

# Statistical implications of the new financial landscape

## Overview of the eighth IFC conference<sup>1</sup>

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Opening the eighth IFC conference on the *“Statistical implications of the new financial landscape,”*<sup>4</sup> Katherine Hennings, IFC Vice Chair and representative from the Central Bank of Brazil, underlined central bank statisticians’ ongoing efforts to improve international financial statistics in response to the Great Financial Crisis (GFC) of 2007–09. Such efforts aimed, in particular, at developing better quality, more comprehensive and more flexible data sets.

In his remarks, Luiz Awazu Pereira da Silva, Deputy General Manager of the BIS, recalled the numerous actions undertaken in the area of financial statistics since the GFC, including, in particular, the Data Gaps Initiative endorsed by the G20 (see IMF and FSB (2009), and Heath and Goksu (2016)). The BIS and the various financial stability groups hosted at the BIS have concentrated their efforts on four major areas: the production of new financial statistics; the effective dissemination of these data; their adequate use, especially for policy purposes; and the anchoring of Basel-based statistical work in international initiatives. Looking ahead, one needs to be prepared for the constant emergence of new data-related issues. To this end, statisticians should further their efforts to: produce better macro statistics; collect macro-relevant, “pure” micro data; facilitate the linking of macro- and micro-financial data; better assess the distribution of aggregated indicators; ensure that the design and assessment of new financial policies are based on statistical evidence; and expand “the knowledge frontier” by developing new concepts for analysing financial stability issues (Tissot (2016a)).

In his keynote speech, Pedro Silva, President of the International Statistical Institute (ISI), emphasised the disconnection between the large data gaps revealed by the GFC and the increasing volume of statistics emanating from the digital revolution (IFC (2015b)). But having more data at one’s disposal was not necessarily associated with better quality information. It was also posing new and sometimes unexpected challenges. The way forward for statisticians was to keep their existing and well known data frameworks, and to complete them with available information rather than switching to the compilation of entirely new large data sets. In any case,

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<sup>4</sup> Hosted by the BIS in Basel on 8 and 9 September 2016 and attended by about 150 participants from 63 countries.

applying statistical thinking for process analysis and having sound methodology were essential in ensuring data quality and evidence-based decision-making, especially in a world of big data.

The conference was fruitful in combining various country experiences, both from methodological and empirical perspectives, and allowing for an in-depth exploration of several specific themes. Session 1 focused on the post-GFC data frameworks that were developed to capture financial stability risks. Session 2 looked at the statistical implications of changing financial intermediation patterns. Session 3 reviewed the new data required by evolving monetary policy needs. Session 4 dealt with the assessment of vulnerabilities. Session 5 focused on micro data. Finally, Session 6 reviewed issues related to the sharing and dissemination of statistics. The Conference ended with a panel discussion on the statistical implications of the new financial landscape.

## 1. Data frameworks for systemic risk

The first session, chaired by Aurel Schubert, Vice Chair of the IFC and European Central Bank (ECB), discussed *data frameworks for systemic risk*. The greater focus on systemic risk analysis after the GFC had called for new types of statistics (eg financial stability indicators) and compilation practices (eg greater focus on micro data). The session was thus an opportunity to look at central banks' experiences in enhancing existing data frameworks, building up new databases and creating indicators to support systemic risk analysis.

The first presentation, by the ECB, stressed the importance of having adequate and comprehensive statistical databases to support macroprudential policies. A new "*Macroprudential Database*" was launched in the European Union (EU) in 2015 to support the activities of both the Single Supervisory Mechanism (SSM) and the European Systemic Risk Board (ESRB). In the main, it provides a framework for collecting the various statistical inputs required for macroprudential analysis within euro area countries (as members of the SSM) and also for the whole Europe Union (the ESRB being in charge of macroprudential oversight for the entire EU financial system). The database is structured around a number of domains that are key from a financial stability perspective; for instance, macroeconomics and financial markets, debt and credit, residential and commercial real estate, banking sector, non-banks and interconnections. Most of the statistics covered are in the public domain, allowing for interaction between academic researchers and the central banking community.

