially high due to maturity structure	More limited
Market risk	Common sensitivity to fall in securities prices and to low level of interest rates	
Conglomeration risk	Spreading of problems through concentration risk or reputation risk; Cross-subsidisation effects and governance issue	

Table 2 – Systemic risks associated with banks, insurance companies and financial groups

	Banks	Insurance companies
Systemic risk	Role in payment system and in allocation of savings and investments	Support for economic activities and trust in the financial system
Contagion risk	High through interbank market	Low through reinsurance
Conglomeration risk	Contagion between bank and insurance sector directly through bank-insurance groups and indirectly through financial markets	

companies increasingly cooperated and even formed financial conglomerates. This closer cooperation could however also lead to specific risks, called here conglomeration risks. These include the risk that, within a financial group, problems from insurance activities spread to banking activities. This is possible through several channels, of which cross-subsidisation, governance inadequacies, double-gearing and reputational problems are the most important ones.

1.2. Relevance for financial stability

As a result of the differences between banking and insurance activities mentioned above, their implications for financial stability are also divergent, as illustrated in Table 2.

The need to closely monitor the resilience of banks in order to safeguard financial stability directly follows from the structure of banks' balance sheets, which makes them, as indicated above, prone to runs and exposes them to liquidity risk, from their pivotal role in the payment system and from their close interlinkages through the interbank market, which could speed up the propagation of shocks to the whole financial system. While insurance companies do to a large extent not share these specific characteristics, they are also connected to each other through a network of reinsurance companies and are also becoming exposed to liquidity risks akin to these of banks as a result of the evolving nature of their liabilities.

However, a more important threat to financial stability posed by insurance companies has to do with their role in the real economy and through the possible negative impact on the trust in the entire financial system if problems should arise in the insurance sector.

In addition to that, insurance companies are tied to banks through their financial markets operations. They do not only influence the prices of a wide range of financial instruments which are also actively traded by banks, but they are increasingly operating on the credit risk transfer market as sellers of credit risk protection to banks. This implies that systemic problems in one sector could spread to the other.

The relations between the two sectors may also be institutionalised within bancassurance groups. This is notably the case in Belgium, where the four major financial groups, which hold a market share of over 80 p.c. in banking, also account for approximately 50 p.c. of the total Belgian insurance market (Table 3). Besides a common ownership, the different entities interact through a wide variety of channels, such as cross-selling of products or intra-group credit granting.

Table 3 – Market share of the large financial groups active on the Belgian market in banking and insurance (Data at the end of 2004 for banking and at the end of 2003 for insurance)

Group	Insurance market			Banking market
	Entire insurance market	Life insurance	Non-life insurance	
Fortis	20.3	23.0	14.6	32.0
Dexia	8.0	9.9	3.8	15.9
KBC	10.3	11.1	8.6	22.0
ING	8.1	10.1	3.8	12.0
Total	**46.7**	**54.1**	**30.8**	**81.9**

Sources: Assuralia, CBFA, NBB.

2. Macro-prudential framework of the financial sector

It has become clear that, especially in the Belgian context, financial stability analysis cannot remain confined to the banking sector, but has to be broadened to include also the insurance sector and the large financial groups.

In all three cases, the mission of macro-prudential analysis is to explore the risks to which the institutions are exposed and their ability to stand up to them. The overall financial position of the institution depends on many factors, some of which are difficult to quantify. As a result of this, an assessment of financial soundness needs to take into account both qualitative and quantitative measures. Quantitative information often forms the starting point however, as it allows to establish priorities and to focus on the most important risks. In the remaining part of this note, we will focus on the quantitative measures or financial soundness indicators (FSI's).

More particularly, the main FSI's used for analysing the financial position of the insurance sector and the financial holding companies are discussed. Next to that, the main weaknesses of the currently used data and the ways in which things could be improved are highlighted. While section 2.1 sets the stage by comparing the situation in the two above-mentioned sectors with the one in the banking sector, where financial stability analysis is best established, section 2.2 looks more in depth to the insurance sector and section 2.3 to the financial holding companies.

2.1. Banks vs. insurance companies and financial holdings

The macro-prudential analysis of the financial position of the banking sector is well-established and can rely on a frequent and extensive set of supervisory data. In the case of Belgium, banks report on a territorial basis, i.e. excluding their foreign branches and subsidiaries, on a company basis, i.e. excluding their foreign subsidiaries, and on a consolidated basis, including all domestic and foreign activities. These reportings allow to analyse the sector from different angles. They are extensive as they comprise the balance sheet, the profit and loss account, off-balance sheet information as well as an extensive set of annexes, related i.e. to banks' solvency position, asset composition and credit risk, funding, interest rate risk and market risks. Data are at least available on a quarterly basis, with a time lag of maximum 2.5 months. They are easy to consult through a Windows-based application. One can choose to obtain information for an individual bank, a peer group (which allows for instance to compare the largest banks with the others), and aggregated data for the entire sector. With the introduction of IAS/IFRS as of January 2006 for the supervisory reporting of all Belgian banks, the reporting and consulting features will be further refined.

In the case of insurance, the supervisor also makes use of a predefined set of data, as for banks. The coverage, frequency and timeliness of this data is however not comparable with that in the case of banks, as will be discussed in section 2.2.

Financial holding companies are a specificity of the Belgian financial system. Such companies head the financial groups and, in most cases, have different subsidiaries, specialised either in banking, insurance or other financial activities. There does not exist for the time being a supervisory reporting for these holding companies. It would in fact be particularly difficult to aggregate banking and insurance data in one template. In order to carry out its supervision of the group as a whole, the supervisor has to rely on information provided by these groups on demand. This means that, for the macro-prudential analysis of these groups, other sources of information are needed. These issues are treated in section 2.3 of this note.

One type of information frequently used in analysing the financial position of a company is market data. While equity-related information is available on the holding level of the large financial groups in Belgium, there is only one Belgian bank and no insurance company listed on a stock market. Also for debt-based data, it is more difficult to obtain information for the banking and insurance subsidiaries separately, as in most cases bonds are issued by a specialised subsidiary of the group. Debt-based information is also obtained through the group's and its subsidiaries' credit ratings.

Next to that, publicly available information, stemming mainly from annual and quarterly financial reports, is available for the large financial holdings and their bank and insurance subsidiaries.

2.2. Insurance sector

Insurance companies are much less exposed to liquidity risks than banks as a result of the inverse maturity structure of their balance sheets (see above). In addition to that, maturities are generally longer in insurance than in banking, especially on the liabilities side. This lends support to the use of financial soundness indicators that rely on accounting data for surveillance purposes, since problems will likely be reflected, at least to some degree, in recent historical data.

On the basis of several studies, mainly based on US data, which identified the variables that are important for prediction of a failure of an insurance company, the IMF has developed a set of indicators for the periodic monitoring of insurance companies, broken down in a core and encouraged set (see Appendix 1). While most of the core indicators are available through Belgian supervisory reportings, some have a higher priority than others in the Belgian macro-prudential analysis framework. Section 2.2.1 treats in more detail the characteristics of the available supervisory data and discusses the most relevant FSI's.

2.2.1. Supervisory data

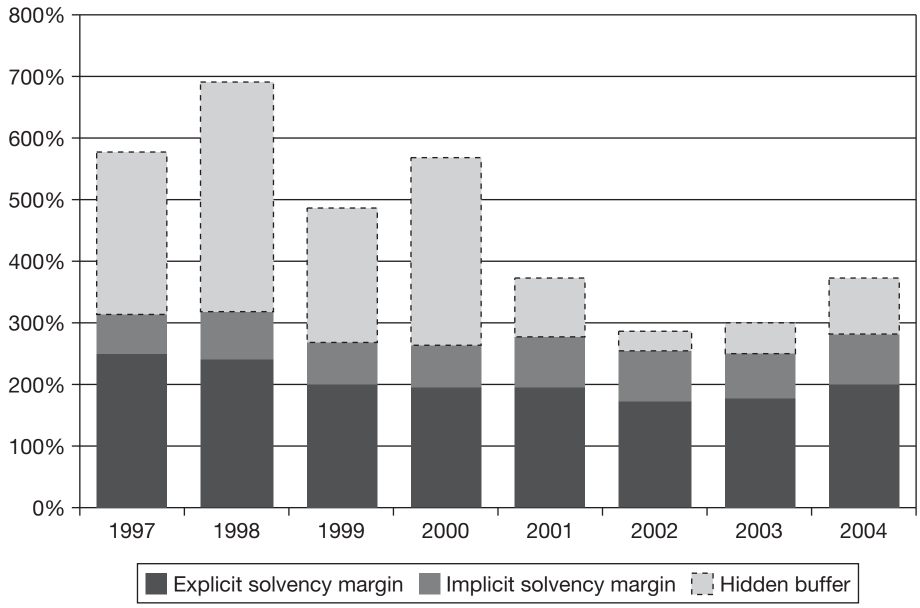
The macro-prudential analysis of the insurance sector in Belgium mainly draws on supervisory data. These figures concern all insurance companies supervised by the Belgian authorities, accounting for around 90 p.c. of the entire Belgian insurance market, the remainder being institutions without an establishment in Belgium or registered in another member state of the European Economic Area. The figures are basically only available on a company basis, which means that information on the activities of foreign subsidiaries of Belgian insurance companies is not included.

While solvency figures are available on a quarterly basis and with a relatively small time lag, financial statements and statistical information per product type are only available (electronically) on a yearly basis, with a time lag of about 6 months. In order to have more timely data, the provisional data of a set of large companies, accounting for about 80 p.c. of total premiums in life insurance and 50 p.c. in non-life insurance, is used. This information is already available after 3 months.

It is clear that a first improvement of financial stability analysis could be realised by making supervisory data available more timely. In addition to that, one could pose the question whether all data should not be available on a quarterly basis, as is already the case for banks. Another shortcoming of the supervisory data is that it only exists on a company basis. It would enhance the quality of the analysis, both at the macro and the micro level, if data on a consolidated level would be used, in order to better gauge Belgian insurance companies' activities abroad. While these activities are still quite limited for the time being, this might quickly change with increasing European financial integration, and the important activities of a large Belgian financial group in Central Europe.

Turning to the content of the data, the analysis of the insurance sector focuses both on the solvency and the profitability of the sector, along the lines of the soundness indicators for the insurance sector proposed by the IMF.[1]

Chart 1 – Available solvency margin of Belgian insurance companies (Percentages of the minimum required solvency margin)



Sources: CBFA, NBB.

With regard to the solvency position, the available regulatory own funds are compared to the minimum required capital, calculated according to European regulation. Next to that, also the other FSI's proposed by the IMF are looked at.

A major shortcoming in this analysis of the solvency position is that the minimum solvency requirement is calculated on the basis of insurance companies' underwriting activities only, and does not take into account the full range of risks insurance companies are exposed to. In addition to that, the required solvency margin is mainly calculated on the basis of the collected premiums and constituted provisions, which means that stronger insurance companies, holding larger provisions or calculating higher premiums, may have to constitute a higher solvency buffer. This should however improve with the introduction, on the European level, of a more risk-based solvency regime (Solvency II).

The weaknesses are partly addressed by including in the solvency margin the unrealised capital gains on the investment portfolio not recorded on the balance sheet as a result of the fact that accounting rules are based on the amortized cost for bonds and the lower of cost or market principle for equities (for more information, see Box 5 in last year's Financial Stability Review, pp. 56–58[2]). This correction is however not complete, as the difference between the book and the market value of liabilities is not included in this additional solvency buffer, which is due to the fact that the market value of the liabilities in not part of the supervisory reporting scheme. Chart 1 provides, by way of illustration, the available solvency margin of Belgian insurance companies in percentages of the required minimum. One can distinguish the regulatory margin, composed of an explicit and an implicit element, and the "hidden buffer", which comprises the unrealised capital gains on the investment portfolio not recorded on the balance sheet.

With regard to profitability, some basic indicators are used, such as the return on equity and assets, the profitability of life and non-life activities, the financial versus the underwriting revenues, the impact of reinsurance on the non-life insurance result and the return on the investment portfolio. The focus lies however on underwriting risk in non-life insurance and on investment risks in life insurance. With regard to the former, the goal of the analysis is to see whether the underwriting business is profitable on its own (measured on the basis of the combined ratio) or heavily dependent on financial income (measured on the basis of the financial dependency ratio, calculated as the return on the investment portfolio needed to make a class of activities run

1 *An illustration of the types of indicators used can be found in this year's Financial Stability Review, pp. 59–66, http://www.nbb.be/doc/ts/Publications/FSR/FSR_2005_EN.pdf*

2 *http://www.nbb.be/doc/ts/Publications/FSR/FSR_En_04.pdf*

break-even). While the focus is generally put on the non-life activities as a whole, specific classes of insurance activities are sometimes looked at in more detail if there exist profitability problems on the sectoral level (e.g. car liability insurance). With regard to life insurance on the other hand, the focus is on the profitability of contracts providing guaranteed returns, looking in the first place at the financial margin insurance companies realise on these contracts.

Next to that, also the composition of the investment portfolio is analysed in order to assess the quality of the assets, insurance companies' exposure to market risks and their liquidity position. Investments are available for the company as a whole and per type of activity, and are broken down per instrument, per counterparty and geographically. The analysis of insurance companies' exposure to interest rate risks is still less developed however, as only limited supervisory information is available on the interest rate sensitivity of both insurance companies' assets and liabilities. With regard to insurance companies' market risks, some basic stress tests have been devised. These tests are however inevitably incomplete due to the above-mentioned information shortfalls.

In addition to this weakness, another important lack of information relates to insurance companies' off-balance sheet activities. Currently, only very fragmentary information is available on the transactions not recorded on the balance sheet (e.g. credit risk transfer or the options embedded in some life insurance contracts).

Another element that renders the financial stability analysis of insurance companies more difficult lies in the relative opaqueness of these companies' accounting rules. Insurance companies' profit and loss account is made up of 3 large parts: the technical account non-life insurance, including the underwriting result of these activities as well as the financial income allocated to these activities, the technical account of life insurance, including the same elements, and the non-technical account, including the financial income allocated to neither of the activities together with some other elements, such as taxes and extraordinary items. A major problem relates to the opaqueness regarding the attribution of financial income to one of these three accounts. Next to that, accounting and valuation rules do not always allow to obtain a genuine picture of the real financial position of insurance companies, as already mentioned above.

The introduction of IAS/IFRS for insurance companies' supervisory reporting might resolve some of these problems. While the consolidated supervisory reporting for the banking sector will be based on IAS/IFRS as of 2006, nothing is yet decided with respect to the insurance sector. This is partly due to the fact that the current standard on insurance contracts (IFRS 4) will likely be adapted before the end of the decade. In the meantime, insurance companies have, according to Phase I of IFRS 4, to use a mix of Belgian GAAP (for their insurance contracts) and IAS/IFRS (for other items). The non-supervisory consolidated financial statements of listed insurance companies on the other hand already have to be based on IAS/IFRS as of this year.[3]

2.2.2. Other data sources

Other data sources include rating agency data and information communicated by the companies to the market through their periodic financial statements. Both types of information are, in Belgium, however to a large extent only available for the insurance companies which are part of the large financial groups. And even to the extent that periodic financial statements are published for a wider range of companies, useful information would be rather burdensome to aggregate and difficult to compare between institutions. Therefore, these data can only serve to provide some additional, merely qualitative, insights for the insurance companies which are part of the large financial groups. As already mentioned above, market data on insurance companies is not available.

2.3. Large financial groups

While there is much international guidance available on how to perform macro-prudential analysis in the case of banks and even insurance companies, less is known on the data requirements for monitoring the systemic risks related to large financial groups. Nevertheless, as the result of the important place these institutions take in the Belgian financial system, a framework in this field is being set up. The main difficulties encountered in this respect are related to the fact that

3 *In practice this only concerns insurance companies that are part of larger financial groups, as no Belgian insurance company is listed.*

there does not exist a prudential reporting for these groups. Section 2.3.1 will draw further on this issue, while the other sections will discuss the data that are used instead.

2.3.1. Supervisory data

The supervision of financial conglomerates is regulated by the European Conglomerates Directive, which introduces additional requirements for banks and insurance companies that are part of such financial conglomerates, for instance with regard to their capital position, risk concentration and intra-group transactions, and imposes additional requirements to the companies heading such groups (i.e. the financial holding company in the case of Belgium), for instance in the field of management and organisation. Note however that not all large financial groups active on the Belgian market qualify as a financial conglomerate according to the definitions of the European Directive, which means that these rules do not apply to them.

But even for the groups that qualify as a financial conglomerate, the European Directive did not introduce a supervisory statute for the holding level, along the lines of the existing supervisory framework for banks and insurance companies. As a result of this, there does not exist a fixed periodic reporting on the group level. In the Belgian context, such a reporting might however be warranted given the importance of these groups in the financial sector, although it has to be acknowledged that it would be difficult to integrate both types of data in a single framework.

In Belgium, the absence of such a reporting has, on the micro-prudential level, been counterbalanced by the fact that the supervisor can easily request data from these groups and look into their financial accounts even without the existence of a periodic fixed reporting. This possibility however exists to a much lower extent for macro-prudential analysis goals, as the direct contacts between the individual groups and the central bank, which takes care of macro-prudential surveillance, are, logically, less developed. The data received by the supervisor from the individual groups is moreover largely unharmonized, which makes it seemingly impossible to construct aggregate indicators out of it.

To a certain extent, supervisory data of the bank and insurance subsidiaries of one group can be combined to obtain a rough indication on the financial position of the group as a whole. This method has however severe limitations, as it does not take into account intra-group transactions and double counting of capital for instance. As a result of this, the macro-prudential supervision of financial conglomerates relies to a large extent on publicly available data, ratings and market data.

2.3.2. Market data

The price development of financial instruments issued by financial companies may provide information on how financial markets assess risks in these companies. This information may be summarized in market-based risk measures. These have a number of advantages in that they may be forward-looking, they reflect the expectations of a wide range of investors, and data is available with a high frequency. However, the use of market-based indicators assumes a liquid market for financial assets issued by these institutions. In the case of the Belgian financial groups, such markets exist without any doubt for their equities, but this might be less the case for their debt instruments. Furthermore, market prices are influenced by factors that are not specific to the individual institution, but result from market-wide trends. Finally, market-based information should be supplemented with other types of information in order to be able to explain the observed evolutions of the market indicators.

The most frequently used market-based risk measures are based on bond or share prices. Furthermore, the price of hedging credit risk on assets issued by these institutions, i.e. the price of credit default swaps, may be used. While the prerequisites mentioned above in order to be able to use these indicators are fully fulfilled for share price-based indicators and to a certain extent fulfilled for bond price-based indicators, this is not the case for CDS's on Belgian financial groups.

With regard to the indicators based on share prices, the share price itself, relative to the entire market performance, the historical and implied volatility of the share price and the distance to default can be used.

Bond based market indicators include mainly subordinated debt spreads vs. the risk free interest rate. It is however clear that bonds issued by banks are not homogenous, as they differ in maturity, etc., and so are difficult to compare. Next to that, bonds should be traded regularly in order to provide a forward-looking risk measure. In order to isolate group-specific developments from market-wide trends, one has to compare the development of the individual group's indicator with the one for the entire market. In this field, further work has to be done in order to obtain robust information.

2.3.3. Public data

The large financial groups active on the Belgian market all publish quarterly financial statements, annual reports and other documents, providing both qualitative and quantitative financial information to the market. While these reports include very useful and detailed financial information, are very explicative and are quite timely and frequent, their main shortcoming is that they are not constructed according to a fixed scheme. As a result of this, the information included in these reports is rather difficult to interpret and to compare both between groups and over time.

For the time being, these reports are used to obtain an overall insight in the groups' activities, structures and results on a more qualitative basis. They yield information on the relative importance of banking and insurance activities and the profitability of the different business lines.

Next to that, some basic indicators, such as the groups' return on equity, can be used, although they should not be used for cross-sectoral comparisons. These indicators should moreover not be compared with those calculated for banks and insurance companies separately on the basis of supervisory data. Indeed, the differences in the calculation methods and accounting and other rules applied by the groups and these applied by the supervisor render those figures incomparable. These difficulties also exist for the groups' solvency figures. There, each group uses its own methodology and assumptions to calculate a solvency level in the non-existence of regulation in that field: some groups use measures based on the economic value, others include market capitalisation, while still others stick to accounting definitions to calculate the available capital.

2.3.4. Rating data

All large Belgian financial groups and their banking and insurance subsidiaries are rated by the main rating agencies. These ratings and their upward or downward adjustments can be compared with those of other financial groups, for instance in other European countries, in order to obtain an idea of the relative creditworthiness of these Belgian financial groups. One has to note however that the ratings for the holding company, its insurance and its banking subsidiary are often different. While the insurance company has in most cases the highest rating in Belgium, the financial holding has generally the lowest one, reflecting the fact that the holding company does not enjoy the implicit support from a parent company.

3. Conclusion

While the analysis of the financial position of the banking sector remains the most important field of work in macro-prudential surveillance, it is clear that, especially in the case of Belgium, where the four largest banks are all part of a financial group with both banking and insurance activities, also the financial position of the insurance sector and the financial holdings heading the main banks and insurance companies, should be monitored on a regular basis.

The macro-prudential analysis of the insurance sector largely takes place along the lines of that in the banking sector, which means that it is mainly based on the supervisory reporting of the institutions. There are in both cases no market-based indicators available, while the information stemming from the annual and quarterly reports is rather difficult to compare. The main indicators looked at, based on accounting data, relate to the solvency and profitability situation, as suggested by the IMF's list of soundness indicators. The main difference compared to the banking sector relates to the fact that supervisory data in the case of insurance is less complete, timely and frequent.

The situation with regard to the financial groups of which the main banks and insurance companies are part is completely different as there exists no supervisory reporting on that level. Financial stability analysis in this case draws on publicly available data (annual reports of the groups), market-based indicators and the groups' ratings. It is clear that on their own, these data are insufficient to obtain a full picture of the financial position of these groups. As long as there does not exist a fixed reporting for these groups, financial stability will have to rely, even more than is the case for banks and insurance companies, on information provided by the micro-prudential supervisor, which has a more direct contact with these groups and has the power to request any qualitative or quantitative information from them needed to carry out its assignment.

Pim Lescrauwaet (National Bank of Belgium)

Appendix 1 – IMF set of financial soundness indicators for the insurance sector

Category	Indicator	Non-life	Life
Capital adequacy	Net premium/capital	X	
	Capital/total assets	X	X
	Capital/technical reserves		X
Asset quality	(Real estate + unquoted equities + debtors)/ total assets	X	X
	Debtors/(Gross premium + reinsurance recoveries)	X	X
	Equities/total assets	X	X
	Non-performing loans to total gross loans		X
Reinsurance and actuarial issues	Risk retention ratio (net premium/gross premium)	X	X
	Net technical reserves/average of net claims paid in last three years	X	
	Net technical reserves/average of net premium received in last three years		X
Management soundness	Gross premium/number of employees	X	X
	Assets per employee (total assets/number of employees)	X	X
Earnings and profitability	Loss ratio (net claims/net premium)	X	
	Expense ratio (expenses/net premium)	X	X
	Combined ratio = loss ratio + expense ratio	X	
	Revisions to technical reserves/technical reserves		X
	Investment income/net premium	X	
	Investment income/investment assets		X
	Return on equity (ROE)	X	X
Liquidity	Liquid assets/current liabilities	X	X
Sensitivity to market risk	Net open foreign exchange position/capital	X	X
	Duration of assets and liabilities		X

Category	Indicator	Non-life	Life
Capital adequacy	Cover of solvency margin	X	X
	Risk-based capital adequacy ratios	X	X
Asset quality	Asset/liability position in financial derivatives to total capital	X	X
	Investments: geographical distribution	X	X
	Investments: sector distribution	X	X
Reinsurance and actuarial issues	Underwritten business: geographical distribution	X	X
	Underwritten business: sector distribution	X	X
	Underwritten business: distribution by main business lines	X	X
Management soundness	Operating expenses/gross premium	X	X
	Personal expenses/gross premium	X	X
Earnings and profitability	Earnings per employee (Net profit/number of employees)	X	X
	Return on assets (ROA)	X	X
	Return on revenue (net income/total revenues)	X	
Liquidity	Liquid assets/total assets	X	X
	Liquid liabilities/total liabilities		X
Market-based indicators	Market/book value	X	X
	Price/earnings (P/E) ratio	X	X
	Price/gross premium	X	X
Group exposures	Group debtors/total assets	X	X
	Group (premium + claims)/total (premium + claims)	X	X

Source: Das, U., N. Davies and R. Podpiera (2003), Insurance and issues in financial soundness, *IMF Working Paper, WP/03/138.*

A securities regulator's perspective

Ann Leduc (Canadian Securities Administrators)

First, let me thank the Bank of Canada for the opportunity to attend this workshop and share some thoughts with this very learned group. I'm hoping it will prove useful for you to hear the perspective of a securities regulator although I'm afraid I'll provide more questions than answers. Of course, these views are entirely my own.

It may be useful to explain the mandates of securities regulators and the general rules around market intermediaries. Securities regulators in Canada are entrusted with the task of protecting investors from unfair, improper or fraudulent practices while fostering fair and efficient capital markets and confidence in them. The Canadian Securities Administrators is the council of Canada's thirteen provincial and territorial securities regulatory authorities. Established in 1937, its objective is to exercise national leadership to improve, coordinate and harmonize regulation of Canadian capital markets for the betterment of Canadian investors and market participants.

Given their mandate, the fundamental concern for securities regulators is the preservation of the integrity of capital markets and the relative asymmetry of information between investors, intermediaries and issuers. The fundamental way we've tried to balance the information between them and maintain a level playing field is through disclosure, so that investors receive the information necessary to make enlightened decisions about their investments.

The role of market intermediaries in financial transactions has come under scrutiny of late, most notably with the publication of a paper by the Technical Committee of IOSCO[1] which may be of particular interest in the context of this conference. The intermediaries are broadly defined as "investment banks that acted as underwriters for public equity and debt issuances and brokered private loan arrangements as well as broker-dealers who marketed securities to institutional and retail investors"[2]. Securities regulators in general attempt to rebalance the asymmetry of information by holding underwriters and market intermediaries liable for misstatements or omissions in their disclosure documents. A "due diligence" defense is possible where the intermediaries only have to demonstrate that they conducted a reasonable investigation, diligently and in good faith, but this defense is not available to issuers who may be held liable for errors and omissions, even if made in good faith.

The members of IOSCO highlight a challenge for securities regulators in maintaining a relative symmetry of information between investors and intermediaries. "As part of a securities underwriting, market intermediaries frequently become aware of material non-public information about the issuer. . . . Further, complex structured financial transactions may provide intermediaries in possession of knowledge of a company's dire financial condition with opportunities to transfer these risks to third parties"[3]. Right now, there are no international standards defining the required level of due diligence by an intermediary which is underwriting a securities issuance or arranging a loan transaction[4]. Regulators and intermediaries are interested in "what constitutes an adequate review of a transaction for legal and reputational risks to the intermediary, particularly where cross-border securities issuances and other transactions are involved"[5]. Some regulators have attempted to shed some light on the issue. In the UK, the FSA (Financial Services Authority) has issued a letter to investment banking chief executives outlining existing UK standards for addressing management conflicts of interest and reputational risk and how these standards apply in the current business environment[6]. Also, in May 2004, US financial regulators released for public comment an interagency statement concerning complex structured

1 *Technical Committee of the International Organization of Securities Commissions,* Strengthening Capital Markets Against Financial Fraud, *February 2005.*
2 *Ibid, page 21.*
3 *Ibid.*
4 *Ibid, page 22.*
5 *Ibid.*
6 *Ibid, Letter from Hector Sants, Managing Director, Wholesale and Institutional Markets, UK FSA re "Senior Management Responsibilities: Conflicts of Interest and Risks Arising from Financing Transactions", September 17, 2004.*

finance transactions undertaken by market intermediaries describing "in broad detail the types of approval processes and internal oversight mechanisms investment banks should have in place as part of a 'due diligence' review"[7].

Securities regulators around the world are also keenly aware of the possibility of the transmission of risks and events in the financial system, even if securities markets may at first blush seem removed or relatively insular to other sectors such as banking. Mr Corder in his paper[8] makes the point that the channels of transmission in the financial system include counterparty exposure, links through markets and effects on confidence. Other authors[9] have raised the issues inherent in complex banking structures and complex corporate structures. These authors raise the concern that "from a systemic perspective, the critical question is whether the creation of larger and more complex banking organizations has increased the risk that the nation's broader financial system would be adversely affected by a single event or exogenous shock- for example, the failure of (such a large complex banking organization)"[10]. These concerns with large complex banking organizations may or may not also be relevant in the context of other complex financial organizations because of linkages and channels of transmission of risks and events. In any case, these authors comment that "the emergence of megabanks, with their inherent complexities, has increased systemic risk in the U.S. banking and financial systems"[11] because of their size and the degree of interdependency between large complex banking organizations.

Another aspect of these complex structures is well developed by Mr Lescrauwaet in his paper[12], where he makes the point that what he calls "conglomeration risks" may affect even highly diversified financial conglomerates and lead to various degrees of contagion within the conglomerate from events affecting the reputation of the entity. In securities markets, it is difficult to avoid making parallels between these financial sectors and the hedge fund and the mutual fund industries since they are believed to present some degree of interdependency or a degree of herding behaviour with the concomitant impact on financial markets and the risks of contagion. According to research done by the Hedge Fund Market Activity Working Group (staffed by the Bank of Canada, securities regulators, Office of the Superintendant of Financial Institutions and the Investment Dealers Association), hedge funds represent nearly $27 bln in assets in Canada, with quite a high degree of concentration among a limited amount of funds. This data leads us to ask whether these industries present systemic risk issues, correlation issues, or issues related to interdependencies with some of their counterparties and intermediaries.

