Summary and conclusions of session on "Micro-databases Integration and Business Intelligence"

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Session D.2 "Micro-databases Integration and Business Intelligence" covered the entire lifecycle of business intelligence platforms in the context of central banks' micro-databases integration, including issues from collecting and processing data to the delivery of information to support decision-making to internal and external stake-holders.

The session program included five presentations detailed below that presented the different realities and challenges faced in distinct countries and environments (Germany, South Africa, Romania, Portugal and Mexico) in what concerns the evolution that is being made in adopting a business intelligence approach in the management of micro-databases and the creation of added value to the conversion of data into information in an increasingly analytical environment.

In the first presentation entitled "House of Micro-data and Research Data and Service Centre at the *Deutsche Bundesbank* – A draft concept", Ulf von Kalckreuth (Statistics Department, *Deutsch Bundesbank*) summarized the state of discussion in the Statistics Department of the *Deutsch Bundesbank* on setting up micro data based information systems. According to von Kalckreuth, currently the available production systems are not geared to micro level data analysis and changing them will be a time and resource consuming endeavour. The presented suggested approach features a short term enhancement of using existing micro-level data, jointly with a longer term reform of the infra-structure. Finally it was referred that the short term enhancement will be greatly helped by the fact that the Bundesbank has a long-standing tradition of providing micro-data to internal and external researchers on-site.

"Business intelligence tools and micro-data related to the South African equities market: Application and experience" was the title of the second presentation, where Zeph Nhleko (Research Department, South African Reserve Bank) addressed the specific thematic of equities market statistics referring that fully understanding the meaning of equities market statistics has become an increasingly difficult task in recent years. According to him, following the financial crisis many well-established relationships and causalities in the market have been weakened somewhat and this created the necessity for monetary policy-makers to analyse equities statistics in a much more pronounced granular manner. In this context the use of business intelligence tools and micro-data sets has never been more relevant and during the presentation it was possible to understand how such tools have been applied to extensive micro-data sets in the South African equities market environment.

The third presentation, made by Andreea Varjoghe (Statistics Department, National Bank of Romania) on "Data management – Running systems and ongoing projects in the National Bank of Romania", consisted in an overview of the main projects underway at the National Bank of Romania in this context. As the author

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referred, National Bank of Romania's present information systems consist in Intranet/Internet sites, communication/hardware/software infrastructure, dedicated systems (for accounting, for payment incidents, for balance of payments, etc.) and reporting systems: SIRBNR – Reporting Information System to the National Bank of Romani, which is the main reporting system to the National Bank of Romania and is in use from January 2007; and RAPDIR – Direct Reporting System, which was designed especially for reporters other than credit institutions.

This information systems' environment led to the development and implementation of a Data Warehouse – Business Intelligence (DW-BI) system in the National Bank of Romania, integrating data at micro and aggregate level from SIRBNR and RAPDIR databases, Excel/Word/PDF files and paper sources as well as from other systems and databases. Simultaneously, mechanisms and software tools were designed and implemented for loading and updating data in the DW-BI database on regular basis or on supervisor decision. According to the presenter, this approach and the business intelligence tools will allow users and key users to have *e.g.* better insight knowledge of the business areas, faster data access, *ad hoc* reports, dashboards, predictive analysis, drill-down analysis and what-if scenarios.

Maria do Carmo Aguiar (Statistics Department, *Banco de Portugal*) made the fourth presentation, on "Business intelligence in securities statistics: An evolutionary approach". According to Maria do Carmo Aguiar, securities statistics at *Banco de Portugal* have been around for a while. In fact, they were first released in the *Banco de Portugal*'s Annual Reports of the 1940s and their regular publication, with information on the issuance of short-term securities (*e.g.* Treasury bills and commercial paper) and long-term securities (shares and bonds), dates back to the 1980s. Monthly data on net issues and end-of-period positions, including totals and values broken down by type of security, maturity, currency, institutional sector of the issuer and respective classification of economic activity, were released for the first time in January 2005. As referred, a milestone in the history of *Banco de Portugal* securities statistics occurred in the late 1990s with the creation of the Securities Statistics Integrated System (SSIS). This system was developed with the purpose of gathering, in a single repository, all the information deemed necessary to comply with reporting requirements on securities.

It was referred that the SSIS stores securities issues and portfolios (holdings) data on "security-by-security" and "investor-by-investor" basis (comprising detailed data on stocks and transactions of debt securities, shares and other equity – financial derivatives are not included). The classification of securities relies on the existence of a reference database that, in the case of domestic securities, is maintained by *Banco de Portugal*; foreign securities are classified according to the Centralised Securities Database (CSDB) managed by the European System of Central Banks (ESCB).

With regard to securities holdings, Maria do Carmo Aguiar mentioned that detailed information is collected on the investments by residents in domestic and foreign securities, as well as on the holdings of non-resident investors in domestic securities. This information is reported by financial institutions, both as investors and custodians, and other resident entities.

An important aspect referred was that SSIS promotes consistency across statistics produced by *Banco de Portugal* and makes it possible to meet user needs, both at national and international level. In fact, SSIS information is used as an input for the compilation of a wide set of statistics produced at *Banco de Portugal*, from monetary and financial statistics to balance of payments and international

investment position and financial accounts. On the other hand, information from other statistical sources is used as an input for estimation of missing data and for data quality management purposes.

The initial SSIS architecture relies on two relational databases: the collected data is stored and validated in the "transactional database" (which is also used to estimate missing information); validated and "enriched" data are copied to the "exploration database" on a daily basis. In 2006, the analytical capabilities of the system were enhanced through the development of an analytical database, which enables user-friendly multidimensional analysis of the information.

Maria do Carmo Aguiar stressed out the fact that while multidimensional analysis of securities data has proved to be a powerful tool for rapid analysis and reporting, they foresee advantages in adding dimensions of analysis from other statistical systems, whose integration is not straightforward. Thus, more than ten years after its inception, it was launched in 2012, an Information Technology (IT) project aiming at developing a new SSIS within the Business Intelligence (BI) framework envisaged for the *Banco de Portugal* statistical systems.

Finally, Alejandro Gaytán González (Directorate of Financial System Information, *Banco de México*) made the fifth presentation, on "The use of micro-data in the financial system information model of *Banco de México*". According to the author, the current financial system information model of *Banco de México* was a strategic response to the challenges the 1994–1995 "Tequila Crisis" brought about. Although there was evidence on the building up of some unbalances (*e.g.*, large public debt denominated in foreign currency, increasing current account deficits and private credit booms), it was different to the traditional balance of payment crisis. Nonetheless, mismatches in bank balances and financial contagion mechanisms remained hidden.

In addition, in the mid-1990s the information model of the financial authorities was cumbersome and had several inefficiencies: (i) disperse, non-structured and duplicated information requirements from financial authorities; (ii) heavy information burden, *i.e.*, too many data requirements, some of them obsolete or inaccurate; and (iii) inadequate frequency, granularity, and opportunity of the information.

Thus, as Alejandro Gaytán González referred, information was insufficient to identify measure and monitor risks. Also strengthening the supervision and compliance of new regulation as well as the measurement and monitoring of risks posed heavy information challenges. In this context, it was said that some important strategic decisions were undertaken: (i) coordination and information sharing among financial authorities; (ii) redesign of data requests to reduce duplicates and to generate economies of scale; and, (iii) *Banco de México* develop a highly granular information model to ease future analysis and reduce information scarcity in turmoil times.