



IFC workshop on *“Combining micro and macro statistical data for financial stability analysis. Experiences, opportunities and challenges”*

Warsaw, Poland, 14-15 December 2015

How to keep statistics' customers happy? Use micro-databases!¹

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¹ This paper was prepared for the meeting. The views expressed are those of the authors and do not necessarily reflect the views of the BIS or the central banks and other institutions represented at the meeting.

How to keep statistics' customers happy? Use micro-databases!

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Abstract¹

This paper illustrates how the Banco de Portugal has been able to meet new and more detailed statistics users' needs while keeping the respondents' burden at an acceptable level, by exploring a number of available statistical micro-databases. The paper is structured around two main subjects. We first exploit the necessary preconditions to effectively explore micro level data sources. In this respect, the existence of a unique key identifier and reference data are of the utmost importance. Secondly, we detail some concrete examples where the use of micro-data is of the highest relevance, including (i) the new statistical products created to meet data needs that emerged while Portugal was under the Economic and Financial Assistance Programme; and (ii) the ad hoc requests to assess the exposure of both the financial and the non-financial sectors to a certain entity, country or financial instrument. In this context, special attention is dedicated to the use of micro-data for financial stability purposes, given the importance of following very closely the existing interlinkages between financial institutions, and between those financial institutions and the non-financial sector.

Keywords: micro-databases; reference data; macro-financial linkages; financial stability.

JEL code: C18; C81

¹ The opinions expressed here are those of the authors and not necessarily those of *Banco de Portugal* or the Eurosystem. Any errors and omissions are the sole responsibility of the authors.

1. Introduction

As highlighted in the context of the G20 Data Gaps Initiative, the burst of the financial crisis has clearly shown the degree of interconnection and integration of the economies and markets worldwide. The crisis caught supervisors, policy makers and investors unprepared to deal with areas poorly covered by the datasets available at the time. On the one hand, as policy makers and supervisors soon realised, the information gaps identified were not related with the quality of economics and financial statistics *per se*, which was already very high, but instead on their availability and comparability across countries. In particular, due to the interconnections amongst economies and financial institutions, information gaps clearly emerged from exposures underlying complex instruments and off-balance entities, and from cross-border linkages between financial institutions. On the other hand, market players and investors were unsettled by uncertainty and lack of reliable information, with consequent negative repercussions on the stability of financial markets.

The G20 Data Gaps Initiative Report identified data gaps towards which an urgent response was needed, to avoid keeping stakeholders unprepared against financial turmoil. In the report, the G20 specified a set of 20 recommendations to be implemented in the years to come, which addressed the shortcomings identified, namely the vulnerability of domestic economies to shocks, the need for a better communication of official statistics, the insufficient identification of risk building-up in the financial sector and the spillover effects of cross-border financial linkages between countries.

National central banks who naturally generate and have access to significant amounts of data are thus under pressure to address these shortcomings. However, trying to keep up with the rapid changes of the economy and continuously adapting the statistics to new phenomena has some serious limitations. Conventional data collecting systems cannot simply keep on expanding indefinitely to cope with the need to fill in the information gaps perceived by the users or in anticipation to their future data requirements. In 2013, the *Banco de Portugal* organised the Porto Workshop on Integrated Management of Micro-databases aimed at promoting the discussion within the central banking community with a view on overcoming such limitations. In that context, we came to the conclusion that it makes sense to exploit the largely unused statistical potential of the available micro-databases covering different areas of the economy and the financial markets. Once statistically edited, these micro-data might play an important role in enhancing the efficiency of central banks' statistical systems. The granular nature of this information, together with an almost full coverage of the relevant population, offers increased flexibility as regards the compilation of new statistics and a more rapid response to *ad hoc* data requirements from the users. In general, this approach is technically easy to implement and with relatively low costs associated. The evolution in network and communication protocols, database systems and multidimensional analytical systems has somewhat removed the potential disadvantages of having to deal with the significant amounts of data normally associated with the handling of micro-databases. In addition, these developments created the objective conditions for

the statistical systems based on the so-called stove-pipe model, in which statistics in individual domains have developed independently from each other, to evolve to the next level, based on coherent and fully integrated data systems, enabling rapid data exploration, multidimensional analysis and cross-referencing of multiple sources with different granularities.