Other sectors of Canadian capital markets are also growing very fast and becoming important. For example, the income trust sector has grown to $40 bln[13]. Do we have the data to positively state that there are no interdependencies or that the risks are contained enough so as not to affect capital markets if an event occurs that affects various fast-growing sectors of our capital markets? There seems to be few very clear answers to these questions right now and perhaps our understanding of the risks inherent in the non-bank financial sector can benefit from the work done in other sectors of our markets.

I thank you for the opportunity to express these views and questions, and I'm quite certain that the discussion to follow will shed some light on them.

Ann Leduc (Canadian Securities Administrators)

7 *Ibid, US Department of Treasury, US Office of Thrift Supervision, US Federal Reserve System, US Federal Deposit Insurance Corporation, and US Securities and Exchange Commission,* Interagency Statement on Sound Practices Concerning Complex Structured Finance Activities, *May 13, 2004.*

8 *Matthew Corder,* Assessing Risks from UK non-financial Sectors, *Financial Stabillity Review, December 2004.*

9 *Kenneth D. Jones and Chau Nguyen,* Increased Concentration in Banking: Megabanks and their Implications for Deposit Insurance, *New York University Salomon Center, vol. 14, no.1.*

10 *Ibid, page 13.*

11 *Ibid.*

12 *P. Lescrauwaet,* Data for the Financial Stability Analysis of the Insurance Sector and Financial Conglomerates, *June 2005.*

13 *G. Deschamps, Valeurs Mobiliéres Desjardins, for l'Institut Canadien: Conférence sur les Fiducies de Revenu, mai 2003.*

Data requirements and availability regarding hedge funds

Miville Tremblay[1] *(Bank of Canada)*

Many central banks have – or are in the process of setting up – hedge fund-related surveillance efforts or research activities. Their specific surveillance concerns include:
- Attacks on domestic financial markets;
- Exposures of domestic financial firms and investors; and
- Stability of markets in international financial centres.

Sources of information that are relied upon include commercial hedge fund databases, academic literature, market intelligence and BIS international banking statistics. There are serious limitations on the quality of databases on hedge funds. While the databases are probably good enough to identify major trends, some of the main drawbacks of the 14 available databases on hedge funds are the following:
- "Successful" hedge funds voluntarily provide information when they are actively raising capital, "survivor bias,"[2] and "backfilling" (reporting after the fact).
- The quality of the data is no more verified than the personal information of online dating services; many hedge funds withdraw their names and data once they are closed to new investors (the larger hedge funds are no longer listed).
- Certain databases record some "secret" data from closed funds in order to calculate their market indices; data on leverage and lockup provisions are vague and outdated if not absent.
- No database is seen as best and the overlap among them is significant, but not large.
- Data clean up is time consuming for researchers.

The attached graphs illustrate how existing statistics can help to facilitate the ongoing analysis of the hedge fund industry. They show:
- Assets under management, aggregated for all reporting funds, from the TASS database.[3]
- Quarterly flows of capital into hedge funds by style, for the most recent quarter, long-run average and maximum.
- Aggregate maximum portfolio leverage, according to the Hennessee annual survey.[4]
- Leverage by strategy (annual), according to Van Hedge Fund Advisors.
- Consolidated claims of BIS-reporting banks on the Cayman Islands where a significant number of hedge funds are incorporated.[5]
- UK cross-border and US primary dealer repo financing.

Clearly, more research is required to see how far useful information can be extracted from the databases. Efforts should be made to make the best out of the data that are already

1 *This note is based on a study undertaken by the BIS Committee on the Global Financial System. It reflects the personal views of the author.*

2 *"Survivor bias" describes the inability of trackers to adequately include all information, including all losses, if any, of all defunct funds. Some survivor bias is expected and aggregate statistics therefore may be skewed positively. (Source: Van Hedge Fund Advisors International, LLC).*

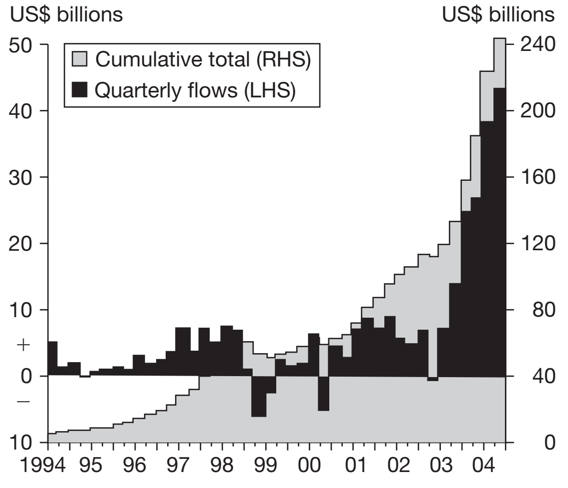
3 *The TASS database is owned and operated by Tremont Capital Management, Inc. and serves as the foundation for the CSFB/Tremont Hedge Fund Index, the industry's first asset-weighted benchmark of hedge fund performance. For more info: http://www.tremontinvestment.com/tass.htm*

4 *The Hennessee Group LLC, a Registered Investment Adviser that consults hedge fund investors, monitors hedge funds through its Hennessee Hedge Fund Index and also conducts the annual Hennessee Hedge Fund Investor Survey to analyze investors' preferences towards hedge funds and understand the underlying factors that affect investor decisions.*

5 *The consolidated claims of BIS-reporting banks on the Cayman Islands form a crude proxy for funded leverage, since many hedge funds are domiciled in the Cayman Islands. (An important qualification is that a significant component of the growth in claims is likely attributable to special purpose vehicles (SPVs), e.g. collateralized debt obligations created by banks for credit risk management or other purposes.*

available and not to collect new data. Research on hedge funds should probably focus on broader issues such as their role and behaviour in financial markets and their interrelationship with financial institutions, particularly banks and brokers that provide them with various financial services.

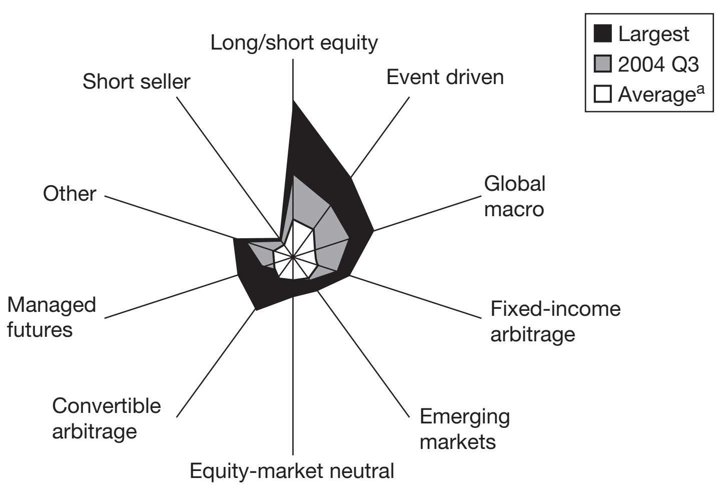
Chart 1 – Hedge fund net assets[a] and flows of capital



a *Captial plus retained earnings.*

Source: TASS research and bank calculations.

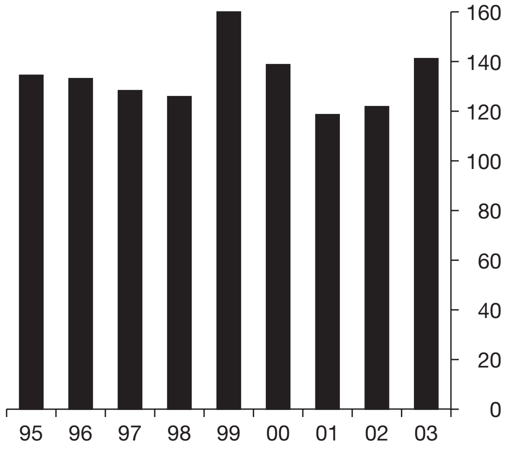
Chart 2 – Capital flows into hedge funds by strategy



a *Mean of net inflows since 1994 Q1.*

Source: TASS research and bank calculations.

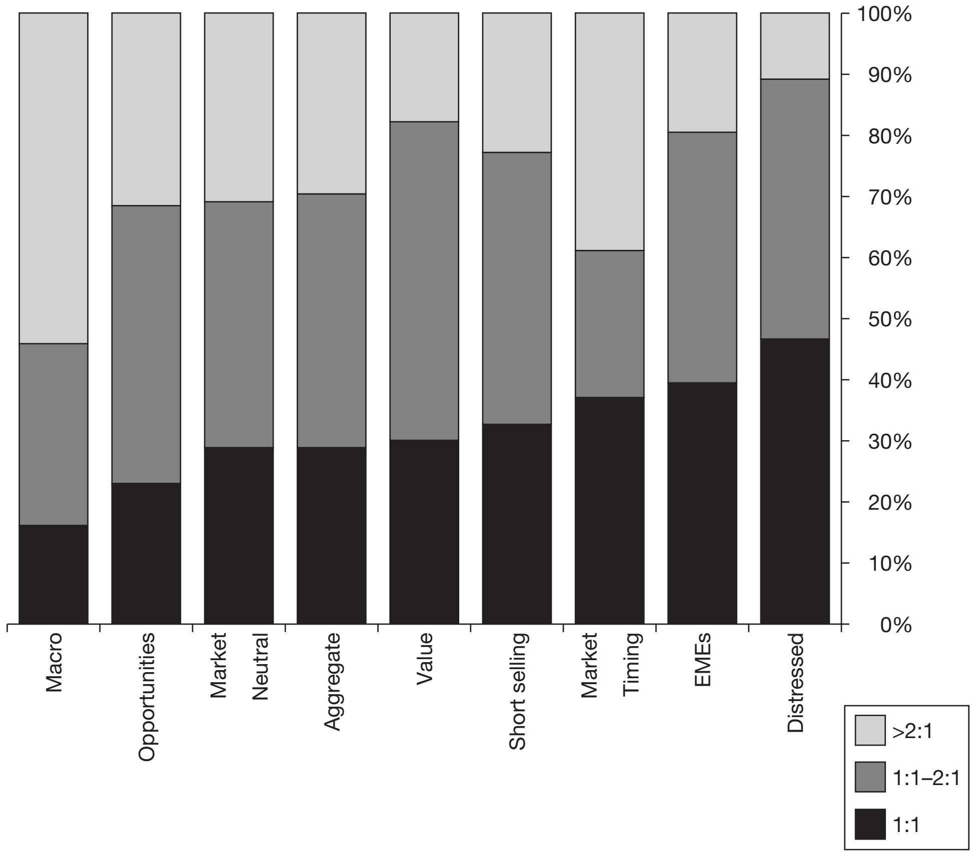
Chart 3 – Aggregate maximum portfolio leverage[a]



a *Leverage defined as maximum historical gross exposures since inception (long plus short) over equity (invested capital plus retained earnings).*

Source: Hennessee annual survey.

Chart 4 – Hedge fund leverage by strategy[a]



a *Leverage is defined as the ratio of total absolute dollars invested to total dollars of equity. A ratio of greater than 2:1 is considered high.*

Source: Van Hedge fund advisers annual publication.

Miville Tremblay (Bank of Canada)

SESSION 5

What are the data gaps regarding non-financial sectors and how can they be narrowed?

Chair's summary:	Mr. Leon Taub (New York FED)
Papers:	**Alternative approaches to financial data collection in Canada** Brad Belanger and Peter Webber (Industry Canada)
	Some data gaps in the Canadian non-financial sector Meyer Aaron and Celine Gauthier (Bank of Canada)
	Background note: data on the household sector Mr. Shinobu Nakagawa (IMF)

Chair's summary

Leon Taub[1] *(New York FED)*

There is no doubt that there are data gaps in the non-financial sectors. The key question is: How serious are these gaps in term of impeding market discipline and our ability to monitor and react to events which can result in financial instability? Related questions are: Can we fill these gaps effectively and if so, can we do so in a cost-effective way?

Several participants opined that historically the non-financial sectors have not been a great source of financial instability, due to the large number of participants, their heterogeneity, and the lack of excessive leverage in these sectors. Other participants disagreed, noting that instability in one or more non-financial sectors has often led to instability in the financial sector. Still others opined that the situation may have been benign in the past, but may have changed (or be rapidly changing) for several reasons, including: increased access to leverage by the non-financial sectors; increasingly sophisticated risk management in the financial sectors, which may have led to the dispersion of risk; new tools and institutional arrangements which have the ability to shift (and often the purpose of shifting) risk to some non-financial sectors; and the increasing interdependence of the world's financial systems. Further, the lack of data is, itself, a risk factor. One participant noted that these developments may lead to increased economic instability, but not increased financial instability. However, this distinction might not be critical, as economic instability can lead to financial instability.

Conference participants agreed that in discussing non-financial sector data collection, the issues of reporter burden and cost are very important. The large number of participants, the need for disaggregated data (e.g., by industry, by income level, by region, etc.) and possibly even micro-data, and the limited need to collect these data for basic business control purposes make data collection far more expensive and difficult for all involved. Conference participants agreed that it is imperative to minimize these costs. Ways of doing so include identifying clearly at the outset: Specific intended uses of the data; the exact information required; the availability of alternative sources (particularly related administrative data); the needed periodicity of the data (For example, is a given data set is needed on an quarterly basis or can it be collected on a less frequent basis and updated using estimation tools and macroeconomic data?); ways to link related data sets; ways of collecting information from more central sources (such as some financial sector institutions); and other potential uses of the data.

The session focused on three main non-financial sectors:

(1) non-financial businesses;
(2) the housing markets and housing finance; and
(3) household financial conditions.

I. Non-financial businesses (Peter Webber)

Mr. Webber focused many of his comments on the Small and Medium Enterprise (SME) Financing Data Initiative, which was recommended by the MacKay commission to fill data gaps regarding small and medium enterprise financing in Canada. The objective of the effort is to collect data to be used to foster an environment which supports the growth of SMEs in Canada by both promoting public policy discussion regarding SME needs and by bringing clarity to the SME financing market. This data project, which is managed by Industry Canada, Statistics Canada and the Department of Finance, currently consists of two surveys: a demand survey and a supply survey. The demand survey gathers information on owner characteristics, the ownership structure of the organization, existing financial obligations and the type of financing that the

1 *I would like to acknowledge gratefully, the assistance of Meenakshi Basant Ro, Bank of Canada and Rick Weaver, Federal Reserve Bank of New York, in providing session notes and comments.*

business is seeking. The supply survey is a census of enterprises with assets of $5 million or more in selected finance and leasing industries.

Challenges relating to the demand survey include:
(1) a declining response rate;
(2) the need for a large sample to provide adequate detail for research; and
(3) matching the results to the supply survey.

Possible solutions that have been proposed are:
(1) the use of administrative data (e.g., tax data sets) to capture some of the missing information; and
(2) the setting up of partnerships with other organizations seeking to conduct research on similar issues.

Mr. Webber also discussed the paper by Carlos Trucharte Artigas, "A review of Credit Registers and their Use for Basel II." The paper describes the collection of data on loans through surveys of lending institutions. This technique reduces the reporting burden and cost, while increasing overall data quality and providing a consistent multipurpose analytical platform. However, Mr. Webber expressed concern about the use of the technique in Canada, due to the lack of cross-border information, the exclusive focus on loans (indeed on loans provided by financial institutions), and on legal restrictions, due to client confidentiality concerns.

Open floor discussion

One discussion topic was the importance of SME financing data for financial stability analysis. The conclusion was that these data were important for other reasons, but provided little in the way of information about financial stability, owing to the small average sizes and heterogeneous nature of the recipients and the credit provided, the lack of leverage usually provided, and probable knowledge by the lenders of the risks involved. One participant noted that this information could be helpful in better understanding macroeconomic and financial linkages within an economy. Another participant suggested that the greater need is for focused studies of specific markets or industries on an "as needed" basis.

The discussion with regard to credit registers, indicated more usefulness with regard to financial stability analysis needs, as these data focus more on large credit recipients, large extensions of credit, and more concentrated extensions of credit. It was felt that credit registers, where they could legally be used, would provide good data on domestic non-financial loans with less cost and burden than direct collection from borrowers.

Another discussion topic was the importance of cross-border financing. This will vary greatly, of course, by country. However, where cross-border financing is important, the collection of data from domestic lenders will be incomplete.

Another discussion topic was the use of alternative data sets. One participant suggested the use of corporate data (as reported by public companies to meet registration requirements), aggregated to an industry level and supplemented with market data. Another participant suggested the use of tax records. It was asked how useful these data are for financial stability purposes. One participant stated that company data could be very useful, but it is a lots of work to match up and aggregate income, assets, and liabilities in a meaningful way. Also, tax data will only be available with long lags. In general, there was the view that we need to be better about "mining" other data, particularly published corporate data.

II. Data gaps in the housing and housing finance markets (Celine Gauthier)

Ms. Gauthier noted that, as in many other countries, Canada has recently seen a rapid growth in property prices combined with heavy borrowing. There may, therefore, be a risk of a reversal in house prices. This raises financial stability concerns, because mortgage credit represents 45 percent of chartered bank lending in Canada.

As is the case for many nations, Canadian house price indices have significant limitations. The new house price data is quality adjusted but does not control for location. Also, condominium apartments are excluded. The average resale price indexes control for location but are not quality adjusted. The development of a house price index which is quality adjusted and controls for location would improve the quality of analyses on the housing market in Canada.

Also, there is inadequate disaggregated information on the financial positions of housing owners. Key indicators that are used for assessing the credit quality of mortgage portfolios include the loan-to-value and debt-to-income ratios. Important data gaps exist with respect to both of these indicators. Other important data gaps also exist, such as detailed information on houses purchased for investment purposes.

Open floor discussion

One major discussion topic was the need for data by household type. Aggregate ratios can conceal more than they reveal. Some subsets of the market may be highly leveraged and be basing their decisions on inflated prices, while other subsets may be in a much less vulnerable position. The subsets may vary by location, income, age, and other characteristics.

There was discussion about whether the information should be gathered by surveys of households or from loan application records. Both data sets would permit the matching of assets and liabilities information, a crucial need. Loan application data would be less costly to gather and subject to some automatic verification. Thus, the quality should be high. However, there are confidentiality concerns. Also, the data would be gathered from a limited, and non-representative, sample of home owners, although this concern might be mitigated if refinancings and home equity loans were included).

An additional issue is that it may be important to segregate the information by type of lender, and perhaps even by institution, as some institutions may be far more exposed than other institutions to weakness in the housing sector.

III. Data on the household sector: What is needed for a risk profile analysis? (Shinobu Nakagawa)

Mr. Nakagawa noted a significant increase in risks transfers to households in recent years in many countries. Examples included the substitution of mutual funds for deposits as a vehicle for savings, the increasing prevalence of index-linked products, and shifts from defined-benefit pension funds to defined-contribution and/or hybrid plans. As a result of the increase in risk borne by this sector, data collection needs for assessing financial stability are increased.

Household data need to be disaggregated so that policymakers can understand which households are most affected by these changes and hence by changes in the risk profile of the household sector. For instance, in the U.S. 10 percent of the population has 57 percent of the net worth. It is likely that if a shock were to occur, it would occur in another segment of the population. Thus, aggregate data on net worth is not very useful in assessing the vulnerability of the household sector to shocks affecting net worth.

Mr. Nakagawa noted that very few countries have detailed information on the household sector; those that do typically have only infrequently collected data that are a year or more old. Furthermore, these data are often incomplete. For example, income and liabilities may not be collected or matched to assets. In addition he identified a number of problems with data on the household sector, including the need for sectorial detail, the need for household balance sheet data that are comparable across countries, and the need to provide more finely defined data, including assets by risk characteristics. (For example, data on mutual fund holdings often do not distinguish between holdings of equity funds, bond funds, balanced funds, and money market funds.)

Open floor discussion

The discussion centered mainly upon the burden, costs and relative need for collecting these data. Given the costly nature of household micro-data sets, analysts need to be clear about which questions they want answered and what specific data are required for them to answer those questions. Several participants felt that frequent data collection was needed; others did not think these data were at all necessary for the analysis of financial stability. Several participants suggested the use of administrative (particularly tax) information, although creativity would be needed in obtaining economically useful information. The general consensus seemed to be that financial stability needs could be met with detailed surveys every few years (needed because we need distribution information, particularly about the tails of the distributions), combined with frequent monitoring of aggregates and perhaps other selected information.

There was a discussion of the usefulness of panel information. Such information is not available in most countries and is needed if one is to track mobility. Several participants noted that there is a need for this information, particularly for academic research. Other participants agreed but noted that this type of survey is expensive and will add little knowledge concerning current financial stability issues.

A participant stated that it was important to learn more about household leverage and debt service capability by segment. Also, in some countries, some households may have foreign exchange exposure, either directly or through indexed loans.

Leon Taub (New York FED)

Alternative approaches to financial data collection in Canada

Brad Belanger and Peter Webber (Industry Canada)

The following paper summarizes alternative approaches to financial data collection using the experiences of the Small and Medium-sized Enterprise Financing Data Initiative (SME FDI) and the Credit Register approach adopted by the Bank of Spain.

Background

In 1996 the federal government commissioned the Task Force on the Future of the Canadian Financial Services Sector (the MacKay Task Force) to examine public policies affecting the financial services sector. As a small part of a much wider mandate, the government asked the Task Force to make recommendations relating to the financing of SMEs.

In late 1998, the MacKay Task Force issued its report which responded in detail to the rest of its mandate, but concluded with regard to the financing of SMEs, that there was insufficient data available for them to be able to make any recommendations. In light of this, the Task Force recommended that the government make a concerted effort to improve the quality and the quantity of information on SME financing, covering all financial service providers as well as SMEs themselves.

In June, 1999 the government responded to the report of the Task Force. As a part of this response, the government accepted this recommendation and mandated Industry Canada, the Department of Finance and Statistics Canada to work together to gather data on SME financing and report on regularly to the House of Commons Industry Committee on the state of SME financing in Canada. To this end these government organizations have formed a partnership to design and implement the SME Financing Data Initiative (SME FDI) and have committed resources to establish this data collection regime. Through this Initiative, other research and analysis they plan to provide a comprehensive picture of SME financing, covering the entire spectrum of financing products and services.

Our mission is quite simply stated (see below), and is the foundation in which SME FDI builds a better understanding of SME financing in Canada. This is a model that is unique in the world; however, New Zealand has implemented a part of this model.

> The mission of the SME Financing Data Initiative is to be a world-class, cutting-edge program, which builds a comprehensive knowledge base of timely and unbiased information on SME financing in Canada. This critical knowledge will help foster an environment, which supports the growth of Canadian SMEs by fuelling the public policy debate and bringing clarity to the SME financing market."

Data Collected under SME FDI

Prior to the SME Financing Data Initiative, data collection on small business financing consisted mainly of reports of various industry groups and Statistics Canada labour force and industry surveys. Although these efforts provided some data on small business financing, they shared no single conceptual framework through which to observe the overall state of SME financing in Canada. The SME FDI provides a very large, and very reliable set of data about SMEs and how they are financed. The surveys collect data related to:

- Details on last credit supplier approached for debt financing
- Other financing events during the year (leasing, equity, informal investment)

- Business information/characteristics
- Financial statement data
- Profile of liabilities outstanding
- Financing of business during reference period
- Financing of business start-ups

From the supply side, the data collected includes:
- Debt financing supplied to all businesses
- Amounts authorized, amount outstanding and number of clients by province, sector, instrument and authorization level
- Lease financing supplied to all businesses
- Factoring

The initiative is currently comprised of three key surveys (see below). The information gathered in all three surveys aim to measure the total value of new and outstanding financing by supplier, as well as shed some light on the financing practices and patterns of SMEs across Canada.

Baseline Surveys of SME FDI

- Survey of Suppliers of Business Financing
  - annual survey starting in 2000
  - measures supply of financing
  - covers all financial service providers (census) with assets of $5 million or more in selected finance and leasing industries
  - excludes governments, other public sector organizations, private not-for-profit organizations, informal suppliers such as business "angels" and family members, and foreign suppliers.

- Survey on Financing of SMEs
  - tri-annual survey starting in 2000
  - measures demand for financing by SMEs
  - captures data by size of business, geographic region, age of business, business owner characteristics, etc.
  - administered to a sample of firms with up to 499 full-time equivalent employees and less than $50 million in gross revenues.

- Survey of SMEs Needs and Satisfaction
  - published in 2001
  - probed the attitudes & perceptions of SMEs owners on issues related to financing

To complement the information gathered from the surveys, Industry Canada mandated over time different specialized studies on a broad range of topics related to SME financing. In the past most of the work has focused on the risk in capital market as this has been an area of interest for the Government of Canada, in particular commercialization of small businesses. However, other specialized studies related to the financial marketplace, SMEs and entrepreneurs and other research.

Issues regarding data collection program of SME FDI

Research in various areas were conducted, based on where we discovered gaps in existing research or sometimes in response to changing government priorities. However our data collection approach based on surveys carries several limitations. These include:
- Declining response rates from SMEs, which, in turn, compromise data quality
- There is a high cost associated with the administration of surveys (last demand survey cost over $1 million)

It is questionable whether using surveys as a data collection strategy is sustainable in the long-term. As a result, the initiative is investigating new approaches to data collection/acquisition, including partnerships with other organizations seeking specific data from a segment of the SME population (eg. exporters), or using administrative data (eg. Tax data) to capture some of the information from SMEs.

Alternative approach to data collection – Credit Register Concept

An alternative approach to data collection under SME FDI would be the development of a Credit Register Concept. This approach has been successful in many countries (including Spain and France), by providing essential information on debt financing with increased accuracy and timeliness of the information. In Canada, the development of a credit register could improve the overall quality of the data available and increase the analytical capability on the financial sector of the Federal Government. Furthermore, this central repository could provide a multipurpose analytical platform available to all Federal stakeholders interested in the financial system.

However, before proceding with this approach several important questions would need to be addressed, including:

- How can a credit register be implemented in Canada within the present legal framework of our financial system? (Privacy Act, Bank Act, Provincial jurisdictions)
- The credit register concept covered only debt instruments; however, data from SME FDI indicates that SMEs use other types of financing (trade credit, personal savings, etc) to finance their operations. What implications would a credit register have on collection of this "other" data (e.g. equity financing, leasing)?
- In developing a credit register what measures should be taken to ensure data collection requirements do not constrain product innovation (e.g. capturing the use of personal savings for business expenditures)?
- Should a credit register also cover special policy requirements (public sector financing (e.g. the Business Development Bank of Canada), start-ups, R&D, business owner characteristics?

Brad Belanger and Peter Webber (Industry Canada)

Some data gaps in the Canadian non-financial sector

Meyer Aaron and Celine Gauthier (Bank of Canada)

Financial accounts data are widely used to assess the financial health of households and non-financial corporations, which together make up the non-financial sector. The assessment itself can be conducted with either aggregated data or microdata.[1] Traditionally, the analysis at the Bank of Canada has focused on aggregated balance sheet data because it is comparatively easier to obtain. However, as advances in information technologies have made it easier to obtain and manipulate data, the demand for microdata has increased. But ease of availability by itself does not signify value. It is important to keep in mind that financial system surveillance requires assessment of the financial system as a whole rather than of individual households or companies. In this context, microdata should be shown to augment analysis currently conducted with aggregated data. A data gap is present if data are unavailable and availability would add value to the analysis.[2]

There are a number of ways that microdata can augment analysis based on aggregated data. Aggregated measures do not provide information about the underlying distributions which may be relevant for financial stability analysis, whereas microdata can provide information about the "vulnerable tails".[3] Another way in which microdata add value is by providing flexibility in the way that results can be combined to investigate a point of economic significance.

In this short note, we use the non-financial sector to illustrate the value of microdata in financial stability surveillance. We describe the case of the Canadian household sector where the availability of microdata would enhance financial stability surveillance. This is followed by a summary of some ways in which microdata can be used for the surveillance of the non-financial corporate sector. We conclude with some comments on the value of microdata and some gaps in these data for future research.

1. Data gaps in the household sector: the need for distributional information

Recent years have seen a dramatic increase in household indebtedness. However, the analysis at the aggregate level shows that the financial position of households has improved: household wealth has increased (mostly through the appreciation in the value of homes) and the interest burden is at historical lows due to low interest rates. Hence, households are judged to have a good ability to support their level of debt. But this conclusion depends on the distribution of debt among different incomes and wealth of households.

Consider the debt to income ratio normally used to assess the financial health of households. Usually, this ratio is obtained from aggregated data by dividing the total outstanding debt for households in the economy by the total household income. However, this ratio may be misleading since information about the distribution of individual debt-to-income ratio, is lost in the aggregated data.

Take a simple example of an economy with three households as shown in Table 1. In case A the debt is allocated to give the same debt/income ratio for all income levels. In case B, a portion of the debt is reallocated from the high income households to the low and medium income households. In both cases the ratio from aggregated data is the same.

Since the debt/income ratio is taken as a measure of riskiness, analysis of risk using aggregate data would indicate that the debt at risk in this example is the same for both cases.[4] In fact, in comparison to case A, the debt at risk is considerably higher in case B for two reasons. First, the low and medium income households have a higher proportion of the debt in case B

1 *The December 2004 Financial System Review (pp:5–7) highlighted an analysis of corporate financial structure using aggregated data.*
2 *See the background paper by Engert in this volume.*
3 *Benito and Vliege (2000).*
4 *Debt at risk is taken to be the product of the probability of default (which is a function of the debt/income ratio) and the amount of debt.*

Table 1 – Distribution information

	Case A			Aggregated data	Case B		
	Low	Medium	High		Low	Medium	High
Debt	5	50	500	555	10	100	445
Income	10	100	1000	1110	10	100	1000
Debt/income	0.5	0.5	0.5	0.5	1.0	1.0	0.445

compared to case A. Second, in case B, the riskiness of the debt, as measured by the debt/income ratio, has doubled for the low and median income households, which is offset slightly by the modest decrease in the debt/income ratio for the high-income household.

Clearly, a proper assessment of the risk arising from household debt requires information about the underlying distribution of this debt. Unfortunately, this information is currently not available for Canada, giving rise to a data gap.