Such a comprehensive collection of existing information can be a cumbersome exercise, especially if one wants to integrate financial supervisory data that are usually not available in the public domain. From this perspective, the Bank of England presented a new *Historical Banking Regulatory Database*. This database provides a long-term overview of the UK banking sector and its various business models, with information at both the consolidated parent group and solo levels. The data are available since the late 1980s, a significant advantage compared with other

relatively shorter databases – not least considering that financial cycles tend to have a longer time-span than more traditional business cycles.<sup>5</sup>

While the first two presentations had mainly dealt with existing statistics, the third presentation by the Netherlands Bank illustrated the need to collect new statistics to better analyse systemic risk. From this perspective, a key issue was to assess the role played by “pass-through funds”<sup>6</sup> in the Netherlands. For that purpose, and as compiler of statistics on balance of payments (BOP), the Netherlands Bank had originally defined the concept of “Special Financial Institutions (SFIs)”<sup>7</sup>. In order to align this national concept with international standards, the focus was now on switching to those special purpose entities (SPEs) considered to be “captive financial institutions”<sup>8</sup> in the System of National Accounts (SNA) framework. However, to continue with being able to specifically monitor the impact of pass-through funds, the Netherlands Bank was following a combined approach to identify precisely those SPEs engaged in pass-through activities.

Independently of whether the statistics collected were old or new, the next step was to build adequate indicators to underpin systemic risk analysis. To this end, and as explained in its second presentation, the Bank of England set up a regulatory database of inter-institutional exposures which was extended to cover both financial and non-financial firms. This information allowed for the computing of a risk index that encompassed the system-wide impact of the potential failure of an institution due to its credit exposures and interactions in various market segments. This modelling allowed for the assessment of each bank’s contribution to systemic risk and provided, in addition, a basis for developing regulatory responses.

The last presentation, by a researcher from Erasmus University (Rotterdam), looked at the role of statistical frameworks in globalisation, with a focus on the banking statistics collected by the BIS (2015). By providing information on multinational banks, these data help in analysing the structure of global capital markets. In particular, they allow to measure banking operations from residency and nationality perspectives, and help to differentiate among the various types of capital flow (eg domestic versus cross-border). This statistical framework thus provides a

<sup>5</sup> See *Debt and the financial cycle: domestic and global*, in BIS (2014), Chapter IV.

<sup>6</sup> See the 2008 System of National Accounts (European Commission et al (2009)), especially Chapter 21: ““Pass-through funds” or “funds in transit” are funds that pass through an enterprise resident in one economy to an affiliate in another economy, so that the funds do not stay in the economy of the affiliate” (#21.41).

<sup>7</sup> SFIs are broadly defined by the Netherlands Bank as resident institutions in which non-residents hold a participating interest or exercise influence. Their business consists schematically in holdings of assets and liabilities abroad and/or transfers of royalty and licence income earned abroad to foreign group companies and/or the generation of turnover associated with re-invoicing to and from foreign group companies. All SFIs are ultimately owned by foreign parents (see *Notes to the SFI benchmark survey*, available on [www.dnb.nl/home/index.jsp](http://www.dnb.nl/home/index.jsp)).

<sup>8</sup> The 2008 SNA provides guidance on the treatment of units with no employees and no non-financial assets, units often described as SPEs or special purpose vehicles (SPVs). See 2008 SNA Chapter 4: “There is no common definition of an SPE but some of its characteristics are that it has little physical presence, is always related to another corporation, often as a subsidiary, and it is often resident in a territory other than the territory of residence of its parent” (#4.55-6 and #A3.10). A SPE can fall in the category of “captive financial institutions”; in particular, “a holding company that simply owns the assets of subsidiaries is one example of a captive financial institution” (#4.59-61).

geography of financial globalisation and related systemic risks, complementing country-based indicators. One issue, however, is that this new financial geography is shaped by multinationals' decisions to distribute activities across countries, contributing to the expansion of cross-border capital flows and questioning the traditional role of the nation-state.

## 2. New financial intermediation patterns

The second session, chaired by Hock Chai Toh, Central Bank of Malaysia, reviewed the *new financial intermediation patterns* that have emerged since the GFC and their statistical implications. A key issue was to deal with the increasing importance and variety of financial intermediaries – such as SPVs/SPEs and other “shadow banks” – and the associated emergence of new “data gaps” as well as the implications for traditional banking activities.