These efforts are already producing results, as put forward in this paper. In particular, and after describing, in Section 2, the importance of micro-databases and how they are build up and currently managed by the *Banco de Portugal* , Section 3 focuses on the identification of those micro-databases, and Section 4 on the current multiple uses of those micro-databases. Section 5 focuses more specifically on the use of micro-data for financial stability purposes and Section 6 concludes.

2. Micro-databases: why and how?

The *Banco de Portugal* (hereinafter referred to as “the Bank”) has been exploring the statistical potential of a number of available micro-databases, which cover different areas of the economy and the financial system, with the aim of enhancing the effectiveness and efficiency of its statistical system while keeping the respondents’ burden at an acceptable level. However, to reap the maximum potential of these databases, it is essential to take an additional step and, instead of viewing them in isolation as standalone data repositories, putting them together in a single fully integrated and highly granular data system. By connecting the information contained in each individual database, this data system will boost the potential associated with each database considered individually.

2.1 Question: Why? Answer: Clear benefits for statistical production!

The main benefit of statistical compilation systems based on item-by-item reporting is their flexibility. This flexibility is manifold, both for respondents and compilers since it:

- a. Increases the ability of the system to deal with changes in the statistical requirements, especially in cases where further details in existing breakdowns are needed (in most cases these situations do not imply any intervention in the reporting system);
- b. Facilitates changes in the reporting scheme as they typically consist of additional granular items (new dimensions) that will not need to be transformed or aggregated by respondents;
- c. Prevents data redundancy, promoting in practice the principle that “data should be collected only once”;
- d. Enables a more efficient data quality management; and, above all,
- e. Improves dramatically the responsiveness to *ad hoc* requests.

One thing that we have learned with the global financial crisis is that aggregate figures are not sufficient to fully grasp developments in economic and financial variables as they refer to the average

of distributions. These data should be complemented with micro-data, which enable exploring the heterogeneity hidden behind aggregate numbers. In fact, in many situations, the tails of the distribution provide the most important information, and that clearly explains why these data became crucial in recent times.

2.2 Question: How? Answer: Through a Business Intelligence (BI) framework!

Achieving a fully integrated highly granular data system is no easy task; it cannot be accomplished overnight. Attaining the afore-mentioned goals hinges on an effective cooperation between different functions of the Bank, based on the sharing of knowledge and the identification of the information needs of both users and producers. A stepwise approach is warranted, whereby the integration proceeds in a gradual and phased manner.

With this in mind, the Bank has been revamping its information model, including a streamlined governance structure, a revisited relationships' management model and a continually improving information architecture based on micro-data and a Data Warehouse (DW). Three main dimensions constitute the cornerstones of this integrated information model: the governance structure, a relationships' management model and the information architecture.

Governance structure

The clear definition of an Information Governance Structure aims at ensuring a proper alignment between the strategic and operational levels of decision, which are mediated by the integrated management of information. In this context, the various departments within the Bank that are originators/users of information have the decentralized responsibility, in collaboration with the department accountable for the centralized management of information, of analyzing in a critical manner the data and the metadata that are most important for them and ensure their quality. They also collaborate on the identification of the functional requirements, having in mind the integrated and shared management of information – the identification of functional requirements is the basis for the consolidation of logical and technological architecture.

Relationships' management

Given the large number of stakeholders, an effective relationships' management is essential, namely to introduce greater efficiency in the communication process, normalizing and formatting it in the customer's perspective. It is based on two cornerstone principles:

- a. Information is a key asset of the Bank so it must be managed in an integrated way.
- b. The exploration and analysis of information are distributed activities, typically related to the needs and tasks of each department.