Another current issue relates to the reallocation of risk in the financial system. For example, the Bank of Canada June 2005 *Financial System Review* contains an assessment of the transfer of risk to the household sector.[5] It is argued that this transfer of risk has been channelled through an increase in households' holdings of financial assets, which exposes them to market shocks should an abrupt market correction occur. However, as with the example of household debt above, to assess the importance of this transfer for financial stability we would need to know which households are now bearing more market risk. If part of this redistribution is toward highly indebted households, it is possible that a large stock market fluctuation would impact these households' capacity to repay their debt. This would not be as much of a concern if households with high net worth were bearing this higher market risk. Again, this information is currently not available for Canada. These examples highlight the importance of increasing the frequency and content of surveys on the financial health of individual Canadian households.

2. Using microdata for surveillance in the non-financial corporate sector

In this section we illustrate the use of financial accounts microdata to asses the financial health of the corporate sector.[6] Two examples are summarized here. The first one uses information about the tails of the distributions of financial ratios to construct an indicator of financial health. The second illustrates the use of weighting methods to emphasize a point of economic significance.

Consider the leverage ratio which is widely used as an indicator of corporate financial health. As with the household debt to income ratio, this ratio can be calculated from aggregated data and taken to be an appropriate measure of the overall financial health of the underlying companies. In this case the calculated value for leverage from aggregating the microdata is 3.64. However, this single value does not provide any information about the highly skewed distribution for leverage (Chart 1).

In what follows we describe an indicator which uses the information contained in the "vulnerable tails" of the distribution for key financial ratios. There is abundant literature linking corporate vulnerability to three broad categories of financial ratios: profitability, liquidity and leverage.[7] Generally, increasing leverage, decreasing liquidity and decreasing profitability are thought to increase corporate vulnerability. However, the interaction among these measures is also important. For example, high leverage by itself may not be a cause for concern if liquidity and profitability are high. On the other hand, high liquidity may be a concern if profitability is deteriorating. Hence, the microdata based indicator is constructed using the "vulnerable tails" of the distributions for all three financial ratios. Three ratios are selected to assess financial vulnerability: *Leverage* which is total assets/total equity; *current ratio,* a measure of liquidity, is current assets/current liabilities; *net profit margin,* a measure of profitability, is net income/total revenue.[8]

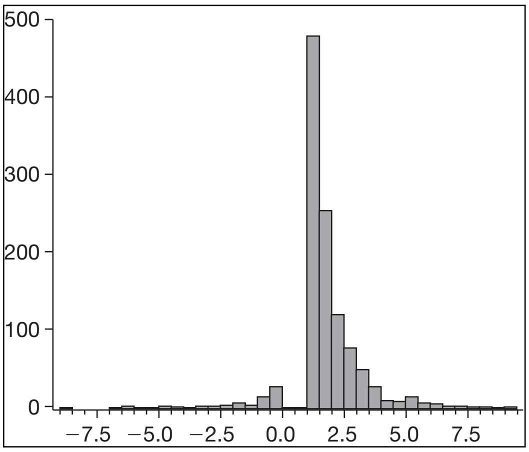
5 *Muller (2005).*

6 *The corporate data is from the Financial Post public company database. It contains about 1400 Canadian public companies from which a sample ranging from 679 to 1176 companies was compiled annually for the 1994 to 2004 period. Companies indexed as financial companies were deleted from the sample. The assets covered represent, on average, 58% of the total assets of non-financial corporations as reported in Statistics Canada's National Balance Sheet releases (ranging from 47% to 70% over the sample period).*

7 *Altman (1983), Scott(1981), Ohlson (1980), Bunn and Redwood (2003), Vliege (2001).*

8 *These ratios are commonly used in accounting based models of corporate financial health.*

Chart 1 – Histogram for leverage (2003)



First, based on chosen thresholds, companies in the "vulnerable tails" of the distributions for the leverage ratio, current ratio and net profit margin are identified.[9] Then the indicator is calculated as the percent of total sample assets held by these companies.[10] A higher value indicates higher vulnerability.

The choice of the thresholds used to define the vulnerable tails is arbitrary since there is no theoretical framework to determine these *a priori*. In this case the thresholds are set at the average level of the 50th percentile over the sample period.[11]

On a preliminary analysis, using simple correlations, this microdata indicator appears to have leading indicator properties with respect to bank business gross impaired loans and corporate bond defaults (Chart 2).[12] Over the sample period, increases in the indicator are followed by increases in bank business impaired loans and in corporate bond defaults. A further refinement is to extend this type of analysis to the sectoral level.

Distribution information can also be combined with other microdata information to asses the economic significance of changes in financial measures. For example, if larger companies are thought to have a disproportionately bigger impact on financial stability than smaller ones, just analyzing the changes in the distributions of the financial ratios may not permit an evaluation of the economic consequences of these changes. For example, the worst financial ratios may be confined to small companies, which may not be cause for concern. Conversely, one would be concerned if companies which controlled a large proportion of the assets exhibited fragility. One way to emphasize this economic significance is to use asset weighted measures from the microdata as illustrated below.[13]

Asset weighted values are calculated as the sum over the sample of the financial ratio for an individual company multiplied by the percent of sample assets held by that company. Normalized asset weighted values for leverage, current ratio and net profit margin, along with an index combining these measures using a "variance-equal" method are shown in Chart 3.[14]

9 *These financial ratios are not normally distributed. There is a high degree of skewness (asymmetry) and kurtosis (long tails).*

10 *Although only the asset based indicator is reported here, indicators were constructed for each ratio and combinations of ratios on the basis of percent of debt and percent of companies in the tails (and combination of tails).*

11 *The chosen thresholds were: leverage greater than 1.5; current ratio less than 1.6; net profit margin less than 0.1%. In the case of leverage, companies with negative values were considered to be part of the vulnerable tails. Sensitivity analysis showed that the indicator was relatively robust to the choice of thresholds ranging from the 25th to the 75th percentile for each ratio. The choice of thresholds did effect the level of the indicator and the width of the peaks.*

12 *This is largely a qualitative assessment since the limited number of observations in this data set does not permit a more rigorous test. A longer data set from another source is currently being compiled for study.*

13 *On the other hand, if debt or employment is of interest, then this analysis could be done by using weights which emphasize the amount of debt or number of employees associated with each company in the sample. Hence, microdata allows the construction of financial health measures depending upon the point of interest.*

14 *The measures were normalized because the asset weighting process transforms them in a way which does not make them directly comparable to the non weighted levels.The variance equal method involves standardizing each financial ratio value by subtracting it from the mean and dividing it by its standard deviation. The index is computed as the standardized leverage minus the standardized current ratio and the net profit margin.*

Chart 2 – Microdata indicator

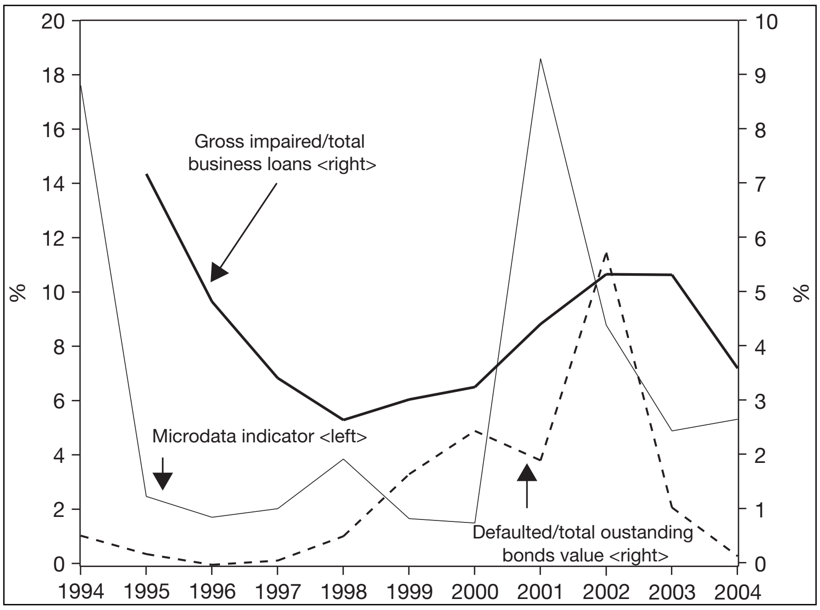
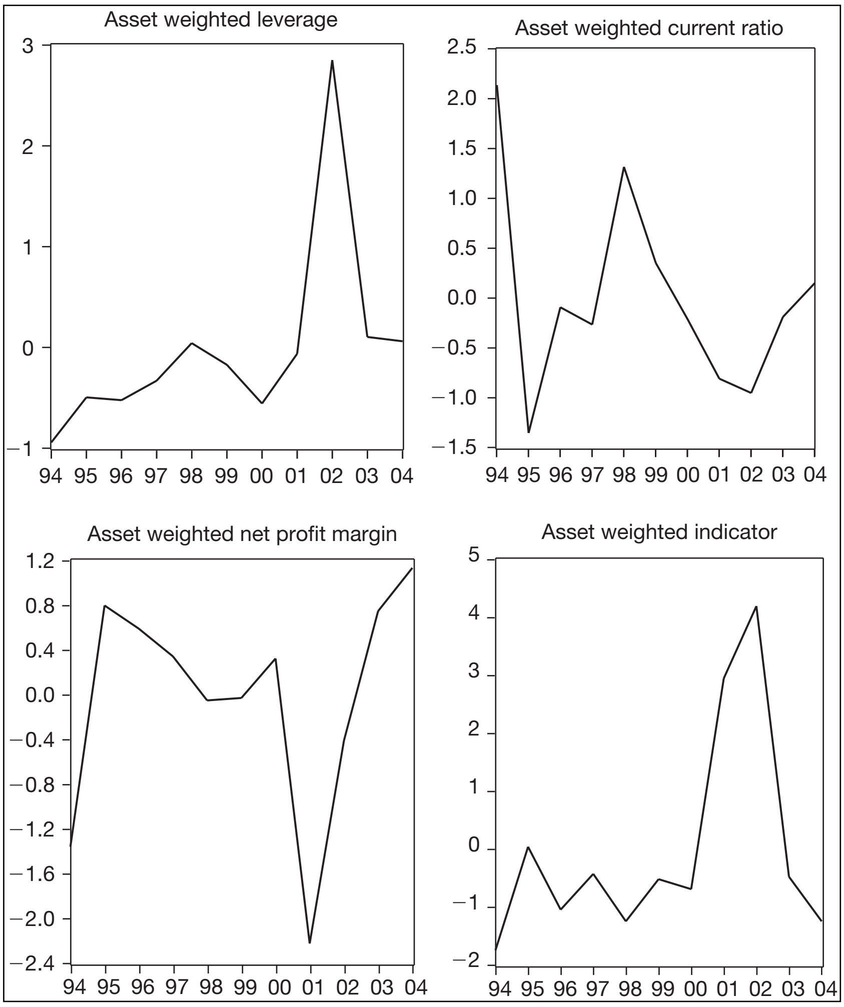


Chart 3 – Asset weighted indicators



By construction, the index is sensitive to the financial health of large companies. This index shows that the period between 2000 and 2002 was quite stressful for large companies. Leverage was high, and liquidity and profit margins were low. However all the measures have improved recently.

Conclusion

This note has focused on the ways that microdata can be used for surveillance of potential risks to the financial system originating from the non-financial sector.

Microdata analysis can augment analysis based on aggregated data by utilizing the information about the underlying distributions of vulnerability measures. Microdata also allows flexibility in the way that information can be combined to emphasize a point of economic significance. As such, it could prove to be a useful addition to the other tools currently available for financial stability surveillance.

However there are some issues related to the use of microdata. Aside from the limited availability of microdata for households and private companies, the frequency of reporting is a key concern. Public companies only file quarterly financial returns, and most data vendors only update their databases on an annual basis. Some of the potential leading indicator properties of the microdata indicators is compromised by the late updates.

Future research using microdata is also hampered by the difficulties of integrating different data. Financial stability surveillance requires integration of financial data, market data and bankruptcy data. Since each type of data is usually obtained from different sources, integration is cumbersome.

In conclusion, microdata have the potential to greatly enhance financial stability analysis. But the construction of integrated databases to allow this type of analysis will require a considerable investment of resources.

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Meyer Aaron and Celine Gauthier (Bank of Canada)

Background note: data on the household sector

Shinobu Nakagawa (IMF)

1. What we analyzed on the household sector

In the Global Financial Stability Report (GFSR), April 2005, **we extensively used the household balance sheet data for selected industrialized countries**, notably France, (tried Italy), Germany, Japan, the Netherlands, the United Kingdom, and the United States, to focus on an assessment of the changing risk profile of the household sector, which results from a variety of influences, including changes in the risk management practices of financial institutions and (in several countries) pension reform (i.e., **risk transfer to the household sector**). In this study, we highlighted and, where possible, presented the following current and potential trends using timely data:

- Net worth
- Asset and liability composition (i.e., risk profiles)
- Investment behavior.

Our particular concern was to **evaluate changes and likely changes in risk profile of the household sector, and to evaluate potential impacts of policy initiatives**. See the GFSR April 2005 (Chap. 3) for further details.

2. Data problems – Aggregate data

To be honest, **we experienced significant difficulties to obtain useful stylized household balance sheets**. Aggregate household data are frequently one or more years out of date, or do not exist in sufficient details, and often are not comparable across countries (but more importantly, as mentioned later, our analysis required much disaggregated household data).

In this regard, **we greatly appreciate that an OECD working group is currently considering ways to improve the coverage of household financial data** in national accounts. However, we would like to stress that **nonfinancial assets, particularly houses, should be included** in each country's household balance sheet, because they are very often the single largest asset class for standard households, which can be also used for current and future consumption needs (e.g., home equity loans and reverse mortgages).

Additionally, since there are a lot of financial products available for households in recent years, we would recommend to **further categorize the asset and liability components by risk characteristics**:

(For example)

- Not just "stocks" but "(of which) listed and non-listed": non-listed stocks often (not always) seem to mean small business.
- Not just "mutual fund shares" but "(of which) stock-type, bond-type, and money market-type".
- Not just "insurance reserves" but "(of which) unit-linked and non-unit-linked": who has performance risk?
- Not just "pension fund reserves" but "(of which) defined benefit (DB), defined contribution (DC), and hybrid-type": this last item is very important, given the very different risk profiles of DB, DC, and hybrid plans.

3. Data problems – Micro data

Most importantly, **panel household data**, such as historical balance sheets for income groups and age cohorts, **were very, very limited**. As far as we learned, such disaggregated household data are available, in its most useful and complete forms, only for Japan and the United States, and to some extent, for the Netherlands and the United Kingdom, in a stylized manner including major components of both financial and nonfinancial assets and liabilities. However, even in Japan, although such cross-sectional data on financial assets and liabilities are available annually (monthly from a couple of years ago), those also including nonfinancial assets are only available every five years (the most recent data is 1999). In the United States, the Survey of Consumer Finances (SCF) provides an excellent household balance sheet data set, but it is available only every three years (the most recent data is 2001).

The timeliness of disaggregated household data has been a particular concern, because numerous market practitioners and analysts note that a variety of changes in the risk profile and financial behavior of different household groups and cohorts has been occurring in recent periods. But we cannot accurately measure or observe this in the available data.

As populations age, **it is extremely important for policymakers to understand**, for example, **how adequately the middle-income, middle-aged households**, who are the majority in the economy and who will become massive retirees in a foreseeable future, **prepare for future obligations** (e.g., expected increases in health and education costs), **as well as their current savings buffer to market or employment or other shocks**. Without sufficient household cohort balance sheet data, we believe policymakers face an extremely difficult task considering and pursuing desired policies, related to the design of the future social security and pension systems.

4. Why micro data, or why not aggregate data?

We believe the **aggregate data do not sufficiently reflect the behavior of typical or average households**, and **do not sufficiently provide the type of information we believe policymakers require**.

For example, let's **look at the shares of bonds, stocks and mutual funds, and life insurance reserves to total U.S. household financial assets** in both aggregate data (the Flow of Funds Accounts) and disaggregate data (the SCF). Largely due to the fact that household wealth in the United States is heavily skewed toward rich households, who have more ability to hold (risky) securities, we observe the following **remarkable differences between aggregate figures and typical or average household figures**:

Financial asset composition of households

	Aggregate (2001) %	Disaggregate (2001)		
		Middle-income Quintile %	Age 35–45 %	Age 45–54 %
Bonds	6.4	0.6	1.4	4.6
Stocks and mutual funds	44.1	22.5	29.1	31.5
Life insurance reserves	2.7	8.8	8.3	6.9

Therefore, **it could be misleading or less than appropriately informative for policymakers to assess risks held by the household sector by only looking at the aggregate data**.

Shinobu Nakagawa (IMF)

SESSION 6

What is the availability and usefulness of data on financial infrastructures?

Chair's summary: Ms. Dinah Maclean and Alejandro Garcia (Bank of Canada)

Papers:

Data issues regarding clearing and settlement systems and retail payment instruments
Ms. Kim McPhail (Bank of Canada)

The pivotal role of the Centralised Securities Database for monitoring developments in financial markets within the European Union
Mr. Carlos Sánchez Muñoz and Peter Neudorfer (ECB)

A brief presentation of the French experience with advanced tools for banking supervision and the operational use of macro stress tests
Mr. Sébastien Clanet (Bank of France)

Chair's summary

Dinah Maclean and Alejandro Garcia (Bank of Canada)

Session 6 had two key underlying themes. First, what data are needed to meet system oversight obligations and to do the research to understand the strengths and weaknesses of evolving financial systems and networks? Second, can data from financial systems and networks be used to provide insight on other elements of the financial system?

The first intervention, by **Kim McPhail (Bank of Canada)** dealt specifically with the first theme – data required for research on and oversight of payment systems. She described the data available from Canada's large value payment system (LVTS), and for retail payment instruments. She also described the development of a database by the Bank for operational risk analysis, which included combining quantitative data and more qualitative information. She stressed the focussed approach taken by the Bank of Canada in terms of developing data sources for both oversight and research – first determining priority areas where data were required, second prioritizing the research questions, and third determining what precise data were required.

The second intervention, by **Paul Van den Bergh (BIS)**, was also payments-related but addressed the second theme. He illustrated different ways that data from Fedwire has been used to analyze the structure of the financial system, including market concentration, bank networks, pricing in the intrabank market and contagion. (Much of this drew on work by Craig Furfine.) His presentation highlighted the usefulness of payments system data for studying financial markets and many opportunities for future work using data from other networks including securities clearing and settlement systems.

The third and fourth interventions both provided examples of databases which have been established, in part drawing on data from financial infrastructures.

Carlos Sanchez Munoz (ECB) discussed users' requirements for data on securities' transactions and how best to set up a database that can efficiently adapt to changing demands of users. He recommended collecting data in as disaggregated a form as possible (for example security-by-security) in order to maximise the flexibility of the database. He stated that this may also reduce costs for the institutions providing the data, since it is likely to be close to their raw data, but increases the costs to those collecting and compiling the data. He then described the Centralised Securities Database which contains very disaggegated information on a large set of variables attached to individual securities issued and held in the European Union.

Sebastien Clanet (Bank of France) described the used of credit risk register data in the SAABA expert system. SAABA combines data from a variety of sources to provide data on the financial health of banks. The system can then be used to simulate the impact of different shocks (for example a degradation of credit portfolio quality) on the level of individual banks and the French banking system as a whole.

Overall, the interventions highlighted the wealth of data available from financial infrastructures and networks, and the many ways in which they can be used to look at a wide variety of financial system questions. The interventions also considered how best to compile data from different sources in an efficient and flexible way. This raises questions about the kinds of resources needed to collect and manage such data, and whether the nature of these resource needs is changing over time. For example, collecting data at a very disaggregated level is likely to require more intensive work for the institution compiling the data, may involve different IT resources, and require personnel with a greater understanding of the data.

The themes of the interventions also reflected themes in other sessions. In particular, a lack of clear consensus on priorities for data needs and forecasting future data needs in part reflected the relatively early stage of analysis on many financial infrastructure issues, where well accepted tools and models are still emerging. In this respect, the focused approach for defining data needs outlined by Ms. McPhail was instructive.

In the general discussion, participants acknowledged the need for better tools to collect and analyse data from financial infrastructures. Particular emphasis was given to the need to study intrabank linkages, in order to improve understanding of contagion and systemic risk. In this respect, there was much interest in both the Central Securities Database and the SAABA system.

Dinah Maclean and Alejandro Garcia (Bank of Canada)

Data issues regarding clearing and settlement systems and retail payment instruments

Kim McPhail (Bank of Canada)

Introduction

Canadian clearing and settlement systems are owned and operated by the private sector. These systems include the Large Value Transfer System (LVTS), which is owned and operated by the Canadian Payments Association (CPA) and is used for settling large-value or time-critical payments; CDSX, which is owned and operated by the Canadian Depository for Securities and is used for settling Canadian dollar debt instruments; the Canadian dollar operations of the Continuous Linked Settlement Bank (CLS Bank), used for settling foreign exchange transactions, and the Automated Clearing Settlement System (ACSS), used for settling mainly paper-based and some electronic items, also operated by the CPA.

Although the Bank does not own or operate these systems, it has several functions related to these systems. Under the Payment Clearing Settlement Act, the Bank is responsible for oversight of systems that have been designated as having the potential to pose systemic risk. The Bank assesses these systems and any proposed changes to design or operation of these systems in order to evaluate whether systemic risk continues to be well controlled. The LVTS, CDSX, and CLS have been designated in this manner.

In its operational role, the Bank provides certain key services to clearing and settlement systems and their participants. It provides settlement accounts to participants in the LVTS and ACSS and is the banker for CDSX and CLS Bank's Canadian dollar operations. It also provides collateral management and valuation services for securities pledged to the Bank of Canada in support of LVTS operations.

The LVTS, CDSX, and CLS are relatively new clearing and settlement systems. The LVTS began operating in 1999, CDSX began operations in 2003 (replacing the Debt Clearing Service, a securities settlement system also overseen by the Bank), and CLS Bank began operating in 2002.

Consequently, until several years ago, much of the attention of Bank staff has focused on the structural design of clearing and settlement systems and on examining their risk containment mechanisms. Little time was available to focus on data-driven analysis and research. Recently, more attention has been given to these issues.

In addition to empirical research and analysis that focuses on the systems used to settle financial transactions, the Bank conducts research on retail payment instruments as part of the Bank's role in supplying currency.

The motivation for analysis and research related to clearing and settlement systems and retail payment instruments

Research and analysis are needed to support the Bank's oversight mandate and operational role in clearing and settlement systems and to understand the linkages between these systems and other parts of the financial system. Although the Bank does not own or operate clearing and settlement systems, it is interested in the contribution of these systems to overall financial system stability and efficiency. This is an area in which much of the existing research is relatively new and research is growing rapidly. The Bank's work aims to deepen the understanding of clearing and settlement systems, for example by understanding how their structure affects the incentives faced by their participants and thus the efficiency and distribution and overall levels of various risks in the system – particularly systemic risk. There is also a need for effective monitoring and analysis of trends and developments in these systems, which is currently hampered by lack of data.

The Bank has the ability under the Payment Clearing Settlement Act to obtain data from clearing and settlement systems for oversight purposes. For broader analysis and research-related data, not directly related to the Bank's oversight responsibilities, the Bank negotiates with system operators or other sources to obtain this data.

The objective of empirical research on retail payment instruments is to determine the relative costs and benefits of using currency versus other retail payment instruments and to assess how the use of cash and other retail payment instruments will evolve in the future. The Bank does not regularly collect data in this area although it has begun to conduct the occasional survey. Currently, however, analysis and research in this area is also hampered by lack of data.

LVTS – Data sources and associated research and analysis

Data availability with respect to the LVTS has increased greatly in recent years. Initially, the Bank received data on daily payment flows (by institution). In addition, due to the Bank's role in providing collateral management services to LVTS participants, daily data on collateral pledged by participants were also available. These data were used in a research study that developed a theoretical model of collateral demand as a function of payment flows and the opportunity cost of collateral. This model was tested using LVTS data and found that collateral levels did not appear to be excessive, suggesting that overuse of collateral does not appear to be a source of inefficiency (McPhail and Vakos, 2003). Estimates of the cost of collateral are, however, subject to considerable measurement error and this opportunity cost probably differs across payment system participants. Data obtained from LVTS participants on their estimate of the cost of collateral (and how they calculate it) would be valuable. This data could be obtained by a survey of participants.

As late as 2001, no intraday data on LVTS payment flows was available and the Bank was not able to monitor intraday flows. The events of September 11, 2001 revealed the effects of this gap as it was difficult during the course of that day to assess the extent to which payment flows were disrupted. Subsequently, the Bank obtained intraday data from the CPA on payment flows at half hourly intervals and the CPA put in place a mechanism that would allow near real-time monitoring of those payment flows. This data also allowed the Bank to evaluate for the first time the typical profile of intraday payment flows in the LVTS against which unusual events such as those of September 11, 2001 could be monitored and assessed (Cheung, 2002).

Further research has begun on modelling the LVTS. The Bank of Canada is working with the Bank of Finland and developers of it payment system simulator to add features to the simulator that will allow it to replicate the design of the LVTS. The CPA has provided the Bank with transaction-by-transaction data on payment flows that will allow this line of research to proceed. Research projects have begun that examine the effects of participant defaults and operational risk in the LVTS.

The existence of transaction-by-transaction data contributes to more effective analysis of LVTS developments. For example, it allows the distribution of payments by value to be calculated – information not previously available. And it will allow intraday credit extensions in the LVTS to be assessed. However, while data on payment flows are now virtually complete, little is known about the source of those payments. For example, no data is available regarding the volumes and values of payments related to foreign exchange flows, money market transactions, client flows and monetary policy operations (although this last category could be obtained from Bank of Canada data sources). More broadly, there is a need to develop a better understanding of the determinants of clearing and settlement system flows. Regular surveys of LVTS participants would help to fill this gap.

CDSX – Data sources and associated research and analysis

The Bank does not regularly receive data from CDSX, the Canadian securities settlement system, although some high-frequency data for a specific research project has recently been provided. For the future, relevant research questions will need to be framed and the associated data requirements will need to be discussed with the operator of CDSX. In addition, the Bank has begun to think about the kind of data that may be useful on an ongoing basis (e.g., characterizing daily activity, settlement positions, contingency plans and incident reports related to operational events).

CLS – Data sources and associated research and analysis

A limited amount of data related to CLS is currently available, measuring the daily volume and value of Canadian and global transactions. In this area also, no research is yet underway. It is not currently possible to regularly monitor the proportion of Canadian foreign exchange activity that is settled through CLS Bank, that which is subject to bilateral netting agreements between payment system participants, or the proportion for which the Canadian dollar leg of a foreign exchange transaction settles on a payment-by-payment basis through the LVTS.

ACSS – Data sources and associated research and analysis

The Bank has received daily data on ACSS payment flows (by participant and also disaggregated into various payment streams) for some time. Research based on these data sources was one important element among a number of factors contributing to an assessment of whether the ACSS had the potential to pose systemic risk and consequently should be designated and overseen by the Bank of Canada. A payment system simulator for the ACSS was built and used to assess the potential impact of participant defaults. This research concluded that the likelihood of contagion effects arising from a participant default was remote. This research was published in 2002 (Northcott, 2002).

This is an ususual instance of a situation in which data and empirical analysis were used directly for oversight purposes. The Bank has adopted a minimalist approach with respect to clearing and settlement systems. It is not actively involved in the design of clearing and settlement systems or changes to design except to the extent of assessing whether risk is mitigated. This is not typically a data-intensive activity. The Bank is, however, reviewing what data might be required for the monitoring of clearing and settlement systems for oversight purposes.

From time to time, the CPA collects and makes available additional data for the purpose of addressing specific questions. Alternatively, the Bank may request additional data for specific analyses of ACSS-related issues. These occasions are not, however, frequent.

Operational risk in clearing and settlement systems – Data sources and associated analysis and research

Another area of recent research at the Bank relates to operational risk in clearing and settlement systems (McPhail, 2003a; 2003b). A framework was developed that can evaluate the degree of operational risk in clearing and settlement systems (and the Bank's own banking operations). This framework has been implemented and a process put in place that provides a regular monitoring tool for assessment of operational risk. Data for this analysis – for example, related to operational problems that prevent participants from sending payments – is obtained because of the Bank's role as participant in clearing and settlement systems and because of its role in providing services to clearing and settlement systems. For the LVTS, the CPA also provides data related to operational events to all system participants, including the Bank of Canada.

Retail payment instruments – Data sources and associated analysis and research

The Bank regularly receives times-series data on various types of retail payment flows settled through the ACSS. But comprehensive, disaggregated times-series data on various retail payment instruments is not available. For example, ACSS data groups low-value cheques (mostly retail payment instruments) with other paper items up to a value of $50,000 CAD (mostly business transactions). While disaggregated time-series data is useful for analyzing clearing and settlement system developments, it would be of particular interest for the currency function – in order to model the evolution of the use of cash versus other retail payment instruments and the associated implications for the Bank of Canada.

Some low-frequency data on variables such as debit and credit card transactions and Automated Teller Machine (ATM) withdrawals is available from various sources, but this data can be recorded only manually. Moreover, data from different sources cannot always be reconciled easily. Data on fees associated with various retail payment instruments is not readily available.

The lack of high quality data has hampered empirical research intended to assess the impact of alternative payment instruments on the use of currency.

In 2004, the Bank conducted a survey of the general public in order to obtain data on their use of currency and alternative retail payment instruments. This cross-sectional database provided valuable data that was subsequently used to conduct empirical research into the relationship between the use of cash and other means of retail payments. Cross-sectional databases provide a valuable addition to times-series data for research purposes. Additional cross-sectional databases obtained from surveys of different sectors of the economy are also needed to add to the ability to develop empirical models of the use of cash versus other retail payment instruments.