A first example was the presentation by the Central Bank of Ireland of a new data collection on SPVs located in Ireland to better assess the diverse range of their activities as well as their linkages to other institutions. The aim was to support financial stability analysis by: (i) enhancing the measurement of the shadow banking sector itself; (ii) capturing the associated geographical and sectoral linkages; and (iii) assessing the potential spillover risks stemming from the SPV sector. This experience underlined the role of data-sharing to better measure cross-sector and cross-border systemic interactions.

A second example was provided by the Netherlands Bank whose presentation emphasised the importance of a better monitoring of financial flows across sectors. Enhanced cooperation with Statistics Netherlands had helped to develop a new and consistent data set covering the financial and non-financial sectors. This data set provided balance sheet information, including counterparty information, for all the reporting units. A key lesson was that expanding this type of data collection required greater powers for national statistical authorities, including central banks.

A third example, provided by the ECB, related to the securitisation of bank loans. This financial innovation played an important role in the GFC in that it disrupted the assessment of banks' balance sheets, with major implications for monetary and financial stability. Addressing this issue required significant adjustments to European statistics on loans to the private sector. One was to correct balance sheet measures for the impact of loan transfers between banks and non-banks. A second, and more recent initiative, was to collect information on all the loans originated by banks (whether on- or off-balance sheet) so as to get a more comprehensive assessment of the credit provided to the real economy.

New data collections, such as the examples referred to above, could be instrumental in better assessing the nature and size of new financial intermediaries, and the implications that this had for financial stability and systemic risk analysis. Yet, an understanding of the factors driving the development of shadow banks remained a challenge, not least because of the difficulty of assessing the impact of regulatory arbitrage. The paper from the Bank of Korea attempted to fill this gap, using the data regularly collected by the Financial Stability Board (FSB (2015)). This exercise showed that the development of long-term institutional investors, such as pension funds and insurance companies, was an important element driving shadow

banking. It also found that the expansion of new financial intermediaries was not associated with a reduction in traditional banking, as the two forms of intermediation were often developing together.

Another paper, by the Bank of England, focused on the role of competition in UK banking. This was assessed by using the new regulatory database set up by the Bank of England which pointed to a general decline in the intensity of competition in the deposit-taking sector since the late 1980s. In particular, the ability of UK banks to extract market rents from customers had risen significantly in the years preceding the GFC. However, this general picture covered differences across market segments (eg mortgage and retail banking), underlying the complexity of the relationships that could exist between competition intensity and financial stability.

### 3. New statistics for new monetary policy needs?

Monetary policy frameworks have faced a number of changes in the aftermath of the GFC with, in particular, a stronger focus on unconventional policy tools in a context of very low interest rates. The third session, chaired by Katherine Hennings, discussed the *statistical implications of these monetary developments*, in particular as regards the need for new data collections and for a better understanding of the transmission channels of policy actions (both conventional and non-conventional).

A first objective, highlighted by Bank Indonesia's presentation, was to expand the collection of statistics that could be useful in times of financial stress. In that case, it was important to better capture agents' expectations, which could have a destabilising role. An *Inflation Expectations Survey* pilot project was accordingly launched to collect information on inflation expectations following the implementation of the Inflation Targeting Framework in Indonesia in 2005. Another initiative to complement existing data was the conduct of a banking survey to assess financial institutions' practices with respect to the taking of deposits, the provision of loans, the placement of excess liquidity and the determination of lending and deposit rates.

A second objective was to improve the understanding of the transmission channel of "conventional" monetary policy actions, as highlighted by three country presentations. First, the contribution of the Central Bank of Malaysia<sup>9</sup> showed how to assess commercial banks' risk-taking in a situation of low interest rates. To this end, it proposed to use firm-level information from the credit register database administered by the Central Bank of Malaysia to assess the lending standards faced by borrowers. Second, the South African Reserve Bank's presentation focused on the link between the policy rate and alternative interest rates in order to better assess the stance of monetary policy. A key lesson was that in the post-crisis period the policy rate did not properly reflect the real burden faced by borrowers. To obtain a comprehensive picture of the monetary policy stance, various indicators had thus to be looked at – including, for example, the rates observed for baskets of loans as well as quantity-based indicators such as banks' liquidity, credit extension

<sup>9</sup> The related paper "*Measuring bank risk-taking behaviour: the risk-taking channel of monetary policy in Malaysia*", by Teh Tian Huey and Daniel Chin Shen Li (Central Bank Malaysia), received the IFC award for the best paper by a young statistician on the occasion of the Conference.

and loan rejection rates. The third presentation, by the National Bank of the Republic of Macedonia, underlined the need to consider the presence and degree of nominal rigidities. Using firm-level survey data, it found that monetary policy effectiveness was significantly influenced by price and wage adjustment patterns.