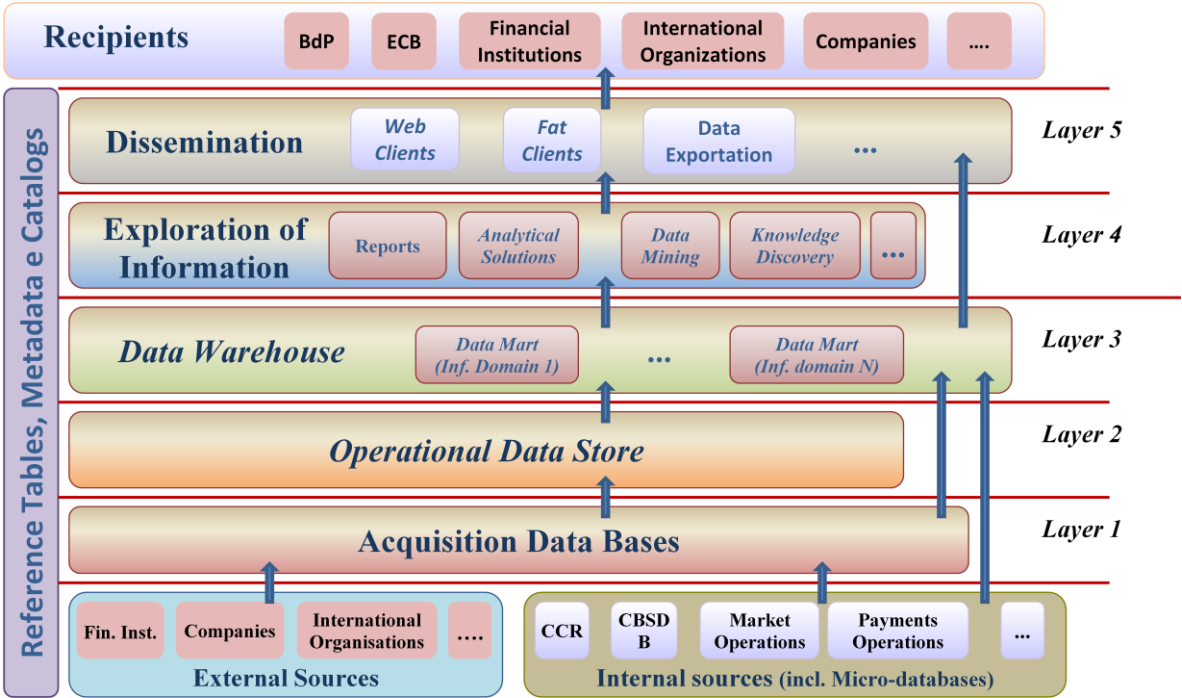
Moreover, an efficient management of information should be based on shared management, which requires a separation of responsibility between the “originator/user of information” and the “manager

of information”. The former is best done in a decentralized way by each department, while the latter should be concentrated in a single department. In fact, given that information is a common good, it should be managed by specialists – these specialists are better placed to collect, classify, manipulate, store, recover and disseminate information.

Information architecture

The information architecture aims at ensuring the quality, auditability and manageability of the data. It is also used to establish levels of responsibility in the management of information, separating the activities related to the organization and processing of information from the analysis and exploration activities. It is based in five layers where the division between the information management and the exploration and analytics activities occurs from the 3rd to the 4th layer, as it can be seen in Figure 1.

Figure 1 – The information architecture



This information model is organised according to the principles of Business intelligence (BI) – “a broad category of applications and technologies for gathering, storing, analyzing, and providing access to data to help enterprise users make better business decisions” (Globalgate – IT Solutions). Simply put, BI is about getting the right information to the right people at the right time, so that they can make good decisions that improve organisational performance.

The Bank’s BI framework is built upon three pillars: a data warehouse, centralised reference tables and a common IT platform. The data warehouse guarantees a central access point to every statistical data, independent of the input source or the production process; the centralised reference database provides common reference data and enables cross linking information from different sources and

systems; the consistent usage of a common technological infrastructure across the multiple information systems makes it easier to integrate and reuse components and promotes data access efficiency and transparency to final users.

The centralised reference database is nuclear to the system and aims at harmonising or linking the different concepts present in the data. The Master Data Management (MDM), collects, consolidates, stores and delivers reference data (*e.g.*, countries, currencies, financial sectors, institutional sector, economic activity and size) that are used across the systems. For example, a register of financial institutions has been kept for long, and there is an on-going effort to streamline the process of gathering data from several sources and consolidating it into an historical register of all resident companies.