Issues for future research and associated data gaps

i. Quasi-systems

It is difficult to obtain data on activities that occur outside of the main clearing and settlement systems. For example, many large financial institutions act as "quasi-systems", settling large volumes and values of payments across their books on behalf of clients – including financial institutions that do not participate directly in a payment system. This settlement therefore bypasses the payment system. These tiered arrangements raise questions about potential effects on risk and efficiency in the financial system. In the absence of data, it is difficult to analyze a range of issues that significantly affect the financial system. These include the effects of financial sector consolidation, the effects on risk management and competition in this environment, the potential effect on large-value payment systems and the effect of tiering on overall financial system efficiency and stability. Due to lack of data, it is currently difficult to evaluate the extent of this activity or how it may evolve in the future. This data would need to be obtained directly from financial institutions and could be difficult to obtain.

ii. Costs of clearing and settlement systems

Costs to participants of using clearing and settlement include membership costs, annual fees, payment fees, internal processing costs and costs of liquidity. In turn, participants charge their clients for settlement of transactions in a clearing and settlement system. These costs affect the incentives of participants to use these systems versus alternative lower-cost and possibly somewhat more risky settlement arrangements. This represents the usual tradeoff between risk and efficiency, a subject of interest for the Bank.

There is currently relatively little data on how various costs associated with clearing and settlement systems are allocated among participants and for various types of payments (particularly for the ACSS). Moreover, no data is available on fees charged to clients, both financial institutions and corporate clients, for payment transactions and services. Occasional surveys to obtain this data would be useful. They would help assess whether clearing and settlement system services are priced in a way that promotes an efficient allocation of resources and distribution of risk. Such data could also make possible analysis and research to help determine the incentives for economic agents to choose between different settlement arrangements.

Conclusion

Research and analysis on clearing and settlement systems and on retail payment instruments is a relatively recent activity at the Bank. While the data available to the Bank has increased considerably throughout the last five years, there are many areas in which more and better data are required to answer current policy-relevant questions about clearing and settlement systems and retail payment instruments.

While some data requirements are currently known, others will emerge as the economics profession develops additional models that can assess policy-relevant questions with the use of data.

For example, empirical research on clearing and settlement systems is at a relatively early stage of development. Some simulation-based studies of payment systems were carried out many years ago and simulation-based research into payment systems is intensifying as more central banks adopt the Bank of Finland simulator to address payment system issues. But, to date, this methodology is typically subject to the Lucas critique – it takes clearing and settlement system flows as given and does not address the incentives for participants to change their behaviour as events occur or as the properties of the system being simulated are altered.

Recent theoretical research does attempt to model these incentives and their impact on behaviour. But these models tend to be stylized and it is too soon for their implications to be incorporated into many empirical models. Once this is possible, additional data requirements are likely to emerge, possibly focusing on collecting a broader range of data from payment system participants.

This paper has identified some currently existing data gaps. In the future, new policy issues will emerge and new theoretical and empirical research will be developed which will lead to new data requirements. Although this will almost certainly occur, it is presently somewhat difficult to be precise about the type of data that may be required in the future.

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The pivotal role of the Centralised Securities Database for monitoring developments in financial markets within the European Union[1]

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Introduction

Transactions in securities account for a large share of the global (domestic as well as cross-border) financial transactions. Indeed cross-border transactions in securities between euro area countries and jurisdictions outside the euro area are usually regarded as a significant factor contributing to the monthly changes in the external counterpart to the euro area monetary aggregates. Furthermore, outstanding positions in securities represent a major proportion of the total external financial exposure – statistically measured through the international investment position (i.i.p.) – of the euro area vis-à-vis the rest of the world.

As at end-2004 debt securities issued by euro area residents amounted to EUR 9.3 trillion, of which EUR 2.1 trillion were held by non-residents. Non-residents also held EUR 3.3 trillion of equities (in direct and portfolio investment). Euro area investors held foreign securities worth EUR 4.5 trillion. The monthly gross issuance usually ranges from EUR 0.6 trillion to EUR 0.8 trillion. In 2004 cross-border income streams (associated with direct investment-equity and portfolio investment) amounted to EUR 163 billion (credits) and EUR 193 billion (debits).[2] Moreover, as securities represent about 20% of the Monetary Financial Institutions' (MFI) consolidated balance sheet in the euro area, they constitute an increasingly important component of broad money.

Along these lines, the appetite of users for the analysis of developments in securities markets from manifold perspectives is continuously expanding. Such growing users' demands force statisticians to consider flexible ways of collecting and compiling related statistics, while preserving cost-efficiency as much as possible.

This paper elaborates on the different requirements for information in the field of securities transactions and positions from several perspectives. From the users' viewpoint, section one hints at some of the issues which may be more typically scrutinised by securities markets analysts. From the statistics producers' viewpoint, section two of the paper explores cost-effective ways of organising the collection of this information so as to respond to such a variety of users' demands. Section three of the paper analyses in more detail the pivotal role of the Centralised Securities Database of the European System of Central Banks (ESCB)[3] in this context. A number of conclusions are briefly summarised at the end of the paper.

I. Information sought by users with regard to securities markets: new challenges for compilers of financial statistics

Broadly speaking, the analysis of financial markets encompasses describing and explaining the motivation behind the creation and trading of different types of financial assets at the level of both domestic as well as international markets. Financial markets may be subject to different types of analyses: on the macro level, aggregated statistics may fairly describe the main

1 *The views expressed in this paper are those of the authors and do not necessarily reflect the views of the European Central Bank.*
2 *See ECB Monthly Bulletin, Euro area statistics, Tables 4.1, 4.2, 7.1.3 and 7.4.*
3 *The ESCB is composed of the national central banks of the 25 EU member states plus the European Central Bank (ECB).*

developments taking place in e.g. individual economies or economic areas. Alternatively the information collected and used on a micro level may provide a valuable research tool targeted to the activities and exposure of individual market participants.

Classical examples for *macroeconomic* financial statistics are financial accounts statistics and, with regard to the external dimension of an economy, the financial account of the balance of payments (b.o.p.) and the i.i.p. These macro statistics describe financial stocks and flows broken down by economic/institutional sector of activity and by financial instrument classes. In particular, a complete set of financial accounts cover both assets and liabilities and thus may reveal on an aggregate level financial linkages across sectors or, in other words, who is financing whom.

Microeconomic aspects of financial market analyses traditionally focus on pricing or valuation applied to specific instruments and markets. The fact that modern financial markets have generated various classes of complex instruments, such as financial derivatives, index-linked bonds, etc. has enlarged the information sets needed enormously. The measurement of the risks connected to different types of instruments and the exposure of debtors and creditors have added to the information needs.

Miscellaneous statistics deal with specific ranges of financial instruments and markets to support macro or micro analyses as mentioned above. For example, yield curves describe the term structure of interest rates for a specific market (segment) based on information about individual instruments. Analyses focused on foreign exchange markets may present slightly different characteristics and may require the coverage of variables other than those by which macroeconomic statistics are usually disclosed.

While security issuance may represent for borrowers an attractive alternative to bank financing, investors regard (debt) securities, and the increasing number of securitised, or hybrid, tradable instruments as liquid and secured assets, usually yielding more than deposits or other low-risk assets. Data on the outstanding amount of securities provide a fair indication of the depth of capital markets. A broader set of variables provides additional information as to some more specific analyses; for instance, the currency of issue of certain securities may denote a relevant gauge for the assessment of the international role of the currency in international financial markets. Another example which goes beyond the analysis of traditional statistical breakdowns is the disclosure of financial assets and/or liabilities by remaining maturity, which could provide a more interesting insight than conventional instrument classifications based on the original maturity at issuance.

In a nutshell, securitised assets and liabilities are the backbone of (domestic and cross-border) financial investments, reaching the form of very liquid (money-like) instruments to long-term financing and covering various types of participation in funds or enterprises. Furthermore the securitisation industry, which is one of the engines of modern capital markets, should be almost completely traceable if a comprehensive set of data for this type of investments is available.

Additionally, the continuous appearance of new types of market players and financial instruments/securities may call for different and more specific categorisations, which the standard sector/instrument classifications of macroeconomic statistics may not supply. Furthermore, new financial intermediation vehicles, such as internet accounts, direct banking, special purpose vehicles, conduits, holding companies, etc. represent further challenges for compilers of statistics.

As a natural consequence of the appearance of more elaborated and globalised markets, the need to monitor developments from a supervisory perspective has also added to information requests. Although the stability aspect of a financial system is for natural reasons permanently in the agenda of supervisory national authorities, the globalisation of financial markets soon triggered initiatives to produce adequate statistical information at the supranational level.

Consequently the discussion on providing a statistical framework for the vulnerability analysis led to the proposal of producing the so called "Macro prudential Indicators" aimed at quantifying and qualifying the stability of a financial system.[4] Although these "Financial Soundness Indicators" (FSI) provide an aggregate view of this development, it clearly relies on the availability of additional micro data. A logical conclusion is to base the logistics of the compilation process on more and more micro data building blocks.[5] When asking reporters not to condense the original information, the statistical agency reduces the reporting burden and, in turn, gains degrees of freedom in the subsequent steps of the statistics compilation process (see next section).

4 *See Moorhouse (2004) or Kruger (2002).*
5 *For a comparison of the micro and macro aspect see Borio (2004).*

While FSI for non-securitised assets (loans) currently play a prominent role in the (core and encouraged) data-sets, indicators on the size and performance of securities may gradually gain more weight. Should such indicators be built upon micro economic information (i.e. upon individual instruments) derived statistics would be capable to offer the maximum of information. Microeconomic (input) data would for instance not only allow calculating an "average rate of return" of a specific security class, but would also allow studying its distribution. Some of these aspects, which directly enter into the way how data on securities and the final statistics could be collected and compiled, are further analysed in the following section.

II. Two approaches for data collection on security transactions and positions: aggregate versus security-by-security

In the previous section, a wide variety of information needs was briefly described. Looking at the same issue from the opposite perspective, i.e. that of data producers, such a wide and changing range of manifold users' demands constitutes a major challenge to compilers. The collection and compilation of financial markets statistics should ideally be designed in a fairly flexible way, serving simultaneously manifold information goals and enabling a quick adaptation to an environment in which innovation plays a primary role.

Obviously the increasing demand of users for various types of information describing financial markets on different levels and for different information goals has an impact on the data collection and statistics production. In a nutshell the collection and compilation of statistical information needs to become more flexible and more integrated.

- As the user requirements imply to provide more and more analytical details, the entire data collection and statistics production process needs to cover an increasing number of aspects so that the same retrieved information can be (re)used without imposing additional burden on respondents. In contrast to more traditional methods, modern statistical systems need to be multidimensional, thus allowing a quick adaptation of the same data to new analytical perspectives.
- At the same time statistics compilers are requested to ensure a cost-effective data collection from respondents and to increase timeliness. The latter is a natural consequence of the accelerating speed of developments in financial markets, which constitute the core subject.

Hence, two main approaches to collect information on securities transactions and positions may be followed: aggregate or security-by-security (s-b-s). Aggregate data collection implies that reporters take care themselves of grouping their transactions/holdings by certain aggregate statistical categories and report them as such to the compiler. Conversely, the s-b-s collection method means that the compiler receives raw information on issues, holdings and transactions with non-residents for individual securities, which permits producing all relevant statistical breakdowns with the assistance of a securities database.

The s-b-s approach enables compilers to double-check the accuracy of the data at the level of individual securities. For example, individual security data may permit a better monitoring of the chain of custodians and sub-custodians (thus avoiding double-counting of securities holdings). It also enables proper reconciliation between transactions and (beginning and end-period) positions at an individual security level, thus improving consistency, value for analysis and, in the case of cross-border portfolios, bilateral geographical comparisons. In turn, this allows detailed comparisons of outstanding amounts issued and securities holdings thus hinting at possible gaps or overlaps.

In contrast, the aggregate approach implies that compilers rely on reporters: they are assumed to properly understand and implement the reporting instructions provided. The only way to further check the quality of the data is getting back to reporters and addressing further questions to them. Furthermore, in case of any change in the international statistical standards, e.g. in classifying instruments, or in the way assets are valued, the compilers have to revert to respondents with amended reporting requirements and possibly request an additional effort to re-build historical series.

Using the s-b-s approach, the aggregation of individual-security data into the required breakdowns can be performed in a standardised way by the compiling agency. This avoids potential misclassifications or varied valuation methods (e.g. for investment versus transaction portfolios), or the use of different aggregation procedures by the different reporting agents. The quality of the results (in terms of e.g. accuracy, consistency, etc.) is significantly increased with the use of a reliable reference securities database like the EU Centralised Securities Database (CSDB) (see next section).

Moreover, s-b-s reporting enables a significant reduction in the reporting burden for the majority of respondents. Detailed information at the level of individual securities is often readily available to the largest reporters, i.e. banks, institutional investors, financial intermediaries, etc. Reporters may implement automated reports from their raw information e.g. on securities in custody. Once established, the systems just need to be run periodically so as to provide the required information to compilers. As mentioned above, any changes in statistical requirements would have no impact on respondents.

This important relief in the burden of reporting agents is to some extent transferred to the compiling agency which faces a higher workload. Since compilers need to classify and value themselves the information according to statistical standards, the s-b-s approach may require some additional and more specialised human and technical resources, e.g. skilled staff able to work with highly automated IT systems and with an additional expertise in financial instruments and markets.

In the European Union, various countries have been collecting and compiling portfolio investment information within the b.o.p. and/or i.i.p. on a s-b-s basis for several years. Results in terms of timeliness, quality and reporting burden overall confirm what has been described in this section.

In a nutshell, s-b-s reporting implies a much higher degree of flexibility and a better adaptation to new requirements. As a consequence, s-b-s systems may provide supplementary statistical breakdowns for analytical or other purposes without increasing the burden on respondents. By way of example, additional statistics may be produced on the basis of variables that are not covered by the current statistical standards, but for which a (high) user requirement exists: remaining maturity, currency breakdown, further splits by instruments (e.g. money market funds) or by sectors, cross-classifications by instruments and sectors, etc. The marginal cost of additional breakdowns is certainly much lower than in the case of aggregate reporting systems.

III. The pivotal role of the ESCB "Centralised Securities Database" in providing tailor-made financial markets information

The previous section concluded that the s-b-s approach can be deemed the most efficient and flexible way to collect and compile information on securities. In that regard, the use of a reference database becomes crucial. In particular, from the euro area point of view, such a database should cover all attributes and variables attached to individual euro area securities as well as to those other (foreign) securities which euro area residents are likely to hold or transact in. The CSDB will play that role in the euro area/EU: it provides a unique central reference whereby consistent statistics across euro area/EU countries become possible. A consistent methodological treatment is ensured for basic variables such as issuers' (and at a later stage also euro area holders') residence and sector, issue currency, market price, accrued interest, etc.

As hinted in the previous section, s-b-s reporting means that each national compiler, i.e. in general national central banks (NCBs) receive limited information on transactions and positions in securities at the level of individual securities, identified e.g. by their internationally agreed (ISIN) codes. More precisely, NCBs only receive the relevant volume information (flows and/or stocks) as well as the respective security identifiers (e.g. ISIN code) of the securities involved. The securities master file provides all other necessary attribute-level information for each individual security (e.g. classification, price, income, type of instrument, size, residence of issuer, currency, etc.). The statistics agency can then produce the required statistical output on that basis.

The core idea of the CSDB is to serve as a central and single "golden" copy for the whole euro area/EU, i.e. to allow for the most cost-effective operation of a securities database at the European level.

The development of the CSDB system has been split into three phases. After Phase 1, ECB users will have direct access to the CSDB, while NCBs will receive data extracts or reports. After Phase 2, the group of users will be extended to staff in all NCBs. Some other enhancements will also occur during this phase, in particular regarding the data model. Phase 3 will basically consist in receiving information on holdings of securities to contribute to the b.o.p./i.i.p. statistics, as well as to euro area financial accounts.

Against this background, it is worth noting that – at least in the near future – the CSDB will not hold and centralise the information on the portfolio holdings by the different sectors of an economy, or by non-residents (broken down by countries or zones); this information is collected and compiled in many EU NCBs. As above-described, such information will be incorporated to the CSDB within the final phase of the project.

The CSDB data model comprises reference data for fixed income instruments, equities and mutual funds. It also covers the respective structures for information on prices and corporate actions. A separate module covers information on the issuers. Future versions will cater for holding information. More precisely the data model (approximately) comprises the following numbers of attributes[6]:

Instrument class	Content	Approx. # attributes
Debt instruments	Generic features plus coupon, redemption, option related variables, etc.	100
Equities (incl. mutual funds' shares/units)	Generic features, plus dividend payments or main characteristics of mutual funds	50
Prices for debt and equity	End-of-period plus period averages	15
issuers	characteristics like residence, institutional sector etc.	10

The CSDB will hold reference data for more than 1 million securities issued world-wide.

The CSDB application is designed as a "multi feed" system, i.e. it processes information from numerous commercial (and institutional) sources. At present, it is fed by 5 commercial data providers and 12 institutional (including ECB) sources. The technical set-up allows the loading of data in various formats. Nevertheless, all data sources selected so far abide – to a large extent – with a common input data structure, described in a detailed data dictionary.

The cleaning process uses a data quality driven algorithm condensing the information received from various sources to a unique data set. In doing so, the system is able to optimise the derived result by combining supplementary information and selecting reliable, or plausible, values between overlapping information.

The CSDB system is designed to offer smooth, effective and user-friendly access to all kinds of users. This includes browser facilities and the ability to use standard reports or to build them upon request.

A final "enrichment" step essentially aims at calculating and estimating data values that could not be acquired from any source. The most prominent example of missing data is the case of instruments not quoted in organised markets and for which there is no track for any transaction. As market prices are essential for the production of many statistics, the CSDB system includes the functionality of estimating prices to fill this substantial gap, if necessary on a massive scale. Another feature of this module is that it calculates the accrued income generated by debt instruments and mutual funds. As an additional benefit for statisticians these accruals are generated according to different (i.e. debtor and creditor) calculation methods.

At the end of the process the CSDB contains a "golden copy" of each security representing the best quality achievable on the basis of the acquired information. As the data structure in which this information is presented does no fit statistical or economic analysis, multidimensional schemes of a data warehouse provide user-friendly ways to access the data and metadata (e.g. by classes).

In terms of production cycles the CSDB system processes security-level information up to a daily frequency of loading and cleaning reference data, prices and corporate events. The output produced is currently made available to end-users every month.

Conclusions

This paper noted the wide range of users' needs with regard to information on securities transactions and positions and the very changeable nature of these demands, partly due to a framework ruled by a high level of innovation in the area of financial instruments as well as with regard to market players. In anticipation of such constantly changeable demands, statistical compilers need to design collection and compilation systems which enable a quick and flexible adaptation to any new challenges.

6 *Excluding corporate actions.*

In the field of statistics on securities markets, the paper thus encouraged the collection of information on securities issues and transactions/positions on a s-b-s basis. Such a collection/compilation system is based on two basic elements: the collection of raw information from reporters on a s-b-s basis and the use of a reference securities database from which the necessary additional information to compile statistics can be extracted by the statistical agency.

In the euro area, and EU, the above-mentioned two elements, namely s-b-s reporting schemes and a central securities master file (i.e. the CSDB), are explicitly deemed to satisfy the request for more flexible and integrated statistics production systems. According to the experience of several EU countries so far, such a system is considered to be a cost-effective approach for statistical compilers and for respondents, and has also enabled the timely production of statistics, thanks to the high degree of automation that can be reached.

Since consistency across countries is a key element for the compilation of meaningful euro area statistics, in the near future the systematic use of the CSDB for the production of securities statistics in the euro area will greatly add to the quality of the final product while preserving cost-effectiveness in the way how these statistics are collected and compiled.

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Carlos Sánchez Muñoz and Peter Neudorfer (ECB)

A brief presentation of the French experience with advanced tools for banking supervision and the operational use of macro stress tests

Sébastien Clanet (Bank of France)

Faced with profound changes affecting the banking business in the last decade, the Commission Bancaire had to adapt its battery of banking supervision tools to integrate new kind of risks, increasingly international activities with potential contagion effects and new financial fragility factors.

These tools are part of preventive action programs aimed at promoting financial stability in its domestic banking system and identifying as well as reducing systemic risk in banking operations. Two complementary approaches are generally used: normalised analytical systems (which won't be addressed in this paper), which provide the supervisory authority with a frame of reference, and expert systems, drawing on several different databases.

SAABA: an evolving supervisory tool focused on credit risk

SAABA is one of those expert tools developed by the Commission Bancaire's General Secretariat, aiming at producing an automated system for financial analysis of credit institutions, tapping into 25 different databases to determine the quality of an institution portfolio and ultimately, run stress tests on the whole French banking sector. The project started as soon as 1997 and has since undergone several makeovers, the latest being linked to the use of SAABA during 2004's FSAP examination of France by the IMF.

The input data come mostly from internal databases of the Commission Bancaire, such as BAFI (in-house main prudential database) and various surveys on subjects such as property risk, country risk, etc., or the Central Bank like the credit register, the later being pivotal source of information. External sources are also used, in particular those available from rating agencies, such as Standard and Poor's and Moody's (ratings, probabilities of defaults).

By drawing on all those different databases in a coherent framework, SAABA aims to take into account the various facets of banking risk and capture vulnerability factors as comprehensively as available information will allow. The way the data is compiled and processed depends on the nature of the risk: for example, quantitative risks – level of capital, prudential capital requirement, operation profitability, detailed analysis of the loan book, short term and medium term refinancing capacity – are approached via financial analysis, risks of a more qualitative nature – robustness of shareholders' base, solidarity of banking groups, quality and support of non-bank holding companies – are handled via a strategic scenario method.

Among the quantitative risks, the loan quality analysis performed by SAABA is a good example of the system's use of information from diverse sources. This analysis draws on data from the Banque of France's central risk database (amount and nature of commitment, beneficiary, granting institution, etc.), Fiben database (important legal and other events, Banque de France ratings) and creditworthiness scores for sectors and individual borrowers.

Over the years, the robustness of the SAABA model as a credit risk focused tool has been reinforced: estimations of probabilities of default have been refined and are now done on an individual basis. From computed PDs and credit exposures, expected losses are then computed at the bank as well as at the group level. Moreover, unexpected losses are introduced as a "stress" applied to the cost of risk. Thus, the impact of EL and UL are assessed on i) the credit quality of the banks' portfolios and ii) individual banks solvency level.

The FSAP examination, in 2004 has provided the impetus to take the model one step further, finally linking economic and financial shocks affecting the national or international environment and their impact on banking variables (results, solvency, provisioning) of the French Banking system as a whole – so called macro stress tests.

Creating a coherent framework for running regular macro stress tests

Since the mid-1990s, central banks and the authorities responsible for bank supervision have placed increasing emphasis on the macro-prudential perspective: the study of linkages between macroeconomic trends and the stability of the financial system, and the banking system in particular. The need to strengthen financial stability analysis has led to the design of "Stress tests" as an important element of this approach.[1]

During the first quarter of 2004, the General Secretariat of the Commission Bancaire (SGCB) and the Directorate General Economics and International Relations (DGEI) of the Banque de France conducted an assessment of the stability of the French banking system and its capacity to withstand a set of macroeconomic and financial shocks, as part of a broader evaluation of the French financial system carried out under the auspices of the IMF's Financial Sector Assessment Program (FSAP). The assessment employed a macro-prudential approach which seeks to quantify the effects of shocks to the banking system using "stress tests". The tests measured the impact of severe shocks, deemed plausible but infrequent: e.g. a recession, a large movement in interest rates, an oil price shock, a sharp drop in stock prices.

Several types of innovation were introduced in the course of the French "stress tests":

- to begin with, as indicated above, the IMF chose for the first time, because of the importance of *bancassurance* in France, to analyze the impact of certain scenarios on banks and insurance subsidiaries together. Information on the effects on insurance subsidiaries was provided by the French Insurance Commission (*CCAMIP*), which was responsible for conducting the FSAP in this sector;
- in addition, several quantitative tools for assessing the sensitivity of bank exposures to macroeconomic developments were employed;
- to ensure consistency between the simulations carried out by the SGCB and those carried out by banks, the macroeconomic "stress" scenarios were illustrated with key parameters drawn from the Mascotte macroeconomic model of the Banque de France, such as the rate of growth in bank loans, and provided to credit institutions;
- furthermore, the macroeconomic "stress" scenarios were implemented using both the Mascotte model (for France) and the NiGEM model (to take into account the effect of international shocks);
- finally, the effect of the shocks on solvency ratios was calculated using the methodologies of Basel I and Basel II. Major market institutions participated actively in these simulations. Along with the simulations carried out by supervisors, "stress tests" were conducted independently by the seven largest banking groups in terms of share of the French banking system (representing more than 60% of the net banking income of the French banking system and 80% of total assets in 2003).

The strategy chosen to carry out the FSAP simulations was sensitivity analysis. This is the simplest approach to produce pragmatic and robust results, given the current state of the art, and is generally used in the majority of the large developed countries which have already carried out this exercise. In agreement with the IMF, the "feedback" effect on the real economy of an initial shock affecting the banking and financial system was not considered. In addition, there was no detailed analysis of systemic risk in the narrow sense of the term, i.e. the propagation of shocks between individual institutions. The emphasis is instead on market shocks and exposure to macroeconomic shocks.

A combination of static and dynamic analysis of risks

The static sensitivity analysis focuses on the instantaneous impact of shocks to monetary and financial markets, including foreign exchange markets. These shocks are large in magnitude but limited in time, and their impact is transmitted through instruments quoted in various markets (interest rate, exchange rate, stock market index, etc.). The calibration of these instantaneous shocks generally corresponds to the 99th percentile of the historical probability distributions observed over the past thirty years. These shocks are mainly univariate (single-factor), although multivariate scenarios combining several factors have also been carried out. They produce a price effect on banks' portfolios, which is evaluated instantaneously. Also

1 *A throughout analysis of the French FSAP Stress tests can be found in "Assessment of stress tests conducted on the French banking system", Olivier DE BANDT and Vichett OUNG, Banque de France's Financial Stability Review, November 2004.*

included in this category are certain shocks of a "systemic" nature affecting credit risk (such as a sudden flight to liquidity), or sectoral shocks: for example, deterioration in credit spreads in the TMT (Technology Media-Telecommunications) sector.

However, there were also two principal reasons for carrying out a more dynamic analysis of the impact of "stress" events:

- The first stems from the fact that credit risk is still the principal risk borne by banks. Since the credit cycle is relatively long and closely linked to the economic cycle, the overall effect of the "stress" event is poorly captured by a static analysis, which focuses on very short term effects.
- The second relates to the weak economic credibility of factor scenarios, in which a shock is assumed to affect only a single economic or financial variable, with other variables remaining fixed; or possibly several variables but with arbitrary assumptions concerning their possible correlation. This explains why this type of scenario is generally credible only for instantaneous shocks.

Hence, dynamic sensitivity analysis is global and macroeconomic in character. It considers a scenario in which an exogenous shock to the French economy is propagated over time, impacting the banking system through two mechanisms: an increase in risk and an income effect stemming from a possible contraction in economic activity.

This type of scenario required the use of a macroeconomic model; the French FSAP utilised the Mascotte model to simulate the impact of several macroeconomic shocks. It was employed in conjunction with the NiGEM model in order to take into account the impact on France's international environment of shocks of a "global" nature.

For each "stress" scenario, measurements were made of the effect of the shock on a set of macroeconomic variables, with a 2 years horizon: GDP and its components, loans extended to businesses and households, and corporate failures. The variants obtained were distributed to the banks participating in the exercise (the "bottom-up" approach – see below) and were also used in the "top-down" approach conducted by supervisors. In addition to providing these variants to the banks, they were given the option of developing alternative variants using their own internal economic models.

The results of the "stress tests" were measured in terms of three different indicators, which constitute the presumed variables of interest for the banking system. These are also the variables used in the macro-prudential approach described in the first section of this article, namely: profitability, exposures and capital, i.e. the solvency ratio.

For each of the variables of interest, the results of the "stress" simulations were expressed in terms of the cumulative change in net income on the one hand, and capital and solvency ratios on the other hand, at the specified time horizon (instantaneous for single-factor and multi-factor shocks and one to two years for macroeconomic shocks). These effects were felt *via* changes in loan losses and net provisions for credit shocks. For the macroeconomic scenarios projected over a two-year horizon, the effect on net income took account of a tax depreciation of 33%, corresponding to the deductibility of losses from the corporate tax base.

The different measures of impact produced by the simulations were summarised and compared in terms of their overall impact on the solvency ratio, with a distinction being made between Basel I (Cooke ratio) and Basel II definitions. While profits generally appear to be the first cushion for absorbing the losses generated by unfavourable situations, they can be insufficient to cover unexpected losses in "stress" situations. In this case, the mobilisation of capital is necessary. Thus the solvency ratio $CARt = Kt/RWAt$ relates capital Kt to risk-weighted assets $RWAt$. The numerator of the ratio includes the change in net earnings due to the "stress" scenario. In the Basel I simulations, the denominator ($RWAt$) takes into account only the variation in capital requirements due to the volume effect, while in the Basel II simulations it takes into account both the volume effect and the deterioration in assets. Thus, in the latter approach both the numerator and denominator of the solvency ratio are affected.

The choice of a Basel II measure of the solvency ratio appears logical. In the first place, it anticipates the adoption of the new solvency standards, particularly under the heading of Pillar 2 of Basel II, which calls on supervisors to incorporate measures of "stress" in their capital requirements. In the second place, the Basel II measure does not limit the impact of a "stress" – in particular, a macroeconomic "stress" – to likely failures, but also captures the general deterioration in the quality of bank portfolios, as an end result.

The international dimension of banking activity and implied contagion effects remain to tackle

Several lessons can be drawn from this "stress test" exercise, concerning the results obtained, the methodology used, and future work.

With regard to results, the different "stress" scenarios applied to the French banking system, on the basis of 2003 reports and predicted performance in 2004 and 2005, indicate French banks' strong capacity to withstand shocks. Among the shocks studied, zero growth in the French economy for two years as the result of a slowdown in global demand appears to be the most severe.