Beside these relatively traditional issues, specific data needs were also triggered by the wide range of non-standard monetary policy actions taken in response to the GFC. Two presentations focused on this area. The first, by the ECB, underlined the importance of having quantitative indicators for the design of new monetary policy tools, their implementation and the analysis of their impact. To this end, new data had to be collected, including on bank loans and money market transactions. For instance, the implementation of the Targeted Longer-Term Refinancing Operations (TLTRO)<sup>10</sup> had led to the setting up of a fully dedicated statistical reporting framework at the ECB. In addition, analysing the impact of unconventional policy tools had required a close monitoring of financial market participants, putting a premium on the granularity and timeliness of the statistics collected; for instance, balance sheet and interest rate information at the level of individual financial institutions.

This point was emphasised in the second presentation on data needs relating to unconventional monetary tools, by the Bank of Portugal. The issue was that aggregated data could be misleading when assessing the impact of these tools. For instance, aggregated interest rate statistics would provide information on the average cost of funding in the economy. However, it might not be sufficient to assess the impact on the potential borrowers targeted by the unconventional tools; for instance, small and medium-size enterprises (SMEs), mortgage borrowers etc. The Bank of Portugal had consequently started collecting individual data on loans provided to non-financial corporations and their respective interest rates. More precise statistics were also in demand for the households sector; for instance, to capture the impact of variables such as age and education. Another important goal was to compute the financial accounts with “from-whom-to-whom” information,<sup>11</sup> including a breakdown of assets and liabilities with counterparty information (Tissot (2016c)), to facilitate the analysis of the impact of new monetary tools on a particular sector.

## 4. Assessing vulnerabilities

Session four was devoted to the statistical information required for the *assessment of vulnerabilities* and sources of financial stress in the aftermath of the GFC. Three main types of fragility were identified and addressed separately, namely those related to exchange rate, macroeconomic and balance sheet vulnerabilities.

<sup>10</sup> TLTROs provide financing to Eurosystem credit institutions for periods of up to four years. They offer long-term funding at attractive conditions in order to further ease private sector credit conditions and incentivise bank lending to the real economy. Two TLTROs series were launched over 2014–2016 (a description of the Eurosystem's instruments is available at [www.ecb.europa.eu/mopo/implement/html/index.en.html](http://www.ecb.europa.eu/mopo/implement/html/index.en.html)).

<sup>11</sup> For a description of the three-dimensional “from-whom-to-whom” (FWTW) tables, see the 2008 SNA (eg #2.150).

## *Exchange rate vulnerabilities*

The first sub-session, chaired by Charles Thomas, Board of Governors of the Federal Reserve System, focused on the assessment of *exchange rate vulnerabilities*. It was an occasion to review the different ways of measuring risks related to exchange rates, including through derivatives operations, and capture the associated vulnerabilities both at the level of the country and at that of individual economic agents.

The presentation by the Central Reserve Bank of Peru addressed the measurement issues related to the dollarisation of the Peruvian economy, which could pose significant challenges for the conduct of monetary policy. To assess the degree and persistence of dollarisation, specific questions were added to the regular survey of SMEs. The information collected on the currency composition of their sales and costs suggested that non-financial firms in Peru were still significantly vulnerable to exchange rate fluctuations.

Another key statistical issue when assessing exchange rate vulnerabilities was to analyse the impact of derivatives contracts. In Europe, the European Market Infrastructure Regulation (EMIR) reporting framework was implemented after the GFC with the aim of increasing transparency in the over-the-counter (OTC) derivatives market. A by-product had been the setting up of a granular and rich transaction-level data set on derivatives, which could be used to measure exposures in a detailed manner. The Bank of England's presentation showed the usefulness of these data in analysing the evolution of the Swiss franc/euro exchange rate following the Swiss National Bank's decision to terminate the Swiss franc's peg to the euro in 2015.