3. The micro-databases managed by the Bank

The use of integrated micro-databases for statistical purposes constitutes the cornerstone of the Bank's long-term strategy as regards not only the statistical function, but also other areas within the central banks' competencies – *inter alia* monetary policy, financial stability and supervision. In this respect, the following statistical micro-databases should be highlighted:

a. The Central Credit Register (CCR), which contains granular information on credit on a borrower-by-borrower basis (and, in some cases, including details which provide loan-by-loan information) with a virtually full coverage.

b. The Central Balance Sheet Database (CBSD), which holds accounting and financial information covering almost exhaustively the existing non-financial corporations (NFCs).

c. The Securities Statistics Integrated System (SSIS) database, a security-by-security and investor-by-investor system of both securities holdings and issuances. SSIS complements the CCR data on loans with data on securities and, from a portfolios' perspective, it is a powerful tool to measure the exposure of banks and non-banks to specific issuers; additionally, putting together the information contained in SSIS and CCR provides a more complete overview of the exposure and indebtedness of the financial system as a whole.

d. Following a data request in the context of the Economic and Financial Assistance Programme to Portugal and, to better assess current credit conditions of the NFCs sector and monetary policy transmission, the Bank started collecting individual data on new bank loans and respective interest rates. This database covers all new operations starting with reference period December 2014 (in its initial stage it was confined to banks with volumes of €50 million or higher).

Moreover, following the creation of the Single Supervisory Mechanism, and the need of better and timelier data for supervision purposes, the Bank is currently assessing the feasibility of integrating in

its information architecture also supervisory data with the goal of obtaining synergies in the joint management of banking statistics and supervisory data.

4. The multiple uses of micro-databases: from *ad hoc* requests to new statistical products

One of the most remarkable examples of the responsiveness of one of the micro-databases just described (the SSIS) took place in September 2008, one day after the announcement of the bankruptcy of Lehman Brothers. The European Central Bank (ECB) requested the Eurosystem to provide within the next 24 hours all the available information regarding holdings of shares and debt of Lehman Brothers and its subsidiaries, including a set of details as, for instance, the country and sector breakdown of holders. A list of relevant International Securities Identification Numbers (ISINs) was distributed to facilitate the query. The request was obviously very urgent, sensitive and exceptional. In a couple of hours, the Bank was able to reply to the ECB providing the full answer to the request and even a number of relevant additional ISIN were identified and also provided. Fortunately, Portuguese institutions had only minimal exposure to Lehman Brothers. The security-by-security model of the SSIS and its high level of coverage (both for issues and holdings) were of paramount importance to address this important *ad hoc* request in such an effective way.

The response to the data requests associated to the 2011-2014 EU/IMF Financial Assistance Programme to Portugal also constitutes a particular example of how the efficiency gains spilled over. The Programme brought about an increased need to closely monitor the Portuguese economy in a timely fashion which, in turn, prompted additional data needs for this purpose. Specifically, the data requests involved identifying the public and private non-financial sectors debt, along several dimensions and breakdowns.

The two following example illustrate the advantages underlying statistical compilation systems based on item-by-item models and on building micro-data databases:

a. The production of “amortisation plans” for banks, general government and state-owned enterprises (SOEs), with the amortisation/redemption amounts, on an annual basis until 2020 and from 2021 onwards, of debt securities, domestic loans and external loans.

b. The production of a new statistical product called “non-financial sector indebtedness” aggregating the amounts of non-consolidated debt resulting from issues of debt securities (held by residents and non-residents), domestic loans, external loans and trade credits. Data are presented combining and crossing different dimensions of analysis, namely: debtor and creditor institutional sectors, type of instrument, original maturity, sector of economic activity and size of companies. It was the first time that the Bank used an integrated approach with such a high number of different

statistical domains. The result was an innovative achievement at international level and led to a new chapter in the Statistical Bulletin in the beginning of 2012,² which is updated on a monthly basis.

General government statistics are also enhanced by the use of information available in the various micro-databases. In this respect, it is worth mentioning the publication of a Supplement to the Statistical Bulletin³ on General Government Statistics where the different concepts of public debt are presented. Moreover, in March 2014, the Bank decided to bring forward the publication of monthly statistics on general government debt by about 20 days. These data are now disseminated in the first business day of the second month after the reference period.