Regarding the methods used, the implementation of "stress tests" is now tried and tested, given the number of exercises already carried out at the international level and the experience acquired previously in France. The use of the Banque de France's macroeconomic model and the development of financial models for measuring risk were particularly useful in ensuring the consistency of the French exercise, allowing those stress to be now run on a bi-annual basis.

Certainly, the prior absence of a common, standardised conceptual framework for the macro-prudential approach made it necessary to tackle the question from a number of different angles. Nevertheless, the overall consistency in the results obtained from the "bottom-up" approach (based on individual banks' accounts) and the supervisors' "top-down" approach tended to confirm their robustness.

Concerning future work, the FSAP has served as a catalyst for the development of tools for assessing aggregate risk. In addition to pursuing the calibration of the instruments, the next phase of work should aim at integrating the different approaches, currently in partial equilibrium (credit market, bank capital market, etc.), in a unified conceptual framework, while also seeking to incorporate more systematically the international dimension of banking activity.

Sébastien Clanet (Bank of France)

SESSION 7

What data do we need on financial markets and how can they be obtained?

Chair's summary: Mr. Randall Powley (Ontario Securities Commission)

Papers:

Measuring risk appetite
Mr. Philip Wooldridge (BIS)

Canadian corporate bond market – what do we need to know?
Mr. Jon Cockerline (Investment Dealers Association of Canada)

Building a securities information system on a security-by-security basis
Mr. Erich Hille (Oesterreichische NationalBank)

Chair's summary

Randall Powley (Ontario Securities Commission)

Chair: Randall Powley (OSC)

The session will start with a broad look at financial markets but will then focus on data needs of the corporate bond market.

1st lead intervener: Philip Wooldridge (BIS)

Issues discussed included:
- Data collection, data compilation, and data dissemination from a data user perspective.
- There is a lot of data out there from the perspective of a central bank which has a budget for data. Retail investors on the other hand cannot afford a Bloomberg terminal etc. and hence this may not be true from a consumer protection point-of-view. Dissemination of data needs work and hence we should focus our efforts on data dissemination.
- New instruments and new markets have increased liquidity which allows us to extract even more information. A few years ago markets were not sufficiently liquid and so it was difficult to extract this information. There is a lot more price data than quantity data.
- Data compilation quality is mixed. GovPX is an improvement over single-dealer and GovPX and CanPX are useful for research. However not sure if TRACE data which is more detailed is useful from a financial stability point-of-view (it seems more useful from a consumer protection point-of-view). The ECB's initiative CSDB (Centralized Securities Data Base) is compiling existing data sources so there is no additional reporting burden on private institutions.
- More data needs to be disseminated to the public. Ideally data should be made available to market participants (setting aside the subject of whether incentives are in place for them to use the data, it should be disseminated to them so they can make informed decisions). Confidentiality constraints are taken too far. We can disseminate more data publicly without violating confidentiality. Awareness about the importance of available data also needs to be increased e.g., trading of Bunds in Germany is collected for regulatory purposes but not aggregated nor disseminated.

2nd lead intervener: Benjamin Cohen (FSF)[1]

- Took a different approach from the other presenters and discussed a research paper he is currently working on using BIS data.
- In the paper, he set domestic data aside, mainly due to lack of comparability, and focused on international data. Thus there is need for comparable domestic issuance data and better data on portfolio investments in foreign securities (there is some U.S. and Australian data but there is no global data to study investor behavior with respect to currency choice).

3rd lead intervener: Jon Cockerline (IDA)

- Provided the perspective of the provider of data. He did not differentiate between financial stability and consumer protection because from a firm's perspective additional data requirements are seen as a cost and the reasons behind are irrelevant. Focused on the Canadian corporate bond market and described the currently available data (MTRS, CanPX, etc.).
- Need to consider the cost burden of providing data – costs not only for participants but also implications for markets (referenced the Governor's speech last night).

1 *See BIS Quarterly Review, June 2005, "Currency Choice in International Bond Issuance".*

- Institutions have access to very good sources of data and perhaps know as much as dealers. CanPX is the designated information provider for corporates (currently 28 bonds displayed). Government securities are relatively more transparent (pre-trade bid/ask quotes) but this is voluntary (exemption of Government securities expires in 2007).
- An SEC study shows a decrease in transaction costs with the implementation of TRACE. However, institutional investors are reporting different experiences (quoted from BondWeek article).
- Stats show that there are a large number of retail investors (76.8%) but they are trading a very small proportion of the total volume (2.7%). Don't have this kind of data for government securities which is a serious gap especially in light of making important policy decisions.
- Hedge fund participation in corporate bonds is increasing. The risks include concentration and herding. However, we don't want an environment that is not hospitable to hedge funds because they perform an important function.
- We need to recognize that when we develop a system and get it to work, the market may evolve in such a way that system is no longer useful (e.g., MTRS before and after ATSs). This is a hidden cost which we don't consider when setting up the system.

4th lead intervener: Erich Hille (Oesterreichische NationalBank – Austria)

- Explained the security-by-security collection system.
- Sources used to fill the databases include issuer reports, commercial data providers, and institutional data providers (these are numbering agencies). Use all three data sources to obtain complete information.

Discussion summary

- What is the cost of collecting all this data and is the benefit worth it? Randall Powley referenced the SEC study which used TRACE data and showed that investors could save about $3 billion annually as a result of increased transparency in corporate bond markets. Thus the cost benefit analysis seemed reasonably clear. However, Jon Cockerline commented that we should be careful in using these statistics. The US corporate bond market is far more liquid than the Canadian market. Also, there are significant differences between the impact of transparency in the equity and bond markets. Equity markets are mostly auction markets while bond markets are mostly dealer markets. Dealers take principal positions in bond markets and thus need to be compensated for taking that risk. If investors are saving due to increased transparency then those savings are coming from intermediaries (dealers) who may decrease their activity and hence reduce liquidity.
- With respect to data dissemination, Gerry Goldstein stated that OSFI makes considerable amount of data available on its website. What is not made available is due to agreements with the banks. Jon Cockerline said that some data are collected for compliance and not publicly released but the IDA issues fair amount of aggregate data.
- Shinobu Nakagawa highlighted the importance of data dissemination and said he was dreaming of a statistics "google".
- David Longworth asked whether there are private sector or public sector companies cleaning the data. What are challenges in linking balance sheet data with security data, i.e. how can we match identifiers of firms with identifiers of securities? Sebastien Clanet said it could be done theoretically but difficult in practice. Mario Quagliariello said it is difficult since classifications and sources of balance sheet and security data are different.
- David Fanger commented that there appears to be lots and lots of pricing data but from a financial stability perspective, volume data is very important. Ben Cohen commented that volume does not necessarily translate into exposure because of the use of derivatives etc. Randall Powley said we need to know where the exposures are especially in the OTC derivatives market so we know what the risk of a liquidity squeeze is. Phil Woolbridge stated that commercial data providers are not providing exposure data but public providers don't have it either.
- George Pickering suggested that getting data to help understand what is happening in financial markets is a challenge and will become even more difficult in the future with increasing disintermediation (in the past there were only a few banks but now there are many institutions involved). We should therefore be careful in terms of expectations when we get the data.

Session summary

- There is a lot of data available especially to central banks and hence the focus should be on improving data dissemination.
- There is more price data than quantity data available.
- Both the costs and benefits of obtaining data need to be considered before formulating policy.
- Linking balance sheet data with security data is a challenge faced by most countries.
- Recognize that data has limitations and thus form realistic expectations of how useful data is in understanding financial markets.

Randall Powley (Ontario Securities Commission)

Measuring risk appetite

Philip Wooldridge (BIS)

Movements in asset prices may be driven by a shift in fundamentals or a change in investors' appetite for risk. Risk appetite tends to move in tandem with fundamentals, rising when fundamentals are seen to improve and falling when they deteriorate, but the link is rather tenuous, especially over short time horizons. Episodes of market stress can be associated with abrupt shifts from risk tolerance to risk aversion even in the absence of a change in fundamentals.[1] Measures of risk appetite, therefore, can make an important contribution towards deepening our understanding of market dynamics and identifying potential vulnerabilities in the financial system. Disentangling changes in perceptions of risk from changes in the price of risk is especially relevant for analysing the stability of liberalised financial systems, considering these systems' procyclical tendencies and the consequences of such behaviour for the real economy.[2]

Neither changes in risk appetite nor shifts in fundamentals are directly observable and so it is difficult to isolate their respective impact on asset prices. Market participants often rely on simple proxies to capture risk appetite, such as quality spreads or implied volatilities. However, such proxies' conceptual link to risk appetite is not well specified. In recent years, modern finance theory has provided tools that have aided the construction of indicators of risk appetite with solid conceptual underpinnings. Furthermore, liquidity in many financial markets, especially credit derivative markets, has improved to the point where order imbalances and other idiosyncratic factors are no longer among the primary drivers of price changes (at least under normal conditions). This facilitates the extraction of information from market prices.

Building on these advances, a number of financial institutions and organisations, including the BIS, have developed measures of risk appetite for various financial markets. The measures constructed at the BIS to date are outlined below.[3] The intention is to eventually distil a summary measure for the risk appetite of global investors. In what follows, the strengths and weaknesses of these measures are not discussed, and no comparisons with alternative measures are made. Instead a brief explanation is given of how the measures are estimated and of the improvements in data availability that make their construction possible.

The first indicator of risk appetite estimated by the BIS was based on the observed relationship between ex-ante risks and ex-post returns for a variety of financial assets.[4] Specifically, the indicator corresponds to the slope coefficient in a cross sectional regression of one-month realised returns on the two-year historical volatility of those returns (as a proxy for perceived risk). The sample includes equity, bond and money market returns for more than 30 countries, both emerging and industrial. In periods of high risk appetite, increased demand for higher risk assets tends to lead to a disproportionate, if only temporary, increase in these assets' prices, and hence an increase in their realised returns in relation to less risky asset classes. Therefore, a positive slope coefficient can, under certain conditions, be interpreted as representing an increase in risk appetite. Graph 1 reproduced is reported regularly at meetings of the Committee on the Global Financial System, in the graph package on "Recent developments in financial markets". The apparent co-movement of the slope coefficient with real short-term interest rates in the major markets for much of the period provides some circumstantial evidence that market participants' appetite for risk is often whetted by inexpensive leverage opportunities and typically declines when these opportunities disappear.

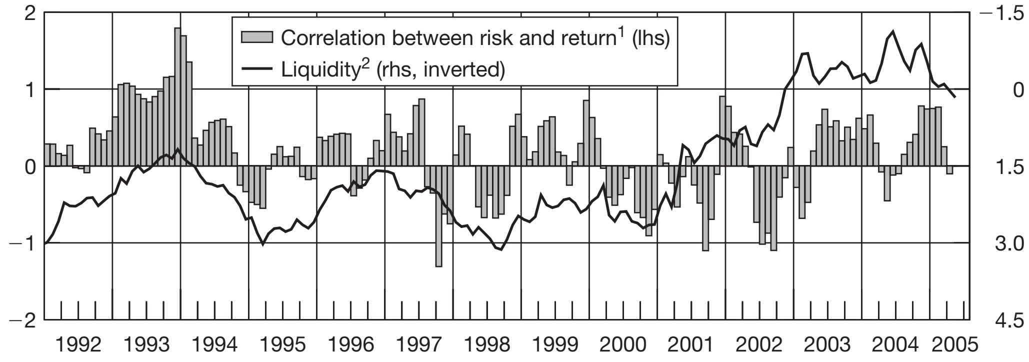
1 *See Committee on the Global Financial System,* A review of financial market events in autumn 1998, *BIS, October 1999.*

2 *See C Borio and W White: "Whither monetary and financial stability? the implications of evolving policy regimes", BIS Working Papers, no 147, February 2004.*

3 *For a summary of risk appetite indices developed elsewhere, see M Illing and M Aaron: "A brief survey of risk appetite indices",* Bank of Canada Financial System Review, *June 2005. They conclude that the measurement of risk appetite is sensitive to the chosen methodology and so it is premature to rely on a single measure.*

4 *See K Tsatsaronis: "An indicator of investors' attitude towards risk",* BIS Quarterly Review, *February 2000, pp 12–13. For a theoretical critique of such indicators, see M Misina: "What does the risk-appetite index measure?", Bank of Canada Working Paper, no 2003–23, August 2003.*

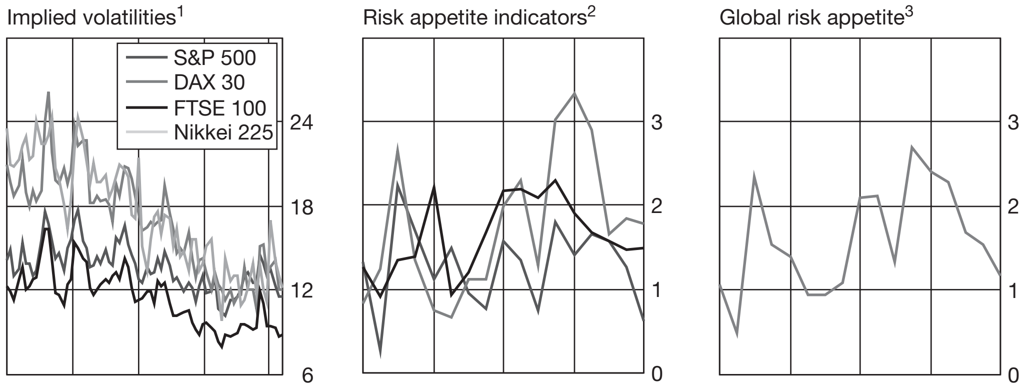
Graph 1 – Investors' attitude towards risk and liquidity



1 *Slope coefficient of a cross-sectional regression of realised returns on historical volatility for a number of asset classes.*
2 *GDP-weighted average of overnight real rates in the eurocurrency market for the United States, Japan, Germany, France and the United Kingdom.*

Sources: Datastream; national data; BIS estimates.

Graph 2 – Volatility and risk appetite in equity markets



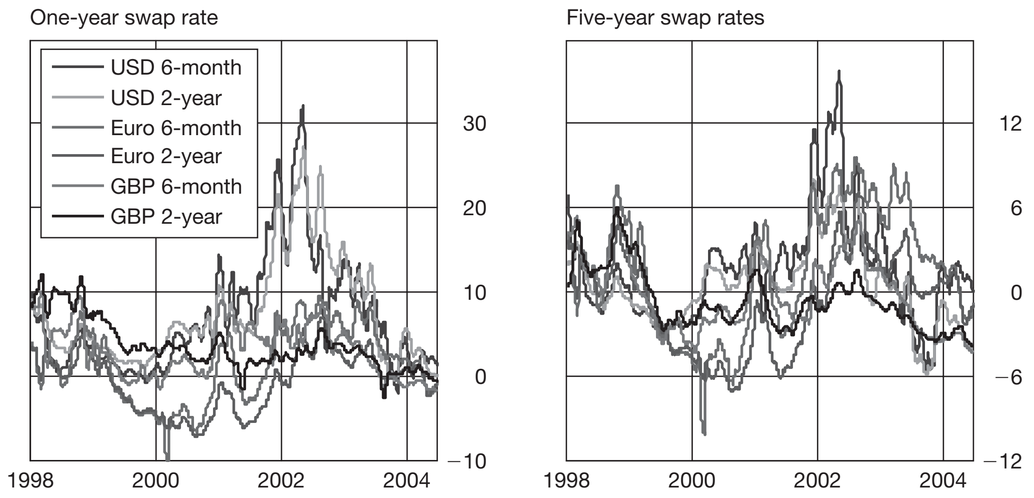
1 *Volatility implied by the price of at-the-money call option contracts on stock market indices; weekly averages.*
2 *Derived from the differences between two distributions of returns, one implied by option prices, the other based on actual returns estimated from historical data.*
3 *First principal component of the three risk appetite indicators.*

Sources: Bloomberg; Chicago mercantile exchange; Eurex; London international financial futures and options exchange; BIS calculations.

Another indicator of risk appetite exploits information from the prices of equity index options.[5] It measures risk appetite by comparing the empirical distribution of equity returns with the distribution implied in options prices. The latter so-called risk neutral distribution weights the empirical probabilities according to investors' risk preferences. Risk averse investors attach greater value to the avoidance of low payoffs and less value to the possibility of high payoffs; therefore, for given expectations of risk, the greater the area under the left tail of the option-implied distribution, the greater is investors' effective aversion to negative outcomes. The indicator is expressed as the ratio of the risk neutral conditional probability of a 10% or larger price decline to the corresponding empirical probability. Indicators are calculated for the S&P 500, Dax 30 and FTSE 100 and the risk appetite of global equity investors is then estimated by taking the principal component of the three indicators. Graph 2 like the one reproduced have been included in the *BIS Quarterly Review* and the *BIS Annual Report* since June 2003.

5 *See N Tarashev, K Tsatsaronis and D Karampatos: "Investors' attitude towards risk: what can we learn from options?",* BIS Quarterly Review, *June 2003, pp 57–65. The Bank of England has developed a similar indicator; see P Gai and N Vause: "Risk appetite: concept and measurement",* Bank of England Financial Stability Review, *December 2004, pp 127–36.*

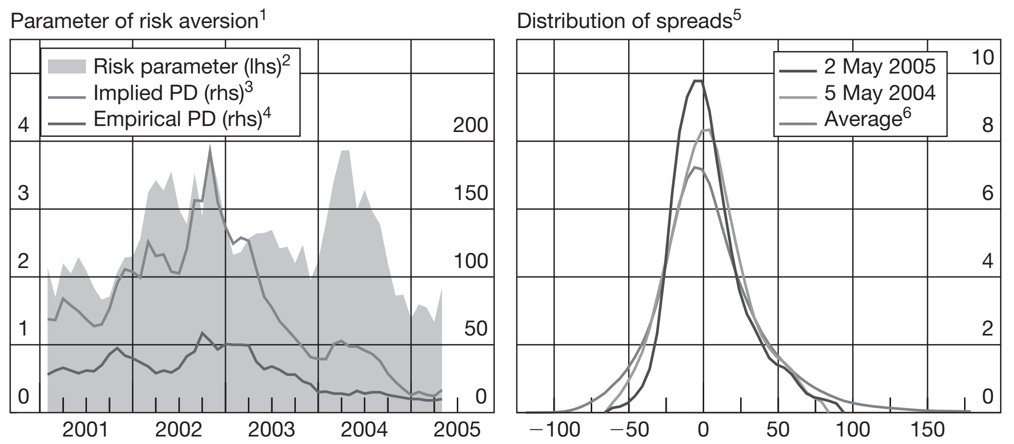
Graph 3 – Compensation for volatility risk in interest rate swap markets[1]
(In per cent per year)



1 *The compensation for volatility risk is the difference between the implied volatility and the expected realised volatility; over the 6-month and 2-year horizons; 1-month moving average.*

Sources: Bloomberg; Datastream; BIS calculations.

Graph 4 – Risk aversion in credit markets



1 *Based on the 125 constituents of the DJ CDX.NA.IG.3 CDS index; monthly averages.*
2 *Ratio of implied (i.e. risk neutral) probabilities of default (PD) to empirical (ie physical) PD.*
3 *PD implied by one-year CDS spreads, assuming a constant recovery rate of 40%.*
4 *One-year PD estimated by Moody's KMV, based on balance sheet information and asset price volatility.*
5 *Based on the constituents of the Merrill Lynch A-rated US corporate bond index; the horizontal axis represents the difference from the median spread; fitted using a normal-based kernel density function.*
6 *January 1997–May 2005.*

Sources: Mark-it; Merrill Lynch; Moody's KMV; BIS calculations.

Work is currently in progress at the BIS to construct an analogous indicator for interest rate swap markets, using information from the prices of swaptions.[6] Swaption markets have gained liquidity in recent years: for example, daily average turnover of interest rate options in OTC markets increased almost six fold between April 2001 and April 2004, from $29 billion to $171 billion. This facilitates the extraction of implied volatilities from swaption prices. Similar to what was done for equity indices, these implied volatilities can then be compared to measures of expected future volatility to derive an estimate of the compensation demanded by investors

6 *See F Fornari: "The rise and the fall of interest rate volatility in the United States: evidence from swaptions",* BIS Quarterly Review, *forthcoming.*

for bearing volatility risk.[7] Preliminary estimates of the compensation for volatility risk are plotted in the Graph 3.

Progress is also being made on the construction of an indicator of risk appetite for credit markets. Like for equity and swap markets, this indicator is based on a comparison of risk neutral probability distributions with physical distributions. Default probabilities derived from credit spreads are conceptually equivalent to those derived from underlying balance sheet information multiplied by some parameter for risk aversion. Owing to the rapid development of credit derivative markets, default swap spreads are now readily available for a wide range of issuers across a wide range of maturities, thereby facilitating the calculation of risk neutral default probabilities. These probabilities can then be compared to estimated default frequencies from Moody's KMV.[8] The ratio of risk neutral to physical default probabilities is plotted in the left panel of the Graph 4, taken from the forthcoming *75th BIS Annual Report* (to be published on 27 June 2005).

Another measure used at the BIS to assess risk appetite in credit markets is the distribution of credit spreads. The distribution of spreads for issuers in a given rating class, for example based on the constituents of a corporate bond index, is estimated using a kernel density function. Changes over time in this distribution can indicate shifts in the degree to which investors discriminate among issuers. The skewness and peakedness of the distribution during periods of low risk appetite, such as October 2002, are very different than during periods of high risk appetite, such as February 2005; however, changes in perceptions of risk could have a similar impact on the distribution of spreads and so, as a measure of risk appetite, its interpretation is not obvious. Distributions like that in the right panel of the Graph 5 have been included in the *BIS Quarterly Review* and the *BIS Annual Report* since June 2004.

Philip Wooldridge (BIS)

7 *Compensation for volatility risk is proportional to the relative risk aversion parameter of a power utility function.*

8 *See A Berndt, R Dougals, D Duffie, M Ferguson and D Schranz: "Measuring default risk premia from default swap rates and EDFs", BIS Working Papers, no 173, March 2005.*

Canadian corporate bond market – what do we need to know?

Jon Cockerline (Investment Dealers Association of Canada)

1. Policy issues/concerns

- Price transparency – how far and how fast?
- Liquidity – what are the systemic risks?
- Market development – high yield, derivatives, CDS, secondary loans?
- Market efficiency – tax impediments?
- Credit Rating Agencies – regulated or not?
- Trading technologies – market impacts?

2. What data do we have?

- MTRS (Market Trade Reporting System)
- New Issues Data Base
- CanPX (CanPX Inc.)
- Bond ATSs (OSC) (Bond Alternative Trading System, OSC)
- Domestic and External Financing, Trading, Outstandings (BOC, Stats Canada)
- Exempt Market Offerings (securities commissions)
- Household Balance Sheets (Stats Can & commercial databases)
- Risk exposures in debt clearance and settlement (CDS)

3. Where are the gaps?

Transparency

The institutional bond market is relatively transparent for pre- and post-trade pricing (indicative quotes from Can Deal Inc., CBID Markets Inc. institutional bid/offer pricing, price information from member firm trading desks, data vendors, IDBs). Pre-trade transparency in the government market is enhanced by the Inter-Dealer Brokers (IDBs) whose markets are voluntarily fed to CanPX and consolidated for public display of best bid and offer. Dealers making markets in approximately 50 designated corporate bonds are mandated to provide post-trade information to CanPX.

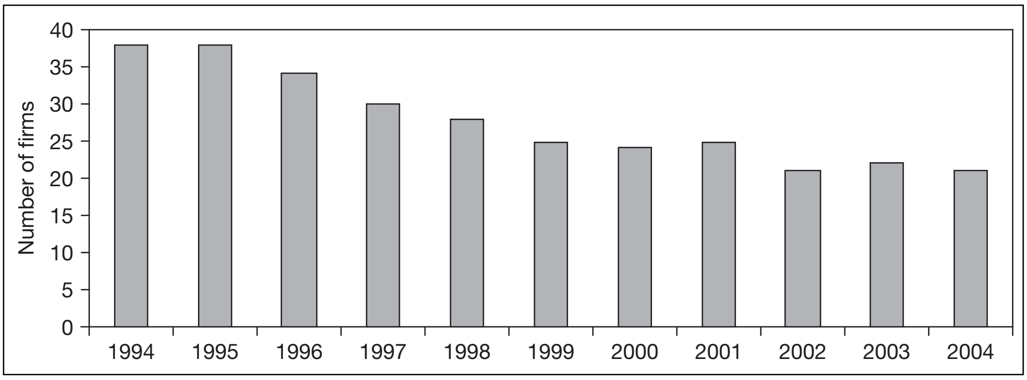
An increasing array of transparency services are also available to retail investors – CanPX corporates, internet vendors such as StockWatch, CBID retail, IAs at member firms, discount brokerages such as E-Trade, Credential Direct, Q-Trade, etc. Despite the expanding list of transparency options available, however, the typical retail investor may not have access to readily available pricing or commission schedules, and may not be able to assess the quality of their executions or the market value of their bond investments.

Through the implementation of TREATS, the Transaction Reporting and Electronic Audit Trail System, regulators will be better able to monitor orders and trades within a firm and in the context of the overall market, and thereby better enforce market conduct and best execution obligations. NI 23–101 requires dealers and inter-dealer bond brokers to record and report orders and trade information in electronic form no later than January 1, 2007.

Transparency, or the public dissemination of pre- and post-trade information, is still under discussion – it is unclear how far and fast regulators should go. As noted, mandated post-trade transparency is in place for a select number of Canadian corporate bonds. The speed and extent to which the list of eligible bonds should be expanded, and the timing interval between trade and display are matters for further review. For governments, exemptions from mandated transparency in the current Rule ATS are due to expire in December 2006.

Questions remain as to the impact of mandated pre- and post-trade transparency on the liquidity of corporate and government markets. Unlike exchange-traded markets, the liquidity of principal-based OTC markets very often rests on the ability and willingness of dealers to hold inventory and make markets.

Government securities distributors



While a recent SEC study[1] has concluded that there exists a relationship between increased transparency and lower transaction costs, institutional investors are finding the opposite. In a recent article in BondWeek[2], for example, the authors note:

> *"High-yield market participants say transparency in the credit markets is rearing its head, with the National Association of Securities Dealers' Trade Reporting and Compliance Engine (TRACE) hampering the ability to trade large blocks of bonds in a declining market. Additionally, they argue TRACE, which began offering transaction and price data on the entire universe of corporate bonds in February, has increased market volatility overall as even relatively small trades can quickly cause the market to reprice."*

For Canada it remains very much an open question. Would TRACE-level transparency work to narrow spreads, or widen them, in a market as small and at as early a stage of development as Canada's?

Corporate bond markets (Canada and United States)

	Dealers*	Size**
Canada	12	202
U.S.	1,881	13,660

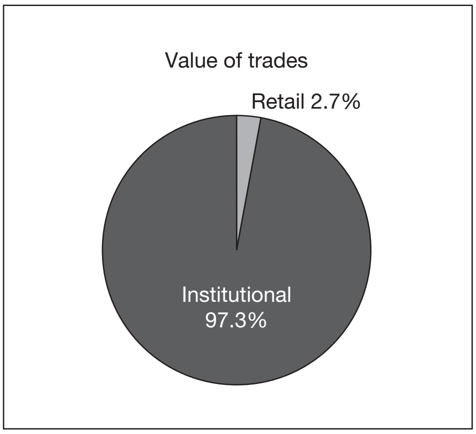
**Number of dealers reporting to CanPX and TRACE respectively.*
***Billions of US dollars, BIS Quarterly, table 16B Year-end 2004.*

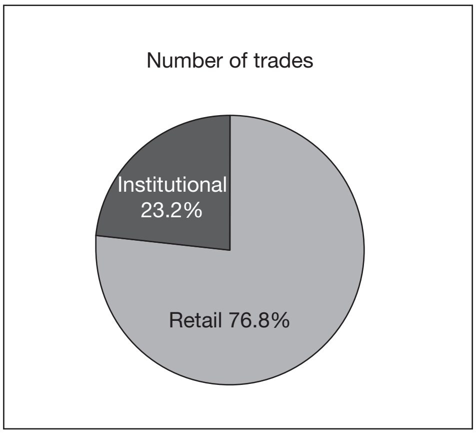
Retail participation

The extent of retail participation in corporate and government bond markets in Canada, and how fast this is changing, is also not well known. CanPX data from the 4th quarter of 2004 show that roughly 3% of value traded, and 77% of trades in the displayed corporate market were in trade sizes of less than 100 bonds (principal amounts of less than $100,000), a trade size used to approximate retail demand. No such data exists yet for the government market. And the validity of 100 bonds as a cutoff between retail and institutional trade size remains to be determined.

1 *"Corporate Bond Market Transparency and Transaction Costs", Edwards, Harris and Piwowar, September 2004.*
2 *BondWeek, June 6, 2005. "High-Yield Players Hit by Downside of TRACE".*

Retail participation in value and trades



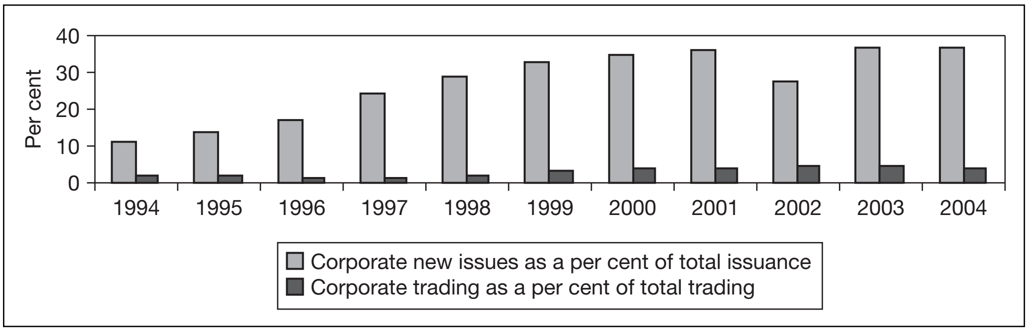


These questions, and others, will have a bearing on policy direction in this area. Consensus will be needed soon on some of these issues for rulemaking and implementation prior to the expiration of current exemptions at the end of 2006.