The presentation by the Central Bank of the Republic of Turkey emphasised the need to have a detailed and frequent assessment of foreign exchange assets and liabilities to assess exposures in the non-financial sector. Macro information based on counterparty data (eg bank lending) could be usefully complemented by firm-level balance sheet data covering, in particular, intrasector transactions. This second, micro approach allowed for a more flexible data set that supported a wider range of analyses. But it also presented important drawbacks in terms of timeliness and reporting burden. This information should therefore be used as a complement to the macro level data instead of replacing them.

The Central Bank of Malaysia highlighted the statistical efforts undertaken by central banks for the surveillance of capital flows. This monitoring was particularly important for small open economies to better understand the causes and effects of capital flows, and their potential risks (IFC (2017)). To this end, the Central Bank of Malaysia used several databases, as there was no perfect way of monitoring all types of portfolio flow with good timeliness, depth and breadth.

The last presentation, by the Central Bank of Chile, analysed the use of derivatives by Chilean exporters and importers to hedge against exchange rate risks. At a macro level, this use was steadily expanding, as suggested by the link observed between the level of foreign trade flows and turnover in the FX derivatives markets. This relationship was tested and confirmed by looking at individual, contract-level data.



## *Macroeconomic vulnerabilities*

The second sub-session, chaired by Jacek Kocierka from Narodowy Bank Polski (Poland), dealt with general *macroeconomic vulnerabilities*. The focus was on the key statistical indicators that should be looked at to inform central banks and policymakers more generally. The various papers discussed this point by reviewing a wide range of statistical domains related to the “real economy”, including production fluctuations, external trade, indebtedness, inflation and asset prices.

A key starting point in the assessment of macroeconomic vulnerabilities was to closely monitor the position in the business cycle and hence output fluctuations. However, collecting, compiling and analysing all the statistical information on domestic production might require significant statistical resources as well as time, and this could be a major problem especially in developing countries. To this end, the Bank of Lebanon had developed a composite indicator to synthetically reflect the evolution of the Lebanese economy. The amount of information that needed to be collected was relatively limited and the indicator appeared to track Lebanese business cycles efficiently, especially their different phases and turning points.

A second important area, in particular for open market economies, was the external sector. While attention had been traditionally on the current account (that is, on trade variables driven by demand, terms of trade and competitiveness), the presentation by the Bank of Portugal emphasised the need to also look at stock indicators (ie financial positions). The level and composition of residents’ assets and liabilities were a key element in understanding the improvement in Portugal’s current account after the euro sovereign crisis of the early 2010s. The need to look at financial positions was echoed in a second presentation by the Bank of Portugal which focused more specifically on non-financial SMEs. Micro data available from the Central Balance-Sheet Database showed, in particular, that companies’ indebtedness and profitability were closely negatively related.

Third, inflation had traditionally been a key focus of vulnerability analyses with an important role played by the formation of price expectations. The presentation by the Bank of Japan looked at the particular impact of business conditions on firms’ inflation outlook in this context, using micro data compiled from various sources, including the well known survey of enterprises in Japan (Tankan) and one more specific survey on the inflation outlook. This information helped to understand the response of firms’ inflation expectations to observed price movements (eg commodity prices) and labour market conditions, as well as structural differences across economic agents; for instance, the fact that SMEs tend to have higher inflation expectations than larger firms.

A fourth issue to be considered was the impact of asset prices on the real economy. Residential property prices, in particular, could significantly influence macroeconomic developments and economic agents’ financial positions. Such prices were of central interest to the authorities in charge of monetary policy as well as to micro- and macro-financial supervisors. The presentation by the Deutsche Bundesbank detailed its multi-indicator approach to the monitoring of the German residential property market, which has experienced significant price increases since 2010, and its analysis of the various impacts that this is having on the economy. The approach relied on a system of alternative indicators (eg prices, financial variables and real economic aggregates), instead of a single, composite indicator. It appeared to have proven useful in analysing the situation of the German housing market, its



drivers (eg respective roles of demand and supply factors) and its implications for monetary and financial stability policies.