The successful implementation of the new manuals (BPM6 and ESA 2010) also relied heavily on the existence of micro-databases, particularly in what concerns the flow of funds. Financial accounts data include both the financial transactions and stocks of the different institutional sectors. For the flow of funds representation, financial accounts data have to be available on a from-whom-to-whom basis, between the different domestic institutional sectors of a given economy, as well as with the rest of the world. More specifically, according to the SNA 2008, *“the flow of funds is a three dimensional presentation of financial statistics where both parties to a transaction as well as the nature of the financial instrument being transacted are elaborated”* (see §27.9). The compilation is done on a quadruple-entry basis, whereby each transaction is recorded for the two institutional sectors involved and as a change in both assets and liabilities. In practice, this is achieved by constructing highly detailed from-whom-to-whom matrices with information on creditor and debtor sectors, financial instrument and assets/liabilities.

In February 2015, Portugal completed the requirements for adherence to the IMF’s Special Data Dissemination Standard (SDDS) Plus – the highest tier of the Data Standards Initiatives,⁴ thus being part of the first cluster of countries joining the IMF’s newest data initiative, at its inception. From the first group of 8 countries, only the Netherlands and Portugal met all of the 9 new data categories; in our case, this was only possible due to the combined use of our micro-databases.

Finally, the Bank has recently taken decisive steps towards further exploring the informational potential of the CCR and balance sheet databases in an ongoing project that aims at creating an in-house credit assessment system (ICAS). This system will provide the Bank with its own internal credit risk assessment system, thus reducing its dependence on external sources. Against the background of the recent economic and financial crisis and the shortage of assets liable to be used as collateral in monetary policy operations, these systems have recently been gaining importance within the Eurosystem, as can be seen by the increasing number of NCBs that have introduced them. In fact, at

² Please see the [press release on the new chapter on non-financial indebtedness](#).

³ <http://www.bportugal.pt/en-US/Estatisticas/PublicacoesEstatisticas/Tumbnails%20List%20Template/....pdf>

⁴ <http://www.imf.org/external/np/sec/pr/2015/pr1546.htm>

the current juncture, a more pressing business case for ICAS stems from monetary policy purposes, for which ICAS will provide an evaluation of debtors' credit notation.

5. New tools for financial stability

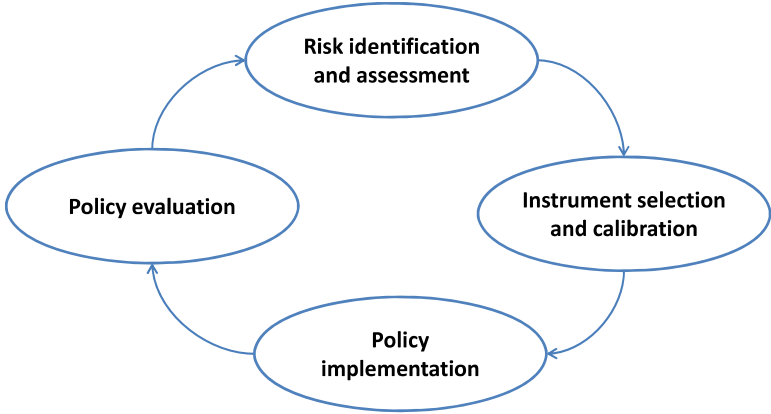
One of the main lessons learned from the recent financial and economic crisis was the need to monitor not only each individual financial institution but also to follow very closely the strong interlinkages between financial institutions, on the one hand, and between those financial institutions and non-financial sector, on the other hand. These interlinkages proved to be, in certain circumstances, a threat to financial stability and, in this context, represent a challenge for financial supervisors.

In fact, several market failures and externalities justify the deepening and broadening of financial supervision: (i) the role of financial sector in propagating and amplifying the effects of shocks on the real economy (*e.g.*, through fire sales and herd behaviour); (ii) the exposure of the financial sector to those shocks (*e.g.*, the “sudden stop” of capital flows across different economies that occurred during the euro area sovereign crisis); and (iii) the existing interlinkages between different financial institutions, which may increase their exposure to risks (*e.g.*, institutions that are too big or too interconnected to fail).