Liquidity

Unlike governments where there is significant after-issue trading, corporates are typically sold and locked away in investor portfolios.

Corporate bond trading and issuance



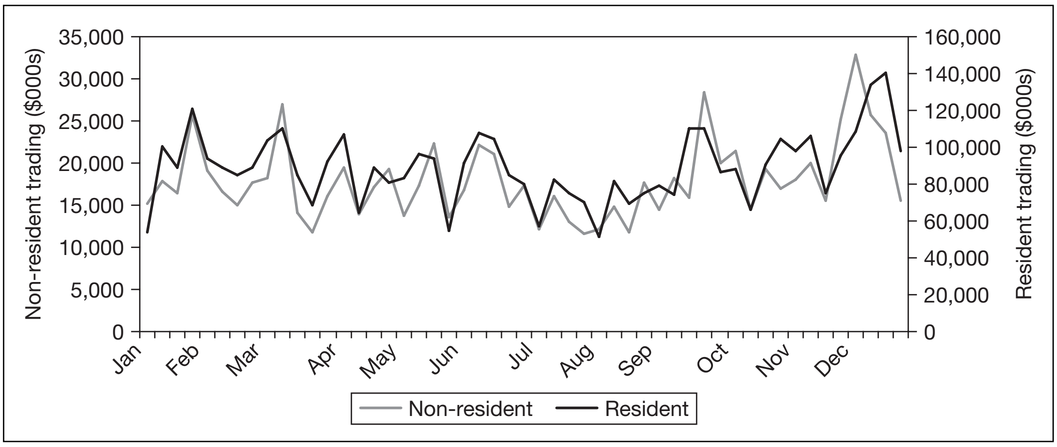
The features of corporate bonds – bond covenants, small issue size, and unique structures – may expose investors to liquidity risks, particularly for highly-levered hedge fund strategies. And as the hedge fund market has grown, funds have pushed more aggressively into the more esoteric and less liquid markets such as distressed debt, structured finance, credit default swaps (CDS), and collateralized debt obligations (CDOs) and their derivatives.

What are the implications of increased concentration in these markets? How common is herding of hedge fund strategies? What percentage of trading in bond and equity markets do hedge funds represent? And what risks does this pose for the system as a whole?

The answers would seem to require better data on counterparty positions than we currently have – presumably derived from better data on the trading activities of domestic banks and dealers with resident and non-resident counterparties. But we need to ask – At what cost? Would better and more complete data help to avert a crisis, or simply add to the regulatory burden of participants and reduce liquidity overall? The potential cost of stifling an activity that is known to have brought innovation and greater efficiency to capital markets needs to be weighed against the policy benefits that improved intelligence would bring to regulators. In addition, prior to undertaking a data gathering exercise of this nature it would be essential to clarify the policy options that would be available, and the triggers that would cause them to be engaged.

Data on fixed income trading in Canada compiled over the last 10 years do not show any evidence that flows in any weekly period have been dominated by non-resident trading. Total trading by residents has remained relatively stable in the 12–25% range. Weekly data for 2004, showing average non-resident trading of 16.7%, is provided in the following chart.

Weekly fixed income trading – 2004



4. Other data issues

While current databases are extensive, they may not reconcile easily and do not allow us to track debt instruments through their lifetimes according to such parameters as: prices and spreads; and volumes issued, traded, redeemed, and converted. In addition, volumes issued domestically and in other markets (size, frequency, price, other detail), and material changes affecting the issue, issuer, and ratings during the life of the bond are not tracked within any single database. Such data could be helpful for policy analysis, but the benefits would need to be measured against the costs of setup and maintainance of such a database.

Market development

The rapid growth of Credit Default Swaps in the US over the last several years has been a major factor in making the US corporate market more efficient and helping to develop more viable 2-way markets in corporate debt. A CDS market has yet to develop to any extent in Canada. Similarly, markets for derivative products, secondary loans, and non-investment grade debt have been slow to develop in Canada while they have blossomed in the US. How can we encourage similar developments in Canada? To what extent are tax impediments, withholding taxes, and the lack of standardization of documentation holding our markets back?

Market impediments/efficiency

What data would be helpful to policy makers in assessing costs and benefits of:
- removal of withholding tax in debt instruments less than 5 years,
- removal of tax obstacles to hedge fund growth in Canada,
- the elimination of double taxation of dividends.

Credit rating agencies

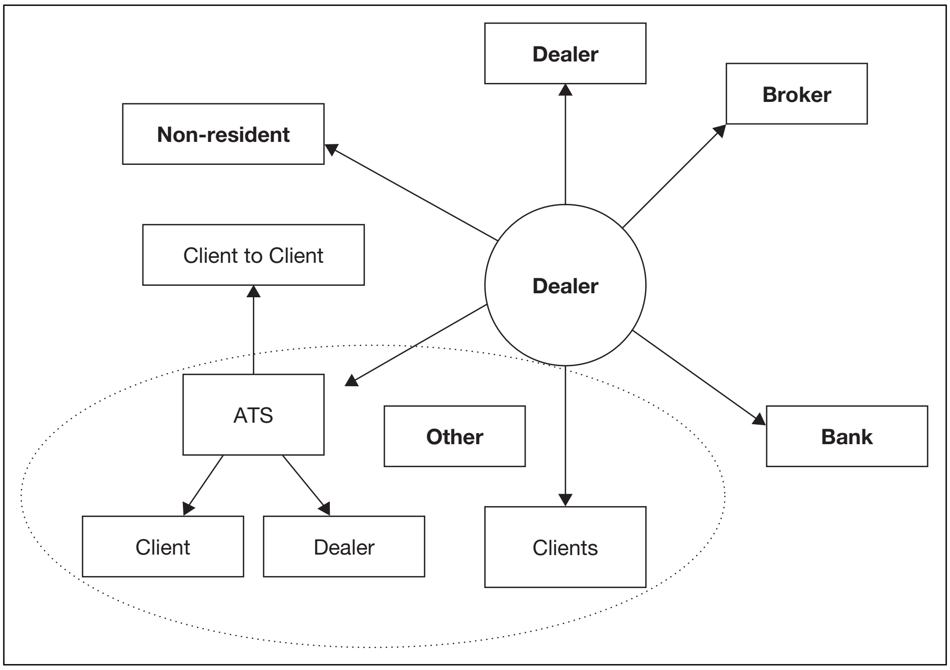
What impact do CRA ratings and ratings changes have on corporate debt prices? How is market-moving information managed, and should CRAs be regulated?

Trading technologies

Electronic systems are changing how debt is traded and widening retail participation in bonds. How has this affected the evolution of market liquidity and volatility of debt market. The jury is still out – some would say that greater investor participation has made bond markets more efficient, some would say that by attracting greater numbers of less sophisticated investors momentum trading has become more profitable and markets more volatile.

Evolving technology can also present challenges for data systems, as the following schematic for MTRS illustrates. The “Other” category in MTRS was designed to measure a dealer’s capacity for placing bonds with end investors. Since 2001, with the advent of ATS platforms which allow dealer–dealer and client–client trading in addition to the more traditional client–dealer trading, the “Other” and “Broker” counterparty classifications of MTRS are at risk of becoming less precise and less useful.

MTRS dealer trading



5. Conclusions

There is an abundance of data and data sources for the Canadian corporate bond market. This is fortunate because there are a large number of policy issues which will need to be advanced with the benefit of informed analysis in the near term. While there are gaps in our knowledge, these may relate more to a lack of in depth analysis applied to Canadian data than to a shortage of data. Databases are costly not only in setup but also in maintenance as resources must be continually applied to ensure the relevance and accuracy of the data being collected. Additional data collection mandated by regulators can be a burden for regulated industries, and should be pursued only after due consideration of all costs and benefits.

Jon Cockerline (Investment Dealers Association of Canada)

Building a securities information system on a security-by-security basis

Erich Hille (Oesterreichische NationalBank)

Requirements

International requirements placed on securities statistics have increased, among other things for monetary policy reasons and in the interest of financial stability, and the harmonization of the requirements on different statistics is being pushed. In addition to the data needed for the balance of payments and financial accounts, other statistics, like statistics on security issues, government finance, other financial intermediaries or on the international role of the euro define special demands. Future requirements, like the need for data on portfolio investment assets broken down by non-domestic issuer sectors, arise from the need to consolidate national balance of payments statistics into a European balance of payments.

Because of the growing importance of security markets, analysts require additional special statistics and ad hoc information.

Components of a security-by-security database

Four components are necessary for setting up a flexible database for statistical security information systems:

- Issuer information: should include information on the issuer's country, the issuer's economic activity, the issuer's domestic sector and balance sheet information;
- Holder information: in principle, the same information is desirable as for the issuer;
- Instrument information: should include instrument classification, information on nominal currency, original maturity, residual maturity and interest type;
- Business information: should include information about
  - stocks measured by market values
  - transactions
  - price, exchange rate and other adjustments
  - cash income (coupon and dividend payments) and
  - income on an accrual basis

The investment background (direct investment, portfolio investment) is another important factor.

The information system links the information about an organisation to each security issued by this organisation. Furthermore, the system shows who the investors for every single security are. Investors are disclosed either on an individual basis, i.e. the investor is known by name, or on the basis of groups of investors, like economic sectors or subsectors.

For each combination of issuer and instrument or holder and instrument, business information is available.

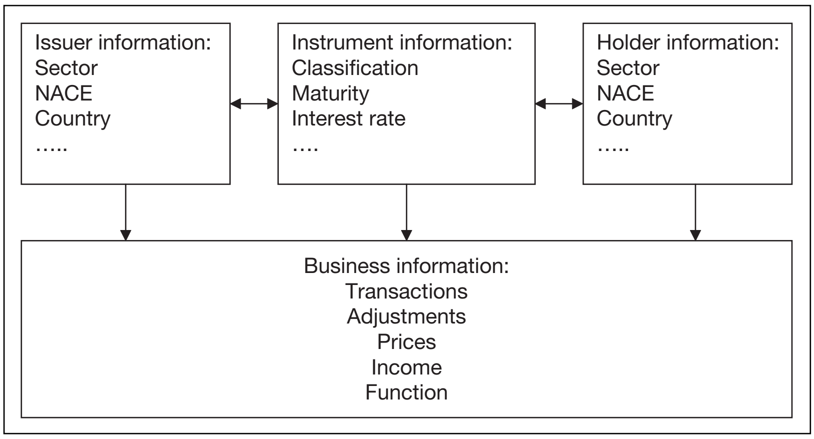
Having access to this detailed information, official statistical requirements can be covered consistently, and specific economic requests can be answered quickly.

Issuer information

Issuer information is usually available in business registers, which also provide links to other information like balance sheets, direct investment information or information collected in surveys. A link from the business register to the issuer of a security or an issuer register has to be established for security statistics purposes.

In Austria, the identifier recorded in the business register of the Oesterreichische Nationalbank is also recorded in the issuer database of the Austrian securities numbering agency.

Figure 1 – Overview of the components of a security-by-security system



This register is linked to the business register of the statistical office, in particular to reconcile the economic and industrial sector classifications of the entities. The register is also linked to the official Austrian company register.

Thus, a wide range of information about issuers is available.

Instrument information

To operate a security-by-security system, all securities relevant to the observed market have to be included in the database. For each of these securities, a minimum set of information is necessary, as described above.

Data providers serve special markets or special purposes; one provider usually neither covers all securities necessary for a securities database nor all the information necessary for each security. Thus, the compiler of a securities database has to combine various sources:

- Direct sources: information directly from the issuers
- Indirect sources:
  - commercial sources
  - registers.

Information collected directly from the issuer is usually very precise and reliable. In practice, however, issuer information alone is not sufficient. Reports might not cover all issuers and all issues, and an issuer cannot report all the attributes desirable in a securities database, especially not financial ratios or key capital market data.

This information can be bought from commercial data providers, which, however, usually do not offer attributes like amount issued and other attributes which are not that relevant to the market.

A more or less complete picture of the securities issued in a market can be given by numbering agencies according to the ISO standard. These institutions usually have quite good information at the time of issue, but this information is often not updated continuously and timely. Table 1 gives an overview of sources for instrument information.

At present, information provided by issuers (especially on the amounts issued and key data about securities not traded on [official] markets) as well as data from commercial data providers (especially price information) and data from the Austrian and German numbering agencies are being incorporated into the Austrian securities database.

In the near future, these sources will be totally or partially replaced by the ECB's Centralised Securities Database (CSDB).

Instrument and issuer information provides good insights into the activities of issuers in the market and related developments. These two components are also sufficient for calculating business information from the issuer's point of view.

Holder information

To complete the picture, investor information has to be added.

Table 1 – Overview of sources for instrument information

Source	Issuers' reports	Commercial data providers	Registers (numbering agencies – ISIN)
Strengths	Reliable and precise information about a subset of attributes	Reliable and precise information about a subset of attributes and issues	Almost complete register of issues
Shortcomings	Incomplete: not all issuers not all issues not all required attributes available	Incomplete: neglect data necessary for statistical purposes	Partially outdated information: not all required attributes available

First, investors have to be identified; second, information about their business has to be collected.

In the Austrian system the investments of the non-resident sector into securities issued by residents are calculated as a residual: The issued amount of a single security minus the holdings of domestic investors yields the holdings of the non-resident sector. The investments of the domestic sector therefore should be completely covered.

Among domestic investors, two groups can be distinguished:

- institutional investors like banks, insurance companies, investment funds, pension funds, etc.; a complete list can be derived from the business registers;
- other potential investors like non-financial companies or households; these are not covered as easily.

Institutional investors can be addressed either directly or indirectly. Usually detailed data on each single investment is easily and electronically available:

- from the investors' own systems;
- from supervisory bodies;
- from official publications, for instance for investment funds, as many of them publish their detailed investments on the internet;
- or from their custodians.

Directly collecting information from investors belonging to the second group has proven very inefficient and impractical. These investors usually do not have the necessary information available in time and in electronic form. In fact, hardly any investors in this group are known by name, their number is very high and the amounts invested are usually small. Therefore, it would be recommendable to collect information on investments in this area via custodians.

In Austria, banks serve their customers by maintaining their deposits. For reporting purposes, banks in Austria classify their customers according to the definitions of the SNA and the regulations in force in Austria. To support the banks, corresponding information is made available by the Oesterreichische Nationalbank, Austria's central bank. Most of the data on investors and their investments are collected via banks in Austria, even for the institutional investors. In our future security-by-security system more than twenty groups of investors will be distinguished, among them:

- banks
- insurance companies
- households
- non-financial enterprises
- pension funds

The banks report:

- holdings of each group of investors on a security-by-security basis (nominal value or units); and
- purchases and sales at market price and nominal value or units.

The information banks provide is precise, as it exactly reflects customers' accounts. In most cases it covers statistical requirements. Nevertheless, for high and extraordinary figures, background information can be very helpful. Banks, however, are not in the position to offer this kind of information, as they do not have knowledge of all of their customers' business.

Bond lending and repurchase agreements are business transactions in whose case correct recording is very important for statistical results. This information is available to the reporting bank only in special cases. Therefore complementary information has to be collected from units involved in the relevant business.

Another weakness of the indirect collection of data via banks is the fact that many small investors and some important private investors do not hold all of their securities with domestic banks. Securities not held with resident custodians have to be reported by the investors themselves.

The few investors that are of individual importance for the statistics can be identified either by analysing reports or by using adminstrative registers.

The large number of small investors at present is only statistically covered by rough estimates. There are some initiatives which aim to promote the exchange of corresponding information among the tax authorities, and thus there is a small chance that information in this area will improve. The best solution would be third party reporting: Information about non-residents' holdings are collected by the host country and forwarded to the investor's resident country.

The most efficient way to collect holder information strongly depends on a country's institutional situation. Some countries have central securities registers in which all investors are listed. In other countries, the banking industry is organised differently from the Austrian system.

Calculating business information and aggregating data

After having collected the information about:

- issuers
- securities
- investors and their holdings (and transactions)

Business information can be calculated by the compiler on a security-by-security basis: (transactions, price adjustments, exchange rate adjustments, reconciliation with direct investment statistics, income, etc.).

As a next step, the security-by-security information is aggregated into a data warehouse with nearly twenty dimensions:

- Issuer information
  - sector
  - economic activity
  - country of residence
- Holder information
  - sector
  - economic activity
  - country of residence
- Instrument information
  - type of instrument
  - original maturity (classes)
  - residual maturity (classes)
  - type of interest
- Function
- Method of calculation
  - market price
  - nominal value
- Adminstrative date
  - version
  - data source

These dimensions make it possible to meet all official statistical requirements mentioned earlier.

Advantages of a security-by-security information system

As there is consistency between the data warehouse and the security-by-security database with links to investors and issuers, a variety of other special statistics can be derived.

- An information system on a security-by-security basis yields high quality data and consistent statistics from different points of view.
- The algorithms used to produce results are transparent to the compiler; the data used for calculations are known and standardised.

- The system is very flexible and makes it possible to link micro and macro data.
- An analysis of special instruments, issuers or investors that are not shown in higher aggregated statistics is possible.
- In cases of special events or developments, detailed analysis is possible.
- Detailed backward projections are possible, which enables case studies.
- Should requirements change, backward calculations are possible, and new time series can also be constructed for the past.

Examples

Some of last year's events illustrate the usefulness of a security-by-security system:

When Parmalat, a large European company (food production), encountered difficulties, the possible consequences for Austrian investors could be estimated within a few hours; the same happened during the crisis in Argentina and in other similar situations. In such cases, the necessary breakdown for analysis cannot be defined in advance, but a security-by-security database makes it possible to extract the necessary information within very short time.

In Austria, pension funds and similar institutions have to invest at least a part of their assets at the Vienna Stock Exchange. What is the risk?

A new product (for example: housing bonds) has been developed and introduced on the market – the security-by-security data helps to analyse the development of this product in the market.

In recent years corporate bonds have become more and more important in Austria. An analysis broken down by the economic sector of the issuer, the interest rates offered and the liquidity of the market can easily be carried out with the help of a security-by-security system (also for the past).

Moreover, the role and the impact of the Vienna stock exchange or other markets can be analysed.

Conclusions

A security-by-security information system, which integrates issuer, holder, instrument and business information, meets all official requirements of security statistics and offers flexibility for analysis.

Thus, it is not necessary to analyse possible information needs in advance, as, in many cases, the information required at a certain time is already available and only needs to be extracted.

Erich Hille (Oesterreichische NationalBank)

SESSION 8

Can improved disclosure/transparency as well as innovations in technology and financial products be expected to improve the availability of relevant financial data?

Chair's summary: Mr. Patrick Sandars (ECB)

Papers:

How informative are market risk disclosures by financial institutions?
Benjamin H. Cohen (Financial Stability Forum)

Introduction of XBRL in the reporting framework of DNB
Patrick C. Hoedjes (De Nederlandsche Bank)

A brief introduction to Statistical Data and Metadata Exchange – the initiative and standards
Presented by Paul Van den Bergh (BIS)

Technology and securities regulation
Mr. Randall Powley presented this paper on behalf of
Mr. Randee Pavalow (Ontario Securities Commission)

Chair's summary

Patrick Sandars (ECB)

The key issues discussed in this session were the improvements in the disclosure of financial data that could be expected to arise from existing and envisaged international standards; the extent to which recent developments in technology could support these developments and permit more financial data to be delivered and at lower cost and, finally, the role of public authorities in encouraging this process.

The session started with a presentation by the 1st lead intervener: **Ben Cohen (Financial Stability Forum)** who assessed the level of public disclosure by large financial institutions. He noted that disclosure relating to financial risk exposures is important to decrease incentive problems between stakeholders (shareholders, managers, and creditors) as well as to facilitate an efficient asset allocation and to impose market discipline in support of better regulation. He noted that increased disclosure is being encouraged by various international initiatives. In particular, the Fisher II Group has made a series of recommendations for financial institutions to disclose information on exposures in trading activity, firm-wide to market risk, funding liquidity risk, and credit exposure. Whereas to date there has been less that complete compliance with these recommendations, recent regulatory initiatives in the form of Basel II (which has disclosure as the foundation of pillar 3) and the International Accounting Standards (IAS) in particular hold out the prospect of improved disclosure. These initiatives clearly hold the prospect of going some of the way to meeting the strong demand for more risk-based financial data to support financial soundness assessment.

The session continued with the 2nd lead intervener: **Patrick Hoedjes (De Nederlandsche Bank)** who focused on technical innovation as a potential catalyst in getting cheaper, faster financial data. In particular, he reviewed the role that XBRL (Extensible Business Reporting Language) might play to improve data provision for business financial reporting via the internet. XBRL has seen a rapid development with initiatives being taken in Europe to promote its use in the context of the ongoing efforts to create a common framework for European supervisory reporting in accordance with Basel II and IAS which is now being set in XBRL taxonomies. However, despite this and other initiatives worldwide, XBRL is not yet a global standard. There is still a need for a global initiative to develop internationally harmonized taxonomies as the full benefit of XBRL will be achieved with full international harmonization. In the absence of this, reporting agents and agencies are reluctant to invest. However, further use of XBRL could carry its own problems – as more countries develop their own taxonomies, close coordination will be necessary to avoid the emergence of differences in taxonomies. XBRL is not designed for statistical collection and processing but links to statistical concepts; improved standardization and better data access hold the prospect of better utilization of financial accounting data for statistical purposes – which could serve as an example not only for delivering more information on the financial sector but also on the non-financial sector where gaps are particularly large.

The 3rd lead intervener: **Paul Van den Bergh (Bank for International Settlements)** further elaborated on the role of technology in improving the collection and dissemination of financial data. In general terms, he sees a need for better use of new technology by respondents to reduce the reporting burden and improve data collection, pointing to the potential that would exist if the electronic trails left by individual transactions etc. could be accessed to permit easy extraction and aggregation. Furthermore, suitable technology is required to permit an automatic downloading of information from websites (better use of IT technology to permit systems to interact). There is a need to standardize access to data and its exchange. In summary, he envisages three simple steps to achieve standardization, namely the creation of a simple information model; provision of a taxonomy (nomenclature) and the technical tools in terms of language, registry (that allows navigation), etc.

Paul van den Bergh then focused on the specific role that SDMX could play to improve disclosure by standardizing statistical data and metadata access and exchange[1]. He pointed to the substantial efficiency gains that can accrue from use of SDMX in statistical data management – citing the example of the BIS, where a small team must manage a very large set of data on behalf of central banks. An ultimate aim could be to have a fully interactive data provision including the statistical equivalent of "Google" (put a list of all key families of data on a site).

He noted that SDMX has already been adopted by the international organizations and major central banks and further development is underway. He saw interoperability between SDMX and XBRL as of key importance to improve data availability and use but an achievable goal as XBRL is unstructured and hence very flexible.

The 4th lead intervener: **Randall Powley (Ontario Securities Commission)** made a presentation on behalf of Randee Pavalow (OSC) in which he discussed how technology can promote efficient financial markets. He stressed that the OSC focuses on the result rather than the form (which is left to the industry) but recognized that sometimes standards need to be set. The examples he presented where technology is being used include the ATS (Alternative Trading System) rules that have been particularly important in increasing competition and TREATS (Trade Reporting and Electronic Audit Trail System) which will address data gaps (in counterparty information). The focus is on technology from the front office through to the back office. STP (Straight through Processing) depends on business processes and the use of technology to reduce risk. He drew the conclusion that imposing technology on the market could negatively impact innovation so the OSC sees its role as that of a "ringmaster". It is important to engage all aspect of industry (buy- and sell-side) to reach a consensus on the use of technology for the benefit of markets.

In the **discussion**, the following key points emerged. First, it was acknowledged that there is a recent trend to increase and improve disclosure of financial information not just by financial institutions but also by corporates. Recent initiatives by international regulators and standard setters are leading to greater and more risk focused disclosures of statistical and financial data. Technological initiatives supported by the internet are helping to create a more standardized framework within which the disclosures can be made. In order to maximize the advantages of these disclosures, interoperability between systems and taxonomies has become important. This places the onus on the authorities to encourage the financial community to make progress by supporting disclosure policies and the development and use of appropriate technology to support data transmission and to foster interoperability. Examples of initiatives include assessing the interoperability between XBRL and SDMX and the work at the ECB to articulate links between statistical data with financial accounting data. However there are important challenges not least to convince firms that standardization will lower their reporting burden. Confidentiality may also be a stumbling block since security concerns delay access to information.

The session **concluded** by noting that the recent move towards greater disclosure and more transparency along with greater use of new technology can play an important role in increasing the availability of financial data and improving financial market efficiency. There are important challenges facing the authorities in fostering this process but it is an essential task given the growing demand for a very wide range of increasingly sophisticated financial data and limited resources available to meet this demand.

Patrick Sandars (ECB)

1 *Statistical Data and Metadata Exchange sponsored by 7 international organizations: BIS, ECB, IMF, OECD, UN, WB and Eurostat.*

How informative are market risk disclosures by financial institutions?

Benjamin H. Cohen[1] *(Financial Stability Forum)*

Purposes of disclosure

The disclosure of information about the risks taken by financial institutions serves three broad purposes.

First is the need to reduce incentive problems between management, shareholders and creditors. In particular, there are downside risks that creditors would want to know about but which shareholders (with limited liability) and managers (with options positions, golden parachutes etc.) might underplay. There are also conflicts of interest between shareholders and managers, which transparency about risk exposures could help to reduce. The **consistency** of definitions across institutions is a key issue here.

Second is the role of public information in supporting efficient asset allocation. This applies equally to financial and non-financial firms. Investors need information about assets and liabilities in order to price equity and debt correctly. Since there are economies of scale in setting standards, this is an area in which public authorities play an important role (a useful analogy is to food labeling laws). The most appropriate venue for deciding what should be disclosed to fulfill this function is the accounting standard-setting process. Here too, the consistency of disclosed information across firms is important, in order to allow meaningful comparisons.

Third is the promotion of market discipline of financial firms in support of regulation. There is a well-established public policy interest in preventing bank runs, which is usually extended to reducing the risk of individual bank failures. Regulation exists because the social costs of bank failure are assumed to be under-priced by the market. Market discipline can support this – the market knows the regulators' reaction function, so if investors perceive weakness in an institution's risk profile, they will send signals that precede or at least reinforce the regulators' message. This implies that there should be informative **qualitative** disclosures, with relatively less importance for consistent methodologies (though the definitions should be clear). The key question is whether management are properly sensitive to downside risks, and have set appropriate policies for managing them.

What is disclosed?

In 2001 a report by a Multidisciplinary Working Group (composed of the Basel Committee on Banking Supervision; the Committee on the Global Financial System; the International Association of Insurance Supervisors; and the International Organisation of Securities Commissions; also known as "Fisher II")[2] identified four areas in which financial intermediaries (such as banks, securities firms, insurance companies, and hedge funds) should make regular public disclosures, and made recommendations about appropriate disclosures in each area:

- Actively managed or marked-to-market exposures, i.e. trading activity.
- Firm-wide exposure to market risk.
- Funding liquidity risk.
- Credit exposures.

The Joint Forum of banking, securities and insurance regulators reviewed the 2002 annual reports of 66 financial institutions (38 banks, 6 stand-alone securities firms, 22 insurers) to see how well they complied with the Fisher II recommendations. The results were published May 2004.[3]

1 *Any views expressed are those of the author alone.*
2 *Available at http://www.bis.org/publ/joint01.pdf*
3 *The Joint Forum,* Financial Disclosure in the Banking, Insurance and Securities Sectors: Issues and Analysis *(Basel, 2004), available at http://www.bis.org/publ/joint08.pdf*

1. Trading activity

The Fisher II report recommended that firms involved in trading activities report their Value at Risk (VaR) estimates, broken down by risk categories, over one-day and two-week holding periods, for their trading operations. Firms would report the high, median, low, and final values over the reporting period, and compare daily VaR to daily profit and loss figures. These were to be complemented by a qualitative discussion of how the estimates were arrived at and what they mean.

The Joint Forum found that disclosure of trading-related risk exposures was generally good.

- All banks but one and all securities firms disclose VaR. Most provide breakdown by risk or asset category, as well as high, average and low values. Most give 1-day VaR, "a handful" give 10-day, and three give both.
- Over half plot daily or weekly VaR, of which 10% give histograms.
- Over half compare estimated VaR and outcomes, through time plots, scatterplots, histograms.
- Almost all have qualitative discussions, some disclose stress-test results.

However, there was room for improvement, especially in explaining the context in which the VaR and stress test figures need to be understood.

- Almost no firms say which activities are excluded from the VaR calculations.
- Could have more stress-tests, better granularity of VaRs, and better discussion of the assumptions underlying VaRs.

2. Firm-wide exposure to market risk

Fisher II recommended that the exposure of the reporting firm as a whole (not just the trading desk) to market risks should be disclosed, through sensitivity analyses (stress tests) to various market events, and through firmwide VaR estimates.

The Joint Forum found that sensitivity analysis was more likely to be disclosed than VaR. Two-thirds of banks and securities firms make quantitative disclosures of material non-trading market risk, while insurance companies make qualitative disclosures. Where VaR is provided, high, low, average, and period-end values are given, but sensitivity analyses are only period-end.

3. Funding risk

Fisher II recommended that a firm's funding risk exposures be discussed qualitatively in its public disclsoures, with the support of quantitative information tailored to the funding needs and strategies of the individual firms.

The Joint Forum found that all banks, and most securities and insurance firms, have qualitative discussions. Most have some quantitative information, including all of the securities firms (one extensively).

- Most securities firms and some banks disclose unencumbered collateral.
- Some banks have funding gaps by maturity, while a few have liquidity ratios, funding sources, contingent liquidity risks, and stress-test results.
- None disclose the concentration of their funding sources. Several disclose the size of credit facilities to which they have access.
- Insurance companies say liquidity risk is relatively less important for them. Some provide stress scenario information.