### *Balance sheet vulnerabilities*

The third sub-session, chaired by Bruno Tissot of the BIS, reviewed the data issues related to the assessment of *balance sheet vulnerabilities*. The various contributions illustrated the importance of compiling sectoral balance sheet and financial account data in the post-GFC era, especially for assessing the liabilities of pension systems, the financial position of the government, and the situation of financial and non-financial firms.

As regards pension liabilities, the presentation from the Bank of Japan focused on their estimation of the new *Flows of Funds Accounts*. These accounts allowed to distinguish between two types of employment-related pension scheme, defined benefit and defined contribution schemes. They also facilitated the analysis of the impact of interest rate changes on retirement benefits. But there were important compilation challenges, related, for instance, to the limited timeliness and frequency of data sources. This was requiring some ad hoc estimations, possibly leading to significant forecast errors, especially in times of significant interest rate fluctuations.

As regards the government balance sheet, the presentation by the People's Bank of China showed that the implementation of the international SNA standards was raising a number of statistical issues, in particular related to the measurement of those public assets and liabilities that were specific to China but also to the delineation of the government sector itself. To address these points, it was important to coordinate the various accounting systems applying to different public sector institutions and, more specifically, to the classification of their respective assets and liabilities.

Turning to non-financial corporates, the presentation by the Bank of Italy analysed the determinants of the country's shift from a net borrowing to a net lending position in recent years. A wide range of factors needed to be considered, including real cyclical developments (eg output gap and demand components), financial indicators (eg profits and leverage) and external influences (eg foreign direct investment). Correctly considering these elements was particularly important in measuring the risks borne by lenders and their associated capital requirements. But assessing counterparty risk could be as much an art as a science. The presentation by Narodowy Bank Polski (Poland) showed that several alternative calibration methods should be considered in estimating default probabilities and establishing rating systems.

As regards banks, the Bank of Portugal emphasised the need to correctly assess international exposures in the light of the dramatic changes observed in cross-border positions after the GFC. The resilience of such exposures to potential shocks could be analysed by comparing existing portfolios with those that would result from an optimal diversification strategy. This exercise suggested that banks' exposures were still in need of further diversification from their "traditional" euro area basis.

Again, a key message was that the assessment of financial positions should consider off-balance sheet items and, in particular, the impact of derivatives. The BIS contribution analysed various data sources that could be considered for this purpose. It noted that each of them served a particular objective, including whether

the data were collected for regulatory or statistical purposes. The resulting data sets were neither integrated nor easy to combine, and fundamental differences existed regarding the definitions of similar concepts and measures. There was, however, room to merge or streamline existing derivatives statistics in the context of the ongoing international initiative for collecting aggregated data from trade repositories. But practical obstacles remained as regards both the way to aggregate micro data and the related need for sharing very granular information in this endeavour.

## 5. Dealing with micro data

The fifth session, chaired by Pedro Silva, President of the ISI, focused on the *management of micro data*. The combination of growing data needs after the GFC and the availability of new, granular sources of data had resulted in the production of very large and diversified data sets. A quick and efficient processing of such sizeable and complex information was crucial to its adequate use for policy purposes. This put a premium on standardised and automated integration systems to effectively manage the increasing number of micro data sets and develop empirical analysis based on them (IFC (2015a)). Several papers were presented to describe how granular data could be used to enhance the collection of existing aggregated statistics (eg on securities and financial market prices) with a possible matching of various data sets. Associated technical and management issues were also considered.

The first presentation by the ECB highlighted the benefits of looking at granular statistics on the security holdings of investment funds. This information had been collected already at an aggregate level for many years for the purpose of monetary policy analysis. However, the more granular details on individual securities and their holdings provided by the newly-developed “Securities Holdings Statistics by Sector” had clearly improved the analysis of economic and financial stability issues. It was also a more flexible tool to address ad-hoc data queries. In particular, greater data granularity allowed for the creation of new indicators tailored to users’ evolving needs, without adding to the reporting burden.