Against this background, macroprudential policy, whose main objective is to increase the resilience of the financial sector to systemic shocks, became one of the most important tools for policy makers to promote financial stability. Macroprudential policy focuses not only on how to avoid or attenuate the building up of imbalances or vulnerabilities over time (cyclical dimension), but also on how to avoid or attenuate the building up of imbalances or vulnerabilities within the financial sector that arise through the existing interlinkages between different financial institutions (cross-sectional or structural dimension).

In line with other economic policies, the adoption of macroprudential policies relies on the definition of intermediate objectives (*e.g.*, avoid excessive credit growth and indebtedness and excessive direct and indirect exposure concentrations (ESRB, 2014)) and on the development of a set of indicators and analytical tools used (i) to monitor the threats to financial stability, (ii) to signal when a specific macroprudential instrument should be activated and (iii) to evaluate the impact of macroprudential policy (see Figure 2).

Figure 2 – Macroprudential policy cycle



Source: ESRB (2014)

Macroprudential policy is relatively new in Europe, when compared to other economic policies, thus raising interesting challenges for the macroprudential supervisor. One of these challenges relies on which data, variables and analytical tools to use at each stage. The support of statistical tools is of key importance in this context. In particular, the availability of micro-data and the link between the macro (“macro aggregates”) and the micro (“micro-data”) becomes crucial for macroprudential policy, given the importance of focusing on the afore-mentioned links across financial institutions and between the latter and the non-financial sector.

The importance of statistical tools for financial stability: an example based on the Portuguese non-financial corporate sector and the underlying links with the banking sector

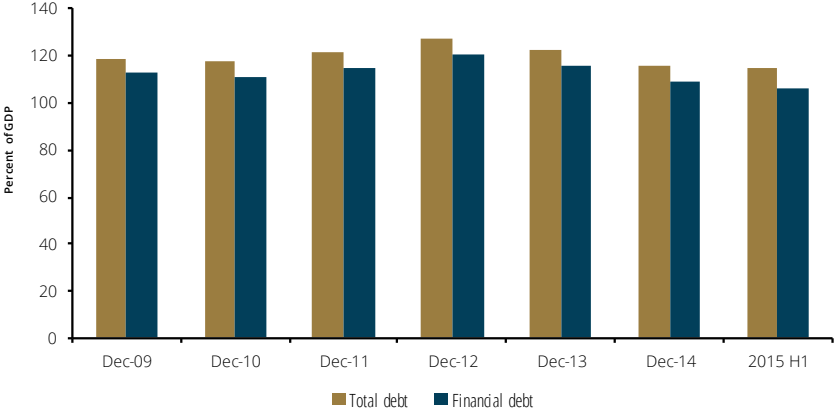
The combination of high levels of indebtedness in both private and public sectors represents one of the biggest challenges faced by some European Union Member States, including Portugal: in contrast with some other “historical deleveraging episodes”, there is very limited room for manoeuvre to compensate the impact of deleveraging in one particular sector by temporarily increasing indebtedness in other sectors. In this context, evaluating the sustainable level of debt and, consequently, the deleveraging needs of the different sectors becomes crucial. The scale and pace of deleveraging, the impact on the financial sector and the underlying feedback loops across sectors require close monitoring given their potential impact on economic activity and financial stability.

The corporate sector has deserved special attention in Portugal, due to the still high levels of debt observed in this sector, the underlying high level of non-performing loans (NPLs) associated with non-financial corporations (NFCs) in the Portuguese banks’ balance sheet, and the importance of NFCs’ activity to the economic recovery.

The current context represents a significant challenge, as pointed out by the Bank in the most recent edition of the Financial Stability Report. On the one hand, and despite the significant adjustment that

took place during the crisis when looking at flow variables – like the net borrowing by firms –, stock variables (as the debt to GDP ratio) have not adjusted that much, when compared to pre-crisis levels (see Figure 3). On the other hand, for the economy to recover, firms need to continue having access to credit. That is, there is the need to reconcile further deleveraging of the NFC sector with economic growth.