This is a sensitive issue, because of the need to maintain investor confidence. No single measure is seen as relevant to all firms.

4. Credit risk

Fisher II recommended that a firm's gross and net credit exposures be broken down by borrower type or business line, credit quality, and maturity. Banks should provide information on non-performing loans, charge-offs, and provisions, with appropriate breakdowns.

The Joint Forum found that banks provide extensive detail on credit risk exposures, but it is not as informative as it could be – less than half break down credit exposures by credit rating and less than a third break down derivatives counterparties by credit rating. Securities firms provide extensive detail, and break down all of their derivatives counterparties by credit rating. "Many" insurance companies provide some kind of quantitative information on credit risks.

- All banks showed exposures net of provisions and by loan type, and some provided industry or geographic breakdowns. Securities firms with large lending portfolios showed aggregate exposures. Insurance firms disclosed bond holdings.
- Most banks and securities firms disclosed replacement values of counterparty credit after netting. Most securities firms, but only a few banks, also report the effect of collateral on counterparty credit.
- Banks, securities firms and most insurance firms disclose contingent liabilities (commitments, guarantees, CDS's), in some cases because of national requirements.
- About half of insurance firms disclose lending arrangements, and about 40% disclose derivatives counterparty risk. Mostly they provide the appropriate level of disaggregation. There is qualitative, and some quantitative, information about exposures to reinsurance companies, but usually not much detail.
- Most firms give a breakdown by credit rating. In some cases bonds are mark-to-market, and credit risk is reflected in market risk disclosures. All securities firms, 30% of banks and 20% of insurance companies disclose credit ratings for derivatives counterparties, usually either external ratings or mapping of internal to external ratings. There is somewhat more disclosure of maturity breakdowns than credit ratings.
- A majority of securities firms cross-tabulate credit exposures by rating and maturity.
- All banks disclose past due loans, non-performing loans, loans charged-off, recoveries, and provisions. Most also break these down by loan types and geography.

Among the areas where improvement is needed are:

- The effect of collateral and other loss mitigation for lending is rarely disclosed. "In exceptional cases" they disclose protection through credit default swaps (CDS's). There was no separate disclosure of secured lending.
- Many firms calculate PFE for counterparty credit for internal use, but fewer than 10% of surveyed firms disclose this, and usually without much qualitative information. Firms said they did not want to report PFE exposures because there is no standard methodology, and did not want to report credit concentration information because of confidentiality.

5. Non-life insurance disclosure

Fisher II made some limited recommendations for financial risk disclosures by non-life insurance companies. In particular, they suggested that such firms disclose reserve adequacy, including paid and incurred losses; pricing adequacy; and loss ratios.

The Joint Forum found that most non-life insurers provided information on reserve adequacy and loss ratios, but few disclosed pricing adequacy.

Basel II and disclosure

Disclosure standards are at the foundation of "Pillar 3" of the Basel II capital accord, which sees the timely disclosure of financial risks as the best way to ensure market discipline of regulated institutions. Many of these standards are based on the Fisher II report. In particular, the Basel II framework envisages disclosure of:

- Qualitative and quantitative information on capital structure and capital adequacy.
- For all banks,
  - Breakdown of credit risk exposures by industry and counterparty type, and the impact of risk mitigation.
  - Simple stress tests of exposures to interest-rate risk in the banking book.
- For banks using the internal ratings-based or internal model approach, stricter standards apply, namely:
  - For market risk in trading portfolios, firms should disclose high, mean, low, and period-end VaR, as well as a comparison of VaR with P&L.
  - Breakdown of credit risk exposures by internal ratings.

The Basel II framework, however, does not include standards for disclosure about funding liquidity. Instead, principles for supervision of funding liqudity risks are addressed in "Pillar 2", which deals with supervisory review of banks' internal assessments of their overall risks.

IASB and disclosure

The International Accounting Standards Board issued draft disclosure standards in July 2004. These are now being revised for publication in 2005H2. As befits standards intended to apply to a broad set of institutions of varying levels of complexity, they are less extensive than the Fisher II recommendations. However, they do cover similar ground. In particular, the draft standards mandate disclosures in the following areas:

- Market risk: Simple stress tests.
- Credit risk: Gross exposure, collateral, credit quality, past due and impaired assets.
- Liquidity risk: Maturity of liabilities, quantitative information on liquidity risk management.
- Insurance: Initial standards were issued March 2004. More detailed standards are expected to be issued shortly.

Reinsurance transparency and public disclosure

One area that has been of particular interest in terms of evolving disclosure standards has been developing a more effective disclosure framework for the reinsurance industry.

In March 2004, an International Association of Insurance Supervisors (IAIS) task force report on "Enhancing Transparency and Disclosure in the Reinsurance Sector" proposed, among other things, qualitative and quantitative sensitivity analyses by reinsurance firms. This was followed by an IAIS disclosure standard, issued in Oct 2004 which stated that information should be provided on pricing adequacy, provisions, risk concentrations, stress testing and capital. The IAIS Reinsurance Transparency Group, "Global Reinsurance Market Report 2003", published in December 2004, aggregated data on 43 reinsurers from 7 jurisdictions.

A reinsurance study group formed by the G30 is expected to propose further enhancements of disclosure, including qualitative and quantitative information on risk management, risk models, scenario analysis, exposures, and capital.

Benjamin H. Cohen (Financial Stability Forum)

Introduction of XBRL in the reporting framework of DNB

Patrick C. Hoedjes (De Nederlandsche Bank)

Introduction

As a member of the Committee of European Banking Supervisors (CEBS), De Nederlandsche Bank (DNB) is involved in the introduction of the new Pillar I reporting framework. This framework is called the Common Reporting Framework (COREP). With the introduction of COREP a further step in harmonising the European prudential supervision reporting framework for banks is taken. The COREP framework will be supported by an XBRL taxonomy, combining a harmonisation on technique with harmonisation on content. At a national level, XBRL is also introduced by the National taxonomy project, who is aiming at lowering the reporting burden of companies by introducing XBRL as a common reporting tool for the National Statistical Institute, the tax authority and the Chamber of Commerce. At this moment the use of XBRL by the financial institutions is very limited. The above mentioned developments could give a momentum to the use of XBRL. In this paper, the recent development in the Netherlands and the position of DNB is briefly set out.

Recent developments concerning the use of XBRL

At this moment XBRL is used on a very limited scale by financial institutions. There is a great deal of interest in its development as well as a great deal of reserve in implementing this new technique. Recently two developments have taken place in the Netherlands concerning the use of XBRL:

1. At a *national* level, the ministries of Justice and Economic affairs have formed the national taxonomy project in order to bring down the administrative burden. In this project IT firms collaborate with the employers' organization and national data collectors (National Statistical Institute (CBS), the tax authority and the Chamber of Commerce) in order to develop a national taxonomy, based on the international IFRS taxonomy. A first edition of the national taxonomy will be presented to the Minister of Justice at the 16th of June 2005. The focus of the national taxonomy is mainly aimed at the SME firms. However the use of XBRL by the SME firms may be of influence to the financial sector. Different IT consultant firms are aiming at the introduction of credit assessment tools based on XBRL. This way XBRL will possibly be introduced at the front office of financial institutions.
2. At an *international* level, the COREP framework is set down in a XBRL taxonomy. This way XBRL will possibly be introduced via the back-office of banks in their administration and reporting structures.

Position of banks

Towards the COREP initiative

At an informal meeting with the Dutch banking sector in December 2004, the sector made it clear that they were in strong support of a far-reaching harmonisation of reporting requirements. The CEBS initiative was considered to be "a good first step, only significant if the ultimate reporting requirements would be the same in all European participants". This meant that the Dutch (international) banks preferred an international harmonised extensive reporting framework above an national limited framework, even if in the base of it, the same taxonomy was used. This indicates that for internationally operating banks, costs are not so much generated by more or less detail, but by differences among reports. The smaller, nationally operating banks (the greater part of the population of Dutch banks) will presumably prefer a smaller reporting above internationally harmonised. The largest part of the reporting burden however, is being borne by the international banks.

Towards the governments' initiative to lower the administrative burden

The initiative by the government to aim at a decrease of the administrative burden of 25% in the time period 2003–2007 is welcomed by the Dutch banks. DNB and the Dutch Bankers Association (NVB) have co-operated in working out the requested 25%. A number of supervision reports were brought back from a monthly to a quarterly frequency and reports on market risk were only obliged for a minor group of banks. In the discussion with the NVB the statistical reports, who were not a subject because they do not originate from national law, were a constant subject of attention. The banks repeatedly called for more connection between the statistical and accounting (and internal) reports. The statistical reports were being brought forward as "expensive" due to the required adaptation of the internal systems to specific statistical requirements. The banks signal a furthering gap between statistical and accounting data. The viewpoint from banks is that the further statistical data moves from accounting data, the greater the administrative burden is for them.

Towards the introduction of XBRL

XBRL is at present not in use by any of the larger Dutch banks. Yet they see the advantages of an international standard of reporting. They are however hesitant to invest in XBRL when the benefits for them are not outspoken yet, mainly because the use is not commonly practiced. An obligation in one or more European countries to use XBRL in reporting to the national supervisor can be the trigger for more widespread use. However, at the present stage, an obligation in one of the participating countries is not foreseen yet. Most participating countries however are planning to technically support the use of XBRL as a means to deliver the supervisory reports.

Position of DNB

An international reporting standard has great benefits for both the reporting agents and the data collectors in terms of efficiency and transparency. We don't know for sure whether XBRL will be the international reporting standard of the future. In our reporting systems however we are planning to be able to process XBRL reports. This step from DNB can trigger the reporting agents to switch to XBRL when new investments have to be done (like in case of the introduction of the new Basel II reporting framework).

DNB has already developed an XML based reporting tool, e-Line DNB, for the different reporting requirements under her responsibility as monetary authority and prudential supervisor on banks, insurance companies, pension funds, investment firms, money transfer offices and electronic money institutions. This reporting tool is in use for the balance of payments reports and the supervisory reports of electronic money institutions and money transfer offices. In October 2005, the monetary reports of banks will be reported through e-Line DNB as well. This internet based reporting tool can easily be adapted to XBRL. In this way XBRL will function as an import format. At the short term, the introduction of XBRL can be facilitated without any major adaptation to the storage, publication and distribution systems.

e-Line DNB is introduced to facilitate reporting, using the same framework for different reports (end-users) and using a technique that provides little adaptation of the internal reporting systems of the reporting agents (using existing import formats and the CSV (Excel) format) but at the same time introducing the XML format. In completely new (future) reports only XML (XBRL) and CSV are planned to be supported by e-Line DNB.

XBRL will be used as an import format for reporting. The storage, analysis and disclosure of data are processed in existing statistical systems. The present developments at DNB are aiming for a further harmonisation of all statistical data into one single database. This means a stronger focus on time-series. The statistical system is better equipped for publishing and analysing time-series. For statistical purposes, the introduction of XBRL at this moment as a storage system would not be an improvement, apart from the new investments that would have to be done to replace existing systems. For supervision purposes, XBRL could be an improvement. An XBRL database has no structure of its own. This way it is very flexible for ad hoc analyses, which are more needed in the field of supervision.

Possible consequences to consider for the longer term are:

1. With the more widespread use of XBRL by supervisors and the National Statistical Institute, the demand for data-exchange through XBRL between these institutions and DNB may rise.
2. By using the same technique for a variety of reporting requirements, small differences in the specification of data are more noticeable in the implementation in IT structures. The reporting agents may demand further harmonisation of different reporting frameworks.
3. By combining different reporting requirements from different fields and data-collectors into one national taxonomy, growth of the taxonomy by increased (inter)national need for data by a single user may be more difficult to implement.

The use of XBRL can bring supervision (accounting) data closer to the statistical data area , due to the fact it can easily facilitate differences in valuation (for example, reporting original price and revaluations). In this way it is possible to accommodate the request of reporting agents for more coherence. Of course only on the condition that the instruments, or split-up in the reports are the same. For example, when the definition of loan is the same in monetary and supervision reports, extra information in XBRL can easily contain date of commencement and duration, this way facilitating the statistical need for original maturity and the supervision need for remaining duration. Some work on harmonising the statistical and supervision (accounting) concepts needs to be done, however.

Opportunities

In recent discussions with the Dutch banks and the NVB, one question kept recurring; will XBRL become the standard for data-exchange in the future? During the discussions and still at this moment, it is not possible to answer this question with a firm “yes”. However, DNB is seeing the development of XBRL as an opportunity to realise this standard. Therefore, DNB supports the national and international initiatives to realise XBRL taxonomies on statistical and supervisory reports.

In the field of supervision and accounting, international initiatives, like COREP, have made good progress in harmonisation. In the Netherlands, a national initiative has been started. In the field of the international statistical framework an initiative to develop a harmonised XBRL taxonomy has not yet been undertaken. Possibly, in other countries national initiatives like in the Netherlands are being set up in the field of statistics. Differences between those national taxonomies are very likely. A harmonised international framework in a common standard, like XBRL, preferably developed in consultation with the supervision and accounting initiatives could deliver a great deal of benefit to data-collectors as well as reporting agents, in terms of quality, data-availability and lowering of the reporting burden.

Is this the right moment for such an initiative? Who must be the pioneer institution? Like in the discussions with the Dutch banks, these questions are not easy to answer. But maybe the development of XBRL should be treated as the opportunity for standardisation from which we all can benefit.

Summary

Two recent developments have put the discussion about the use of XBRL on the agenda at DNB:

- The introduction of a “national taxonomy” in XBRL, combining the different reporting requirements of the National Statistical Institute, the tax authority and the Chamber of commerce.
- The introduction of an international XBRL taxonomy of the common reporting framework by the COREP working group of CEBS.

The large institutions see benefits but are also hesitant if this is “the right moment”. DNB has developed an internet-based reporting tool, able to process XBRL import of data. XBRL will only be used as an import format in this reporting tool. There is no further internal use planned of XBRL.

Patrick C. Hoedjes (De Nederlandsche Bank)

A brief introduction to Statistical Data and Metadata Exchange – the initiative and standards

Presented by
Paul Van den Bergh (BIS)[1]

1. What is SDMX?

The name "Statistical Data and Metadata Exchange"[2] refers to an international co-operation initiative aimed at developing and employing more efficient processes for exchange and sharing of statistical data and metadata among international organisations and their member countries. The initiative, started in 2001, is sponsored by 7 international organisations: Bank for International Settlements (BIS), European Central Bank (ECB), Eurostat, International Monetary Fund (IMF), Organisation for Economic Co-operation and Development (OECD), United Nations (UN) and the World Bank.

2. What are the goals of SDMX?

The rationale of SDMX is standardisation for statistical data and metadata access and exchange. With the ever increasing ease of use of the Internet, the electronic exchange and sharing of data is becoming more and more easy, frequent and important. This stresses the need for a set of common standards for exchange and sharing of statistical data and metadata, and making processes more efficient. As statistical data exchange takes place continuously, the gains to be realised from adopting common standards are considerable both for data providers and users.

The objective is to establish a set of commonly recognised standards, adhered to by all players, making it possible not only to have easy access to statistical data, wherever these data may be, but also access to metadata that makes the data more meaningful and usable. The standards are envisaged to help national organisations in fulfilling their responsibilities towards users and partners, including international organisations, in more efficient ways. Among other things they are seen as facilitating use of Internet-accessible databases in order to be able to retrieve data as soon as they are released.

The SDMX standards also aim to ensure appropriate metadata always come along with the data. For this reason, standards for metadata exchange are extremely important in SDMX. At present, this part of the SDMX standards is only partially developed, but the plans for future editions of the standards comprise full development of metadata standards. In conclusion, several quality dimensions can be improved through the use of SDMX standards, such as timeliness, accessibility, interpretability, coherence, as well as cost-efficiency.

3. Who can benefit from SDMX?

As mentioned above, the SDMX standards are designed for exchange or sharing of statistical information. They have been developed by the sponsors in order to accommodate good reporting practices with respect to the constituencies of the sponsoring organisations (national statistical offices, central banks, ministries, etc.) as well as dissemination to the broader constituency of users of these data. Within and across these constituencies, the standards are intended for reporting (or sharing) statistical data and metadata in efficient ways. But the SDMX standards can also be used within a national system for transmitting or sharing statistical data and metadata and by private data providers (such as re-sellers of statistical databases). This is particularly interesting in countries with a federal structure or a fairly decentralised statistical system.

1 *This is an official document from the SDMX sponsoring institutions.*
2 *See www.sdmx.org*

In such cases, a close link can be established between the national system for data sharing and the international ones, allowing for additional efficiency gains for the involved organisations (for example, the Australian Bureau of Statistics is working on such an integration of systems).

Different forms of exchange can be accommodated, depending on the number of partners involved and the nature of the agreements between them, and on which of the parties is sending the data. Three kinds of exchange can be identified, according to the number of partners and agreements:

1. **Bilateral exchange:** All aspects of the exchange process are agreed between the partners, including the mechanism for exchange of data and metadata, the formats, the frequency or schedule, and the mode used for communications regarding the exchange. This is perhaps one of the most basic process patterns.
2. **Gateway exchange:** Gateway exchange is an organised set of bilateral reporting, in which several data and metadata sending organisations or individuals agree to exchange the collected information with each other in a single, known format, and according to a single, known process. This pattern has the effect of reducing the burden of managing multiple bilateral exchanges (in data and metadata collection) across the sharing organisations/individuals. This is also a very common process pattern in the statistical area, where communities of institutions agree on ways to gain efficiencies within the scope of their collective responsibilities.
3. **Data-sharing exchange:** Organisations use standards to enable their data and metadata to become available to any organisation that has permission to access it. This requires adherence to certain data and metadata publication standards (some of which may involve registering the existence of the data and metadata in an electronic catalogue). This model does not mandate a pre-defined agreement, but requires that data and metadata providers and consumers adhere to the standards. The model facilitates use of the "Pull" process described below.

In the context of the above-mentioned three forms of exchange, data can be reported or accessed in two different modes – push or pull:

1. **Push** mode means that the party who provides the data takes the necessary action to send the data to the party collecting the data. This can take place using different means, such as e-mail or file transfer, and in some cases the transfer can be supported by systems such as Eurostat's Stadium and Statel. These are the "traditional" modes of data collection, as carried out by international organisations for many years.
2. **Pull** mode implies that the data provider simply makes the data available on a server (e.g. via the Internet, possibly just by placing a structured SDMX-ML file on a website; or it may involve accessing a database service, available via the web and capable of processing a standard SDMX query). The data collector fetches the file on his own initiative. In this case, more than one data collector may be allowed to take the pieces of data needed by each collector. This mode also resembles dissemination in the sense that access might be given to final users of information, who will then, according to their needs, access multiple web sites all using the same formats. The pull mode requires adherence to the standards demanded by the data sharing exchange and can also be used within organisations via intranets or between organisations using secure extranets.

All combinations of the modes above are supported by SDMX standards, with some of the most significant opportunities for efficiency gains envisaged to follow from data sharing that relies on the pull mode of exchange.

4. How can SDMX help with harmonisation of content?

A major task of international organisations is obviously to agree on standards for compiling statistical data and to encourage meaningful international comparisons. This involves setting up standards, e.g. classifications, common definitions of concepts, handbooks describing conceptual frameworks and guidelines for data collection. In many cases this work is carried out in cooperation between several international organisations: for instance the System of National Accounts (SNA) is issued jointly by 5 organisations.

Once the methodologies have been defined, the next level of co-operation among organisations is to determine exactly which types of data need to be collected to meet their users' needs. There are a number of important statistical domains with data-sharing agreements at international level: for example education, environment, energy and transport statistics. In several cases, the data sharing is based on common questionnaires between the international organisations, supported by standardised glossaries and other methodological tools. These arrangements imply that each country only reports data to one organisation, and the organisations subsequently share the original data received from the country ("input data") or the data validated by the international organisation ("output data").

An important goal for facilitating greater efficiency in these tasks could be countries releasing their statistical data and tables on their web sites using common standards, with a breakdown able to satisfy the needs of the international organisations with whom they work. This is the kind of support that SDMX standards will help to make possible, hopefully contributing significantly to improved ways to collect and share data and metadata. In effect, releasing or disseminating data and metadata in sufficient detail using standards could lead to reduced direct reporting to multiple international organisations.

An important ingredient in such agreements would be the metadata to be exchanged with data, describing the characteristics of the latter. The SDMX standards are intended to cover the needs of both the data and the metadata, and to do that it is necessary to define the data characteristics using a common terminology. Therefore, SDMX is working both to develop technical standards for data and metadata exchange and to develop a common metadata vocabulary.

5. What are the technical foundations of SDMX?

The specifications of the SDMX standard formats build on the specifications of the GESMES (Generic Statistical Message) UN/EDIFACT standard and more specifically on the subset of GESMES named GESMES/TS (TS for time series). This latter standard has been successful in standardising several statistical data flows. SDMX-EDI is fully conformant with GESMES/TS, safeguarding investments in this format, and can easily be transformed into SDMX-ML, which uses XML syntax. In addition, SDMX standards contain guidelines for the development of web services.

6. Implementations

As part of the SDMX initiative, a number of projects are advancing the use of SDMX standards. These include:

Joint External Debt Hub: Early on in the SDMX work, external debt statistics were identified as an interesting area for piloting, as these statistics were already the subject of a joint web site that releases statistics from the BIS, IMF, OECD and the World Bank. In 2003 a live demonstration was developed for the SDMX web site, showing how experimental SDMX standards

SDMX standards version 1.0: an overview

A full information package on the SDMX version 1.0 standards can be found at *http://www.sdmx.org/news/document.aspx?id=125&nid=49.* The package contains the following standards:

SDMX-EDI, designed for the exchange of statistical information between organisations in batch mode. As the name indicates, it is an EDIFACT standard, and it is in fact fully conformant with the GESMES/TS standard which has been used successfully for more than five years for exchange, especially in the central banking sector. There are two types of message:

1. Structure Definition: A message describing the structure of the data and the structural metadata needed to understand and process a data set.
2. Data/Attributes Message: This is a message used for the exchange of the actual data and metadata (attributes).

SDMX-ML is the XML implementation of the common SDMX information model that is also the basis for SDMX-EDI. This means that the structure is the same, and there exists a one-to-one mapping between the two formats. However, SDMX-ML is designed to be used for a wider variety of exchange modes.

The standard contains the following elements:

1. Structure Definition Message: A common XML message expressing the structural metadata needed to understand and process a data set. It is completely congruent with the SDMX-EDI Structure Definition Message – allowing for a mapping between the two.
2. Full Data Message (or Generic Data Message): All statistical data expressible in SDMX-ML can be marked up according to this data format, in agreement with the contents of a Structure

Definition Message. It is designed for data provision where receiving the data may not have detailed understanding of the data set structure before they process the data set itself.
3. Compact Data Message: A message optimised for the batch exchange of large amounts of time series. This format is specific to the agreed conventions for the subject matter area of the data set (the key family) and, unlike the above-mentioned Full Data Message, it can only be understood in connection with the metadata defined in the Structure Definition Message; this is because all of the data from the Structure Message are not repeated in the Compact Message. It allows for the transmission of partial data sets (incremental updates) as well as whole data sets. It is completely congruent with the SDMX-EDI data message, allowing for conversion between the two formats.
4. Utility Data Message: This message type, like the Compact Data message, is specific to the key family of the data set, but is designed to support validation and other expected XML schema functions.
5. Cross-Sectional Data Message: This message is similar to the Compact Data Message, but it allows for transferring data which are not organised strictly as time series but where there is more than one observation per time period.
6. Query Message: Data and metadata are often published in databases which are available on the web. Thus, it is necessary to have a standard query document which allows the databases to be queried, and return an SDMX-ML message. The Query document is an implementation of the SDMX Information Model for use in web services and database-driven applications, allowing for a standard request to be sent to data providers using these technologies.

could facilitate more efficient ways to share and disseminate data over the Internet. (*http://www.registrysolutions.co.uk/sdmxDemo/notes/index.htm*). Current efforts are aimed at building a new production implementation of the Joint External Debt Hub, as part of the SDMX Pilot Project (2004–2005) and its work on furthering SDMX standards development.

NAWWE[3] – National Accounts World Wide Exchange – is a project launched by the OECD. The idea behind the NAWWE project is to use a web based mechanism for reporting an already internationally agreed set of national accounts data. The objective is to allow any user, in particular international organisations, to access directly a set of internationally comparable data made available by countries. If all the involved international organisations were to agree to use this mechanism, it would reduce the reporting burden on member countries and improve the accuracy, coherence and timeliness of the data. NAWWE is based on the common questionnaire agreed by the OECD and Eurostat for the collection of national accounts data and the tables are expressed using the SDMX-ML standard formats. At the moment three countries – Australia, Canada and France – have made sample data available in this format and the data are presented in the NAWWE web site. It is planned in 2006 to move to full production for countries willing to join in, meaning that these countries would no longer have to submit national accounts questionnaires to the OECD.

The **SODI** (SDMX Open Data Interchange) project, launched by Eurostat in 2004, has been designed to test the feasibility of simultaneous publication at national and EU level of short-term statistics from EU Member States, aimed particularly at making those short-term statistics available more quickly and making them easily accessible to users in formats which facilitate further use. The SODI project is especially concerned with “Principal European Economic Indicators” (PEEI), a set of statistical indicators which are used in the management of economic and monetary union in the EU. SODI will investigate various approaches, based on SDMX standards and tools, for streamlining the collection of these indicators. The data model and metadata standard are based on SDMX. An important concern for SODI is to ensure the underlying harmonisation of the indicators. The first SODI pilots in 2005 will involve five EU Member States (Germany, France, Netherlands, Sweden and UK) and two indicators (quarterly GDP and the monthly industrial production index). There will be regular exchange of experience with the NAWWE project, in order to ensure the coherence of technical developments in the two projects.

Joint UN/OECD trade project (**ComTrade**): Following agreement to share responsibilities for collection of annual foreign trade data, the OECD and UN have additionally agreed to work jointly to establish a common system for managing annual foreign trade data, using an SQL-based data model designed by the UN Statistics Department. Development effort for data

3 *See http://stats.oecd.org/nawwe/*

collection, validation, processing and management software are being shared by the OECD and the UN. Responsibilities for collecting and validating data will also be shared, with data periodically replicated from one site to the other. The OECD and UN jointly agreed to use the SDMX-ML schema for replication of annual foreign trade data between the databases maintained at UN/New York and OECD/Paris.

Dissemination of euro area statistics: The European Central Bank (ECB), working together with the national central banks (NCBs) of the Monetary Union, has set up a project aiming at improving accessibility to national contributions to selected euro area aggregates. The project foresees that national contributions to selected euro area aggregates shall be presented jointly with euro area aggregates and disseminated simultaneously on the ECB's and NCBs' websites (for those NCBs wishing to do so) so as to guarantee full statistical consistency from all entry points. Furthermore, the mechanism allows for the data to be presented on each web site with the general look and feel of that website, including some translation into national languages. The workload for NCBs can be kept to a minimum while the maintenance costs for the statistics are mostly centralised at the ECB. A pilot has been conducted with several NCBs of the Eurosystem to validate the concept. NCBs use SDMX-EDI (GESMES/TS) to report their data to the ECB's central data base; and the ECB generates SDMX-ML for web site dissemination purposes by the NCBs and the ECB.

The IMF **Metadata Repositories Project** intends to contribute to SDMX technical and content standards to facilitate the open exchange of reference metadata. The immediate objectives of the project are twofold: (1) identify the commonalities in the metadata structures of macroeconomic datasets that are collected and stored in existing repositories; (2) build on these commonalities to standardize format, structure, and vocabulary for the exchange of reference metadata. More specifically, the project will implement the SDMX exchange standards to the metadata repositories maintained by the IMF, allowing reference metadata to be received and updated from countries and make metadata available in SDMX-ML format. This work will contribute to the development of version 2.0 of SDMX standards, which is expected to be available for public review in 2005-Q3, and which will be backward compatible with version 1.0 standards.

The project will lead to the inclusion of reference metadata in the SDMX information model (work in progress, available at www.sdmx.org) that provides the framework for defining the structure of metadata to be reported for any subject matter domain. The Metadata Repositories Project will also provide the first short-list of "core statistical concepts" for the exchange of reference metadata under the SDMX. These common metadata items will need to be adapted to the needs of all SDMX partners and extended to suit the needs of specific exchanges.

7. How is SDMX an advancement over earlier attempts to standardise data flows?

There are several reasons for having confidence in the soundness of investing in SDMX:

Metadata and terminology

Metadata standards are important components of SDMX. SDMX metadata standards build on the distinction between "structural" and "reference" metadata.

Structural metadata are those metadata acting as identifiers and descriptors of the data, such as names of variables or dimensions of statistical cubes. **Reference metadata** are metadata that describe the contents and the quality of the statistical data (*conceptual metadata*, describing the concepts used and their practical implementation, *methodological metadata*, describing methods used for the generation of the data, and *quality metadata*, describing the different quality dimensions of the resulting statistics, e.g. timeliness, accuracy).

The idea is that it should be possible, using the SDMX standards, to exchange or share the data and the metadata that will allow a thorough understanding and interpretation of the corresponding statistical data. In the first version of the standards, there is limited support for reference metadata (principally conceptual metadata and some methodological metadata that typically accompanies the data). More comprehensive documentation, notably methodological reference metadata describing definitions, sources, shortcomings, transformations, etc, will have to be exchanged outside these messages. Version 2.0 of SDMX to be released in

2005 will comprise a fuller set of standards for metadata, including common structures for reference metadata, and which will be backward compatible with version 1.0 standards.