A second presentation by the ECB focused on the management issues relating to large, non-standardised micro data sets. In this context, it emphasised the crucial role that unique identifiers could play, as shown with the compilation of the Centralised Securities Database (CSDB). This security-by-security data set contained various indicators derived from multiple sources. Its quality was thus highly dependent on the correct integration of data based on a granular security identifier – the International Securities Identification Number (ISIN). But, in the absence of a standard entity identifier, the individual identification of an issuer was relying on a specific, automated data integration process (eg name-matching algorithm). This was seen as a second best, temporary solution before implementation of the new Legal Entity Identifier (LEI) standard (LEIROC (2016)).

As emphasised by the second ECB presentation in this session, the “matching” of different micro data sources should be considered to facilitate their use for different purposes. For instance, the integration of reference data for both monetary and supervisory analyses had become a key priority in Europe following the implementation of the SSM. To achieve that, a Register of Institutions and Affiliates

Database (RIAD) has been developed as a reference platform for various users' needs. Further data integration was ongoing as well as the development of tools to manage differences in the relevant population and group definitions that exist between the supervisory and statistical approaches (IAG (2015)).

The next paper, written jointly by researchers from the Catholic University of Milan and the University of Basel, illustrated the benefits of using two large high-frequency financial data sets for empirical analysis. The first case was the identification of reactions in FX markets to surprises in monetary policy decisions, using a "minute-tick" database. The study highlighted the difficulties in dealing with the large size of the data and potential ways of addressing them, for instance, by defining narrow time windows around each policy announcements. The second case study showed how to use intraday credit default swap (CDS) and bond data for estimating credit risk contagion effects. The empirical results suggested that making use of high-frequency data could allow users to capture intraday contagion patterns (which would be missed using lower frequency data).

The last presentation, from the multinational management and technology consulting firm BearingPoint, highlighted the need for new technologies in dealing with growing regulatory reporting needs, including those resulting from very large data sets. Collecting quality information from different sources and at a reasonable cost was crucial and called for greater process automation. The industry was considering how to set up a new information value chain to replace template-driven reporting. But this required a greater harmonisation of data sets and the integration of various IT systems, both among reporters and between supervisory authorities and supervised entities.

## 6. Data-sharing and dissemination

The sixth session, chaired by Robert Kirchner from the Deutsche Bundesbank, reviewed the statistical issues relating to *data-sharing and dissemination*. The presentations covered a number of initiatives aiming at enhancing data-sharing, communicating high-quality information to end-users, ensuring strong data governance and implementing efficient standardised technical processes.

The first paper presented Deutsche Bundesbank's experience in building a data-sharing framework for analytical purposes. The *Integrated Microdata-based Information and Analysis System* initiative was launched to meet the demands of researchers and analysts for a direct access to micro administrative data sets. This initiative relied on two key components, namely a central data warehouse (the *House of Microdata*), and a unit dedicated to support internal and external research (the *Research Data and Service Centre*). This central statistical information system enabled bank-wide integration of various data types. A key supporting factor was that the data warehouse had been built on the generic Statistical Data and Metadata Exchange (SDMX) standard (IFC (2016a)).

As regards communication, the greater emphasis on uncertainties had triggered new ways of presenting data to end users. The contribution by the Central Bank of Malaysia showed how "fan chart"-type presentations could be useful in this context. Fan charts usually represented confidence intervals around a baseline forecast to reflect the degree of uncertainty; for instance, in terms of inflation

prospects. This framework was therefore well adapted to visualise the topic in a systematic manner and facilitate their communication.

The presentation by the Central Bank of the Russian Federation emphasised the opportunities provided by modern informational technologies, especially new data visualisation software, in support of data-sharing and communication. To this end, the Statistics Department of the central bank had been using a specific commercial IT solution. It was felt that such a solution could be instrumental in setting up a unified information system integrating in a flexible way multiple data applications, enabling large-scale data distribution (with interactive and visually attractive analytics), facilitating ad-hoc self-service access to the data and reducing internal IT development work.

The success of these various statistical initiatives was often dependent on having a solid data governance framework, as highlighted by the example of the European Insurance and Occupational Pensions Authority (EIOPA). This organisation developed such a framework when designing its information management strategy. The starting point was the need for a data framework that was secure, efficient and adaptable to the changing environment. To this end, the approach relied on the involvement of all key business users so as to define common rules and processes for data collection and dissemination. The new framework was built on a centralised database comprising non-anonymised firm-level data with harmonised reporting data formats and adapted validation rules.