Figure 3 – Non-financial corporations’ debt (% of GDP)



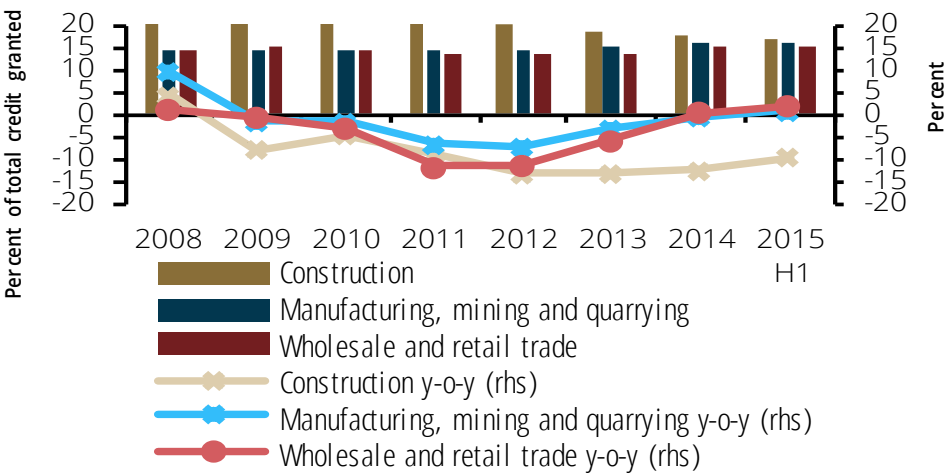
Source : Banco de Portugal

The reallocation of resources becomes crucial in this context: in order to guarantee the convergence of NFCs’ debt to more sustainable levels, the new financing should flow towards the most productive projects associated with robust and financially viable firms. At the same time, measures aimed at decreasing at a faster pace the stock of NFCs’ debt and the underlying stock of banks’ NPLs must be assessed.

This is a clear example where macro-data are not sufficient to monitor this process and to assess the potential impact of the aforementioned measures. These involve, necessarily, disaggregated micro-data on NFCs, on the financial sector and on the feedback effects between the two.

Against this background, several analytical tools have been developed by the Bank based on micro-data. Focusing first on the NFCs’ sector and on the resource allocation question, micro-data are being used to assess whether the available financing resources – coming mainly from the banking sector – are being allocated to the most productive sectors and whether firms belonging to these sectors are being granted credit at better conditions. Data taken from the CCR show, for instance, that the stock of credit granted by the Portuguese banks to the NFC sector during the crisis decreased more significantly in the non-tradable sectors and that it even increased for the exporting firms, which are less dependent on the domestic recovery (see Figure 4).

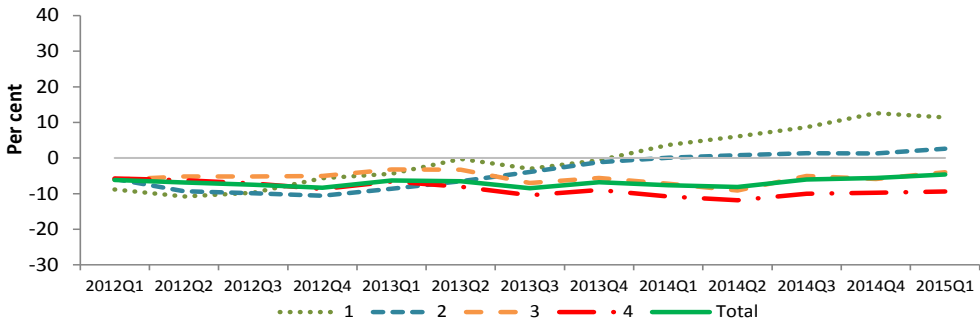
Figure 4 – Share and annual rate of change of credit granted to construction, manufacturing and retail trade sectors



Source : Banco de Portugal

Using data from the CBSD and the CCR to estimate a z-score model, it is possible to conclude that, on aggregate, Portuguese banks are granting credit mostly to less risky firms (see Figure 5). Additionally, recent data point to a decline in interest rates on new loans for NFCs with both low and high credit risk, as suggested by the shift to the left of interest rate distributions (obtained on the basis of corporate micro-data).