SDMX also supports common terminology to be used when exchanging and sharing data. For this purpose, SDMX is developing a Metadata Common Vocabulary (MCV) of terms used for describing statistics and their compilation processes (across subject-matter domains) by national statistical agencies and international organisations. For the latest version, see *http://www.sdmx.org/knowledge/document.aspx?id=66.*

1. The organisations sponsoring the initiative are leaders in the world of international exchange of statistical information, and they are strongly committed to make the standards work in practice. They are also committed to working together, sharing the same mechanisms wherever this is relevant.
2. The sponsors are eager to ensure that earlier investments in standardisation in this field are not wasted.
3. GESMES/TS has been the most successful attempt so far to standardise statistical data flows. Central banks have employed it successfully on a large scale, and Eurostat is gradually migrating more and more data flows to GESMES. SDMX is fully conformant with GESMES/TS in its SDMX-EDI when using the EDIFACT syntax. SDMX-ML is an XML syntax format. Both formats are derived from a common SDMX information model. This means that there is a one-to-one mapping between SDMX-EDI and SDMX-ML messages and they can be transformed into each other.
4. XML is a technology standard which is easy to use and widely accepted, not only in the statistical world. Consequently, it is expected to be a clear winner, and investments in it are comparatively low risk.
5. All the involved international organisations, as well as many data providing organisations in member countries, are already working with XML-based data and, in some cases, web services, so it will be a familiar environment.
6. Freely available tools to facilitate the use of SDMX standards are being developed with the support by the sponsoring institutions.
7. SDMX standards are being anchored within the international standards community. In particular, SDMX (version 1.0) has been approved as a technical specification by the International Organization for Standardization (ISO/TS 17369:2005).

8. Organisation and contacts

As mentioned, the SDMX initiative is sponsored by seven international organisations. Heads of Statistics of these organsiations constitute the members of the SDMX Sponsors Committee, (see *http://www.sdmx.org/about/sponsors.aspx*). This Committee sets the targets of the initiative and supervises its implementation, meeting from time to time throughout the year. The chair rotates among sponsor organisations and is currently held by Enrico Giovannini, Chief Statistician of the OECD. Daily work is monitored by an SDMX Secretariat, consisting of staff from each of the sponsoring organisations. Three institutions (BIS, IMF and OECD) coordinate activities of the Secretariat. Staff from all the sponsoring institutions are involved in the SDMX Pilot Project (2004–2005) and regularly hold joint teleconferences.

Each organisation has its own way of organising its cooperation and involvement of its constituency.

Paul Van den Bergh (BIS)

Technology and securities regulation

Randee Pavalow (Ontario Securities Commission)

Strategic approach to regulation

Regulators are becoming more interested in technology because, just like the industry, we have to be innovative in the way we identify issues, roles, and solutions.

- Issues – Securities Regulators have begun to focus on different issues than we have historically. It is not enough to focus on just disclosure or trade execution. Just as important as disclosure and intermediary conduct, is the structure of the markets and the part of the mandate that sets efficient capital markets as an objective.
- Roles – In the past, Regulators have focused on the roles of standard setting and enforcement. We have come to recognize there are times when a regulator's role should be focused on facilitating. We need to monitor progress and make sure that the decisions do not compromise market integrity or have an undue impact on some parts of the industry or act as a barrier to access and competition.
- Solutions – It should be taken into account that the industry needs to be flexible to adapt to changing technology and client needs. In fact the more the solutions support better service to customers, the more willing the industry will be to accept them. Therefore the role of the industry in developing those solutions has also become increasingly important.

The following sets out three examples of strategic regulation and the role of technology.

1. Issues – The ATS Rules

ATS Rules facilitated competition by creating a regulatory framework for multiple markets while minimizing the negative impact of fragmentation on the markets.

Transparency, fair access and best execution working with technology solutions and the commercial interests of the marketplace are used to achieve the goals of consolidation, integration and meaningful price discovery.

When the U.S. originally considered issues of market integration and data consolidation in their review of the markets in the 1970's, it was concluded that electronic networks such as the Consolidated Quote System and Intermarket Trading System needed to be built. However, due to the developments of technology, the solution in Canada in 2001 did not depend on proprietary networks or specific technology solutions.

2. Solutions – The Trade Reporting and Electronic Audit Trail System (TREATS)

TREATS – The CSA established the requirement for electronic audit trail requirements for all dealers as part of Rule 23–101.

The purpose of the initiative is to enable more effective and efficient monitoring of market activities. It will address current gaps and ensure Canadian capital markets do not fall behind international standards.

Currently the exchanges do collect and monitor information, but there have been delays in identifying the source of the concerns. Gaps are created because there is no order or client identifier that follows the trail of the order from beginning to end. Linkages require manual intervention or delays because information from third party service providers is required. Also not all types of securities are covered which makes it hard to connect patterns.

It will be useful not only for the regulators but in fact should assist the dealers themselves. The dealers should be able to do a better job of monitoring such things as best execution.

As part of this initiative we will be considering where the audit trail should begin and which events during the life of a transaction need to be captured electronically. We will also need to consider where standardization is required and where flexibility can be allowed.

The focus is on the technology from the front office through to the back office, and the impact will be on business processes for both the regulators and the industry.

An industry advisory committee was set up to assist the regulators and made a preliminary report. The status of the initiative and industry report was published on April 15, 2005. Industry will continue to be involved in future.

3. Role – Straight Through Processing (STP)

Straight Through Processing – The role of the securities regulators regarding STP has been to: monitor and facilitate industry initiatives. The CSA is looking to the CCMA to make decisions and set requirements. This is particularly so, because a large part of implementing STP depends on business processes and the use of technology to reduce risk. We are well aware that if we dictate the technology solutions, we may negatively impact innovation. Therefore we hope to provide the role which has been described by Richard Colby of the SEC as the "regulator being viewed as the ringmaster of the settlement circus rather than the lion trainer or human cannonball." As the ringmaster we need to be keen observers of the action and to step in only where needed.

As regulators we have observed the following:

- Progress has been made by the large market participants.
- Co-ordination of the industry effort is lagging.
- Significant work has been done in identifying standards and best practices but there is no plan for achieving them. This lack of a critical path puts the industry at least a year behind the U.S.
- The industry sees the regulators as a necessary catalyst but there are different views on what we should do and when.

The results of our concerns led us to publish a paper and proposed rule. The CSA publication was on April 16, 2004 (24–101)). The objectives of the release were: to acknowledge the importance of the post-execution functions; (b) advance the industry discussion on straight through processing and build upon previous initiatives. The trade matching rule mandates that dealers and advisers with discretionary trading authority will need to take all necessary steps to match a trade as soon as practicable and in any event no later than the close of business on T. The CCMA goal is 99% industry wide trade matching. While the rule focuses on a common objective (matching on T), it does not dictate how it will be done.

Conclusions

Each of the three projects identified use technology as part of the strategic approach to regulation. While securities regulators have identified the benefits of using technology, there are also some significant challenges to these kinds of projects that have technology as an essential component:

- It is often difficult to establish benefits in light of the costs of investment.
- It is important to establish support and gain the commitment of market participants in order to efficiently leverage new technologies for the overall benefit of the markets.
- Significant resources and expertise is needed to co-ordinate various parties with different levels of resources.
- The regulatory requirements need to accommodate different technologies and the ability to adapt in the future while enabling interoperability.

Nonetheless, technology provides opportunities to improve the efficiency of the markets and to address market integrity issues and will be used by regulators as part of their strategic approach.

Randee Pavalow (Ontario Securities Commission)

SESSION 9

PANEL DISCUSSION

Improving financial data: what are the priorities and what steps can be taken to achieve progress allowing for budget constraints?

Chair's summary:	Donna Howard (Bank of Canada)
Panellist interventions:	Mr. Clive Thorp (Reserve Bank of New Zealand) Mr. Art Ridgeway (Statistics Canada) Mr. David Fanger (Moody's Investors Service) Mr. René Garcia (Université de Montreál)

Chair's summary

Donna Howard (Bank of Canada)

Opening remarks

This panel session discussed the issue of improving financial data: what are the priorities and what steps can be taken to achieve progress allowing for budget constraints?

The question, at a very broad level, reflected the breadth of discussion covered in the two-day workshop. Governor Dodge wished us fruitful discussions and on that measure, this workshop was a success. The challenge was to provide an appropriate and focused response to the broad question.

One might say that the devil is not only in the details, but the devil is in the data. We talked throughout this workshop on the need for better and improved data. It appears, however, that the underlying theme is about better and improved information. The discussions at this workshop distinguished between soft data and hard data as well as the role judgment plays in coming to conclusions and decisions. The desire for particular information is also coloured by the perspectives that different people bring to the table, e.g., that of macro financial stability, financial reporting, prudential supervision, oversight of payment clearing and settlement systems, the macro economy, consumer protection etc.

Each of the four panelists leading the discussion in this final session brought a unique perspective:

1. **Clive Thorp**, from the Reserve Bank of New Zealand led off from a central banker's perspective.
2. **Art Ridgeway**, Director, Statistics Canada, discussed his observations through the lens of a national statistician.
3. Private sector sources play an important role in the data framework and **David Fanger**, Senior Vice President, at Moody's Investors Service, offered insights not only from the perspective of a user, but also as a private sector provider of data.
4. Finally, researchers are extensive users, consumers and beneficiaries of data. Moreover their research helps to frame the way we think and it helps us to put data into the proper context, to think about policy issues, and to identify trends. So Professor **René Garcia**, de la département de sciences économique de l'université de Montréal, summed up the panel discussions that addressed the challenge issued by Governor Dodge to figure out how to set priorities, how to move forward, and how to do so cost effectively.

Closing remarks

A few themes discussed at the workshop and incorporated in the panel's remarks were:

- In terms of standardization, multilateral organizations like the IMF, the FSI initiative, and the BIS were referred to quite frequently for their coordination efforts. This raised the issue of coordination and cooperation among users and suppliers of data. Rene Garcia`s suggestion of coordination and cooperation with academics, including working with doctoral students to clean and analyze data sets, seemed attractive.
- Vertical integration was mentioned. Discussion on cooperation touched on the fact that a lot of data available with the existing data sources was not being maximized for current uses. This might reflect in part the different perspectives of those collecting the data for certain purposes versus the perspectives of others that could use the same data. It is thus encouraging to know that there are standardization efforts in effect.
- With respect to the skill sets of statisticians, we should use their expertise in our cooperative efforts. Perhaps we have underestimated the contribution that statisticians could make to the collection and categorization of data.
- With respect to constraints and cost/benefits, it is clear that there are both budgetary and human resource constraints that affect the originators and interpreters of the data involved in providing value for information purposes. Sometimes, data needs to be timely while on other occassions more accurate data will be useful as in the context of long time series. For instance, in analysing financial market developments data on bid/ask spreads, volumes, etc., are useful

if available on a timely basis. For instance, in financial markets bid/ask spreads, volumes etc. are useful. However, the rapid pace of innovation will continue to outpace our ability to systematically collect that data.

- Hedge funds are of topical interest and illustrate the problem of determining how much data is required before an accurate assessment can be made of whether they are going to present a threat to financial stability or not. There has been a great deal of cooperation with international organizations, among central banks and other parties in assessing what those threats are and in recognizing that the hedge funds of today are not the same as the hedge funds of 1998 and that we are operating in a very different environment. Therefore data that may have been critical/relevant in 1998 may be less so today.
- Going forward we should increase the tracking of cross-border flows, recognizing that globalization is going to impact domestic countries in ways that we are not necessarily completely aware of, and cooperate and share information with other authorities to make sure we understand the perspectives of others. This type of workshop is very helpful in bringing that common understanding of each other's objectives and commonalities in the types of data we are collecting.

Donna Howard (Bank of Canada)

Panellist intervention

Clive Thorp (Reserve Bank of New Zealand)

At the outset of the workshop, Deputy Governor Sheryl Kennedy asked us to consider:

- Purposes of the data – what are the key concepts we want to measure?
- Practicality of achieving the purpose – how well do the data relate to the concept?
- How accurate do the data need to be? I think there are several huge subtexts to this question: keep costs down, a link to practicality, and perhaps some alarm at the complexity of compilation guides and their implied resource demands.

I have organized my selective take on the eight substantive sessions of the workshop under these three headings.

A. Purpose – what do we want to measure?

1. A precise stability definition is not necessary to get relevant data

Session 1 quickly saw a consensus that a precise definition of financial stability is not necessary for progress on data. While the well-known "stability is the absence of instability" quote was cited, more prosaically, in the context of validating data work for financial stability, I think we are saying that if it looks like a duck and quacks like a duck, it probably is a duck. And since we are the financial stability equivalent of duck farmers, we can surely get relevant data. But this is not to say, as Satoshi Yamaguchi suggested, that clear objective functions are not worth specifying, if only for clear communication in an FSR, for example.

2. Examine all potential risks and rank data costs accordingly

In session 4 we had an interesting discussion about NBFI data, which in my view illustrates one of the drivers of data priorities we should attend to – the Bill White quote that "at least we know what we know and what we don't know". I don't think in the financial stability world we can leave stones unturned. Our hedge fund discussion appeared inconclusive about the importance or perhaps practicality of collecting data about them, but it illustrates this principle – at least get what you can. No central bank can allow itself to be blindsided by a crisis appearing from a quarter that hasn't been examined enough to permit reasonable conclusions about systemic risks it may contain. Therefore, early on we need to use perhaps partial or cheaper hard data, or more readily available soft data, to get to the point where judgments can reasonably be made about data investment versus potential payoff in particular areas.

3. Monitoring and/or forecasting?

The observation in 2 above leads me to suggest that overwhelmingly, but not to the exclusion of other purposes, data for financial stability are gathered to provide **context**. If I may, I suggest their primary purpose should be to support and develop further the understanding of skilled and experienced central bankers about how the financial system works, transmits and contains risks, and allocates resources. I say this since by definition it is not possible to accurately forecast a crisis. The primary financial stability data objective for crisis purposes is to help inform the establishment of a robust financial framework and optimal actions to be taken in response to a crisis. Our main task is to provide data to help assess complex conditions that may be more conducive to crisis/instability than others, using time series data supplemented by cross-section snapshots. A precondition for making such assessments is deep understanding of the financial system, its real sector inter-relationships and institutional behaviors. Patiently building up data capacity to support this understanding doesn't however preclude seeking predictive indicators. Indeed, seeking context through data accumulation may well find useful predictive series better than *a priori* judgments about where to spend money now to get fairly uncertain paybacks.

4. Metadata are very important

We recognized that while we want data primarily, they must be supplemented by information, metadata and "conditioning" circumstances if at all possible. Numbers are not the whole story.

5. Soft data are worth pursuing

Several sessions raised the value of "soft data", with a number of presentations and interventions explaining practices in their regard. No-one diminished them with the chilling word "anecdote" and there was a positive tone to it all. Soft data can put important flesh on the bones, and an invertebrate is worth a lot more than nothing.

6. Benefits for market participants reinforce stability objectives

One important purpose of data sometimes overlooked is the feedback loop it provides to market participants. This gives parameters within which their behavior might well be modified more to the liking of risk-averse central bankers. To take a simple example, if lenders see a total market growing slowly, the risks they generate with that knowledge might be less than if they thought their own credit standards were the problem. The Swiss National Bank's interest rate risks data initiative, while expensive, had the benefit of raising standards of risk measurement for some banks. All of us have come across our own examples of that result and it needs to be recorded, as one of the benefits against the costs imposed in collection.

B. Practicality – How well do data relate to the concept?

7. Accounting standards rule

Accounting rules and Basle standards are the bedrock for prudential data relevance and practicality. The International Accounting Standards (IAS) could be considered as the primary "financial data relevance" tool. From the point of view of burden imposition and the quality re-inforcement achieved by standardizing on one set of "rules", it would seem likely the statistical errors imparted by using IAS, even when there was some conceptual mismatch, would have to be large to argue they didn't relate well enough to the concept, for financial stability data.

8. Regulatory and market data objectives converge

Relevance in the financial stability data field will increasingly be bolstered by convergence of the market's interest and focus with that of public sector analysts and regulators. Jose Quijano made a persuasive case for this with reference to Mexico's practices.

9. Micro versus macro

Microdata issues came to the fore in papers on households, SME's and work on large corporates in session 5. The variety of microdata techniques available is large, and sources used often originally had an administrative purpose. These can provide relevant prudential data in many cases. Also, statistical series aimed at one primary objective may nonetheless contain relevant (micro) data for prudential stability purposes – practicality of a lot of these data is good enough for use. An example from New Zealand is its household expenditure survey, designed primarily to inform consumer pricing exercises but able to deliver useful household tenure and housing debt servicing information. "Purpose-built" micro series like the monthly household balance sheets available in Japan, and the Australian longitudinal HILDA survey are very valuable. It is often the case that microdata are the more valuable, given they reveal information about "tails", unavailable from macrodata. There seems a good case for some prioritization of work here.

10. Payments system

Data from the many parts of payments systems can be captured relatively cheaply, should be accurate, are timely and are very relevant – both for research and monitoring, and operationally. The payments system has key components relevant to system criticality and for this reason alone, its behaviour need to be tracked and understood, especially for the banking system. Data outputs from its various components can be used to analyse both stocks and flows and for counterpart checking for institutional surveys. These data are "in the zone" for financial stability and should be high on the list of priorities.

Participants in session 6 demonstrated various analytical outputs that can be obtained from systems primarily designed for operational purposes in the payments system.

11. Financial instrument characteristics

Data that can be obtained about financial instruments, notwithstanding the gaps, are highly relevant to monitoring risks in financial systems. There were demonstrations of their value in sessions 6 and 7. There are overlapping sources and reasons for obtaining these data, with some financial markets and instruments already better reported (e.g. short-term money market and government bonds) than others.

12. Commercial data

Our sessions acknowledged use of commercial data but this source didn't come into focus as much as perhaps it warrants. These data are routinely found in financial stability reports – ratings data, trade credit data, expectations surveys published by commercial sources and so forth. In New Zealand we seek out and are willing to work with potential commercial data suppliers to supplement official survey sources. Commercial data series can be of high quality as providers usually monitor aggregate outputs, but the issue of control (e.g. over series termination) is acknowledged.

13. Global perspective

Use of data from other jurisdictions for domestic analytical purposes or among a group of countries poses particular challenges. While absolutely necessary for financial stability purposes, the context in which data are obtained becomes much more important. The implicit institutional knowledge embedded in domestic data use needs to be substituted with metadata of a high standard. Global initiatives with financial and other statistical data, given greater urgency and focus by the IMF since the mid-1990s, provide expert assistance with conceptual frameworks, compilation guides and data methodologies that can guide domestic data strategy thinking. The "priority balance" between applying resources to domestic data objectives and meeting international metadata standards can be problematic.

C. Accuracy – What are the trade-offs?

14. Use International Accounting Standards

IAS data definitions, noted in 7 above, confront financial data compilers with relevance and accuracy issues. Patrick Sandars noted the complexity of issues raised by different conceptual bases for some financial data purposes in the EU, and the potential for increased respondent burden. In some other jurisdictions, there may be options for retention of IAS definitions despite slight loss of accuracy arising from the different conceptual bases. Gains would include lower cost and respondent goodwill. They may also include higher quality data consistency by retaining a focus on one integrated data system for respondents.

15. Financial stability seems to be about the big guys

For the accuracy "trade-off", I inferred from our sessions (and believe so myself) that data work for financial stability should seek accuracy in what matters with critical institutions and operations (the big banks, the payments system) and use cheaper, partial methods with the rest. This is not new to statistics of course – it's what national statistical agencies have always done, as Art Ridgeway would confirm. Scheduled (annual, five yearly?) tests of the "data universe" done as cheaply as possible are likely to be all that is needed to validate cost cutting demarcation/coverage decisions.

16. Complexity needn't imply cost

The excellent IMF/BIS/ECB work through expert committees and secretariats, delivering conceptual guidelines and culminating in compilation guides based on them, is a vital part of the world of data for financial stability. However, I sense that national authorities may find that the exhaustive guides and fully-developed conceptual framework imply heavy costs for "accuracy".

The compilation guide complexity is necessary (and welcome for clarity) but need not imply that a well-constructed data system must be costly. Within that complexity is a "skeleton" data framework well mapped to the conceptual model. Replicating the skeleton is surely well worth doing, but importantly, the degree to which costs are then added by "putting flesh on the bones" is under the control of national authorities. Over time, priorities in national data terms can dictate the fleshing out of the skeleton to a universal standard that enhances international co-operation.

Clive Thorp (Reserve Bank of New Zealand)

Panellist intervention

Art Ridgeway (Statistics Canada)

What do we need?

Over the last two days, there was a greater degree of consensus on the direction that is needed than on specific data requirements. There is need for more research to better define where we are going. We heard a number of interesting avenues for further exploration. We need to try and eliminate some areas of investigation before building large ‘production’ databases.

How do we move forward efficiently?

One thing that struck me was a need to determine where vertically integrated data and analysis processes are required and where data production and analysis can be organized across agencies, one might look at this as contracting out.

- Bank supervisors need real time calibration; often this must be based on ‘soft’ data. The need to create and integrate this ‘soft’ data on the fly suggests that it will be more efficient if undertaken in a vertically integrated organisation.
- Baseline data providing structural and benchmark information for periodic studies is generally more voluminous and more amenable to specialization and thus may be most efficiently gathered by specialized institutions.

Efficiency through specialization requires standards and documentation – metadata. For the baseline research one needs to integrate data from the specialist agencies – or at least reconcile any differences.

There are several areas where statistical agencies may have a comparative advantage in specialized data collection:

- Survey taking
  - Household surveys: The types of detail on household balance sheets and finances referred to over the past two days require large sample sizes. The costs associated with such sample sizes and the supporting infrastructure argues for specialization, generally within the statistical office.
  - Broadly based business surveys: Again the infrastructure needed to collect data from a broad range of business argues for specialization. In Canada, this specialization has for many years been found at Statistics Canada.

- Administrative data
  - As data demands call for more and more detail, the response burden costs demand that we seek to make the most efficient use possible of administrative data that already exists.
  - Only by using efficiently what already exists can we save on the cost of the ‘response burden’ for those inquiries that can only be addressed by direct data collection.
  - Tapping into administrative data may pose some additional confidentiality risks but businesses will generally be prepared to trade off a slightly higher confidentiality risk for lower costs for complying with government regulation, including data collection.
- Linking of data sets can also be efficiently handled at statistical agencies and this can contribute to a better integration of the micro and macro results for economic studies.

Some solutions that should be explored are:

- Improved research access to existing statistical data, particularly for financial market issues.
- Statistical infrastructure – such as the new business register at Statistics Canada – that focuses more on the structures, such as the global enterprise, that are important for studies of financial sector questions.
- Single reporting using XBRL or similar technology by going right to the accounting systems of large complex enterprises to extract consistent data.

- Explore the use of existing administrative sources, particularly within the financial institutions and associated regulatory bodies.
- It may be costly to construct the infrastructure but the flexibility it offers can improve the efficiency of the system when faced with new market developments.

This last point brings us back to the beginning – while there is consensus on direction, more research may be needed to be sure of the specifics before large database investments can be effectively planned.

Art Ridgeway (Statistics Canada)

Panellist intervention

David Fanger (Moody's Investors Service)

What is "financial stability"? – Based on the last two days, it appears that we still need to do some more work on the definition of financial stability. It should be different than economic stability, but that is not always clearly defined. Financial stability is really more about contagion risk – efforts to measure and monitor financial stability should focus on concentration risks, liquidity risks, and transmission effects.

Banks – Data is pretty good, although regulators/supervisors need to do a better job of sharing with central bankers. One area that is lacking is cross-border flows on an intra-company basis – this is especially important in light of globalization. We need to find a way to coordinate the sharing of data across borders to minimize data burden of banks, but banks also need to recognize that the data burden is part of the price they pay for being covered by a safety net.

Another data element which Moody's has found very useful is loan concentration risk. Large loan exposures are one of the primary causes of bank problems, but very little systematic data is collected or published that would enable investors to compare how big the largest exposures are at individual banks.

Nonbank financials – *Insurers and Reinsurers:* Central bankers and statisticians need to work more closely with insurance supervisors, focus on liability structure and transmission risk/risk of contagion.

Financial Conglomerates: Need holding company level data and information on intragroup transactions and financial flows. Consolidating financial statements (roll-ups) are the best way to identify both types of information.
Hedge funds: Concerns over concentration of risks, herding behavior. Work should focus on getting existing data from administrators, prime brokers. We need to use a combination of both hard data (periodic reports) and soft data (market and anecdotal information). Data is concentrated in financial centers but has potential cross-border implications – this mandates substantial data sharing between central banks.

Nonfinancials, Households and SME – Seems to have limited relevance for financial stability and poses high costs for data collection. We should piggyback off existing data sources (social surveys, census takers, tax authorities). Distribution data could give better picture of concentration risk.
Financial infrastructure – Probably already have better data here than anywhere else, mainly because central banks are often at the center. But if it is not available (eg. Canada large payments a few years ago) it should probably be a top priority. Issues seem to more about what to do with the data and how to store it.
Financial Markets – Lots of pricing data. Harder to tie it to holders. How can we tell who is providing the liquidity? Soft data may be best.

David Fanger (Moody's Investors Service)

Panellist intervention

René Garcia (Université de Montreál)

The main goal of this closing session is to outline the priorities that should be set to improve the collection of financial data in order to better ensure the stability of the financial system. Another important goal is to make sure that these priorities are achieved within reasonable budgetary outlays.

As a researcher representing the academic community I will make precise what type of data is needed and why. The need for data will be paired with their use in recent finance studies associated with financial stability. A second important aspect has to do with the statistical tools that are appropriate to address financial stability issues. Finally, as several interventions in the previous sessions have emphasized, we need to link financial stability issues to the real economy: we argue that there is a need for models to better understand these links.

To address many of the issues in financial stability, we need data at high frequency in the time dimension and as well as data disaggregated at the level of households. In the last ten years, the availability of ultra-high frequency data on the prices of assets and on the traded volumes has been instrumental in building new statistical measures of important economic concepts. The volatility of asset returns is an essential quantity for the pricing of derivative assets or for portfolio allocation. Unfortunately it is not observable and needs to be estimated. An important innovation in the finance literature has been a concept called realized volatility, whereby the addition of squared returns at very short intervals of time provides a measure of volatility[1]. Coupled with data on options, this measure can provide estimates of the risk premium associated with the volatility risk as well the average time-varying risk aversion on the market[2]. The availability of transaction level data has allowed also a precise statistical analysis of the relationship between price and volume, price and trading time as well as the study of many empirical microstructure issues in securities markets[3]. Progress has also been made in mixing high and low frequency data especially in the context of forecasting with dynamic factor models[4]. While these data are mainly provided by commercial vendors, there are a lot of data at the transaction level that are collected by exchanges or brokerage firms and kept for several months before being discarded since it represents a huge amount of information to be stored. Arrangements with academic or other institutions interested in the exploitation of these data for research could be a good way not to lose this precious information.

Consumption patterns and financial assets and liabilities of households represent another important source of information to anticipate potential instability of the financial system. Therefore there is a need for a follow-up of these data in true panels or rotating panels. Coordination with statistical institutes will be needed in that case.

It should be remarked in passing that sometimes the lack of high frequency data is not as harmful as it may appear. Hedge funds provide a good example. The frequency of the data is monthly but more importantly it is fraught with backfilling and reporting biases, which makes it hard to rely on this information to accurately assess the risk associated with this type of investment. Since hedge funds are nothing more than investing strategies, another route will be potentially to use high-frequency data on the primitive assets and replicate these strategies to better assess the risk associated with these strategies.

To obtain quantitative answers to the financial stability issues of interest, statistical tools must be applied to the data available. The major part of the statistical analysis conducted in the study of economic or financial problems is based on the means, variances and correlations of the series at hand. This results directly from the fact that the probability distributions of the variables are assumed to be Gaussian. Financial stability issues introduce a major shift in this paradigm since extreme events can introduce fatter tails than in the normal distribution. The respective importance of bad tail events and good tail events can also introduce asymmetry in the distributions. Therefore, there is a need to use statistical models that are appropriate to cap-

1 *See the two excellent surveys by Andersen, Bollerslev and Diebold (2005) and Barndoff-Nielsen and Shephard (2005), as well as the forthcoming special issue of the Journal of Financial Econometrics on the* Analysis of High-Frequency Financial Data and Market Microstructure.

2 *See in particular Garcia, Lewis and Renault (2002) and Bollerslev, Gibson and Zhou (2005).*

3 *Excellent references are O'Hara (1995) and Hasbrouck (2005).*

4 *Stock and Watson (1997).*

ture skewness and kurtosis in probability distributions. These include in particular mixtures of normal distributions, threshold and regime switching models, extreme value distributions. In the presence of financial contagion or crisis, correlation must be replaced by a more general concept of nonlinear dependence. This implies that more emphasis should be placed in the core curriculum on these statistical tools and also that the statistical reporting should include more information than simply the means, variances and correlations of economic or financial variables.

Financial stability is needed for a healthy economic system. Yet it is important to make this statement more precise if one wants to assess quantitatively the effects of financial instability on the macro economy. Models are needed for example to support macro stress tests and to link monetary policy with financial stability objectives. Some progress has been made recently in the term structure of interest rates literature: macroeconomic models together with no-arbitrage term structure models allow for interaction between the financial and the real side of the economy. One could also want to better assess the real consequences of regulatory actions such as the Basel accords and evaluate the cost in terms of economic growth of a reduced crisis risk. Coming back to hedge funds, some researchers have raised the specter of the occurrence of liquidity black holes, whenever liquidity dries up, even in markets with large traded volumes, because all investors want to take the same position. An important question will be to determine if such liquidity black holes are possible in general equilibrium. Only models can provide us with answers on such questions.

To end these remarks on priorities about data and models, we will provide some concrete proposals to enhance data use at little cost. A first interested suggestion is to provide academics with original data to spur research. Central banks, regulators and other institutions involved in the pursuit of financial stability should tap the academic resources to better exploit the data they collect. A few years ago, a Swiss firm gathered a very high-frequency data set and put it at the disposal of academic researchers. A conference was subsequently organized to exchange the results of the research projects that used this data set. More generally, there are very eager researchers and doctoral students in the academic community who will be ready to clean and analyze new data sets since it has added value for publication. Finally, any initiative to provide easy access to data, a sort of Google statistical link, will be of high social value.

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