## 7. The need for new data and related management issues

The conference ended with a panel discussion, chaired by Eugeniusz Gatnar from Narodowy Bank Polski (Poland), covering two main topics: *the new statistical needs of central banks after the GFC*; and *the implications of such needs in terms of data management*.

As regards data needs, a key question was whether existing statistics should simply be enhanced or needed to be replaced with completely new data sets. Obviously, the situation differed across countries, particularly with respect to their degrees of financial development. It also depended on what “good statistics” meant. As recalled by Turalay Kenç (former IFC Chair), statisticians had traditionally focused on the criteria of timeliness, accuracy, reliability and availability. But the post-GFC financial landscape had also underscored the importance of looking at other factors: the insufficient international harmonisation of data, which was hampering cross-countries comparisons as well as the identification of global spillovers; the existence of large data gaps, for instance, to monitor the non-bank financial sector and the real estate market; and the need to link aggregate national data and more micro information when monitoring economic developments and vulnerabilities.

Indeed, a key priority that has emerged for central banks in recent years is to access more granular information, especially at the entity- and transaction-levels. First, more granularity would increase the flexibility of data sets to respond to ad-hoc information needs. Second, assessing financial stability risks often required looking at the trees and not just the forest (Borio (2013)), especially when it came to capturing the situation of systemically important institutions. Aggregated data could even give a false sense of comfort in case of acute financial stress

circumscribed at the level of a specific institution. Third, granular data was also important for monetary policy, for instance, to better understand the monetary transmission channels or assist with the implementation of unconventional policy tools – a key point highlighted in particular by Anita Angelovska Bezhoska (National Bank of the Republic of Macedonia). All in all, aggregate indicators had been losing some of their earlier importance with a greater focus now being put on detailed impact assessment studies. This was requiring a deeper knowledge of the individual situation of financial firms, non-financial corporates as well as households. As a result, several initiatives were trying to mobilise balance sheet information at the entity level, in particular by looking at data sets derived from banking books, credit registers, central balance sheet data offices,<sup>12</sup> tax files etc.

Turning to data management issues, a common theme was how to deal with rapidly expanding big data sets. Their collection was costly in terms of reporting burden. It was also essential to communicate adequately with data reporters when making the case for the new collection exercises undertaken since the GFC. From the compilers' point of view, the new data sets were also requiring more resources. This was obvious as regards the IT equipment and skills needed to set up and maintain micro data collection systems.

Yet, dealing with an increasing amount of available information was only one side of the story. The statistical methodologies underpinning the new data collections also needed to be revisited. For instance, a key challenge was to better link micro- and macro-level data, not least when it came to develop meaningful stress tests (IFC (2015a)). Another issue emphasised by Gabriel Quirós Romero (IMF) was to reconcile international statistics (eg global capital flows driven by group-level strategies) with indicators measured within national boundaries on a SNA-type residency basis (Tissot (2016b)). This particular issue was emphasised in the panel presentation by Hyun Song Shin (BIS). The traditional approach was to view capital flows as the financial counterpart to savings and investment decisions but this assumed a "triple coincidence" of GDP area, decision-making unit and currency area which could be a misleading simplification (Avdjiev et al (2015)).

A final issue was to allow for more data-sharing both within and among national authorities as well as at the international level (IFC (2016b)). Claudia Buch (Deutsche Bundesbank) emphasised the messages of her keynote speech, ie that individual data sets provided insufficient information on the drivers and effects of changing data patterns. The way forward was to combine ("share") data sets from different sources, following the examples of other research areas (eg medicine). Looking ahead, statisticians should better balance data usability and confidentiality issues. The way forward for central banks was to: (i) improve mechanisms for enhanced data-sharing across countries and business areas in central banking (and beyond); and (ii) use existing data efficiently as part of central banks' accountability to the general public.

<sup>12</sup> Central balance sheet data offices are bodies (mostly located within central banks) that collect and handle firms' financial accounts data (with often a focus on the non-financial sector). See, for Europe, information related to the European Committee of Central Balance-Sheet Data Offices (ECCBSO) on [www.eccbs.org/wba/default.asp](http://www.eccbs.org/wba/default.asp).

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