Figure 5 – Total loans granted by risk category/ year-on-year growth rate



Level 1: less risky firms; level 4: riskiest firms

Source : Banco de Portugal

Despite the adjustment process that took place during the crisis, and as previously mentioned, the stock of NFCs’ debt and the underlying stock of NFCs’ NPLs in banks’ balance sheet are still significant in Portugal. In order to assess whether further measures are needed to spur the pace of NFCs’ deleveraging and the potential impact of those measures in both sectors, additional micro-data,

also focusing on banks' balance sheet, are needed. In this context, one of the main strands of work relies on banks' capacity to further clean up their balance sheets. For this assessment, data taken from the CCR and from the Banks' Large Exposure database can be used to assess the coverage rate (both by impairments and by different types of collateral) of a significant share of NPLs in banks' balance sheets and to estimate the impact of the writing off of those NPLs on banks' capital position.

Part of the afore-mentioned information is collected regularly and a joint work by the Bank's Financial Stability and the Statistics Departments – using data from the CCR and the CBSD, as well as financial accounts and monetary statistics – has led to the setting up of the “Corporate Debt Restructuring Monitor”, which is used to assess the latest developments in terms of NFCs' deleveraging and NFCs' NPLs in banks' balance sheets.

This is just an example on how the statistical tools and, in particular, micro-data are of utmost importance for macroprudential policy and to assess and monitor risks and vulnerabilities to financial stability. But many others could also be pointed out. Just to mention a few: (i) the assessment of risks underlying Portuguese banks' exposure to specific assets, (ii) the identification of systemically relevant financial institutions, that took place in 2015 and involved data on banks' size, importance, complexity and interconnectedness and (iii) the impact assessment on the potential impact of the introduction of macroprudential measures, such as capital buffers.

6. Concluding remarks

The increasing demand for comprehensive, detailed and high-quality information has led the Bank to increase its statistical exploration of available micro-databases. In fact, conventional data collection systems cannot keep on expanding indefinitely in reaction to the ever-increasing need to fill in information gaps or future data requirements. In this respect, several advantages can be pointed out in micro-data such as, good population coverage, increased flexibility, relatively low reporting costs and faster response to *ad hoc* data requirements. To properly manage such detailed, comprehensive and complex information, a robust state-of-the-art data system is of the essence, boosting appropriate IT tools and solutions able to respond to the challenges ahead.

This has proved to be quite relevant in different areas followed by the Bank, including for financial stability purposes – the current financial crisis has shown the importance of complementing macro-data with micro-data in order to (i) better monitor the risks to financial stability, (ii) signal when a specific macroprudential instrument should be activated and (iii) evaluate the impact of macroprudential policy. Against this background, several analytical tools have been developed by the Bank based on micro-data.

Furthermore, in addition to the developments and improvements carried out at national level, the degree of interconnection and integration of the economies and the markets worldwide calls for the

extension of such initiatives at the international level. In this respect, the following cases are worth mentioning:

a. ***The Analytical Credit Dataset (AnaCredit)***. Efforts of conceptual harmonisation and convergence have already started regarding CCRs. In order to get a better overview of the level of indebtedness of the borrowers in an environment of increasing financial integration across European Union Member-States, the overarching aim of this European System of Central Banks (ESCB) project is the setting up of a long-term framework for the collection of harmonised granular credit data.

b. ***The Securities Holdings Statistics Database (SHSDB)***. SHSDB is an ESCB-wide project with the objective of collecting security-by-security holdings by institutional sectors of euro area/EU reporting countries for both direct holdings and indirect holdings (third party holdings).

c. ***The Legal Entity Identifier (LEI)***.⁵ LEI is a 20-character, alpha-numeric code, to uniquely identify legally distinct entities that engage in financial transactions. The LEI code is associated with reference data for each entity, currently including core identification information, such as the official name of the legal entity, the address of its headquarters and address of legal formation. A result of joint public and private sectors efforts, the LEI supports authorities and market participants in identifying and managing financial risks.

In statistics, like in many other areas, there is the need for continuous improvement and innovation. A stepwise approach is not only wise but the most realistic to be followed.

⁵ <http://www.leiroc.org/>

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IFC Workshop

*Combining micro and macro statistical data for financial stability analysis.
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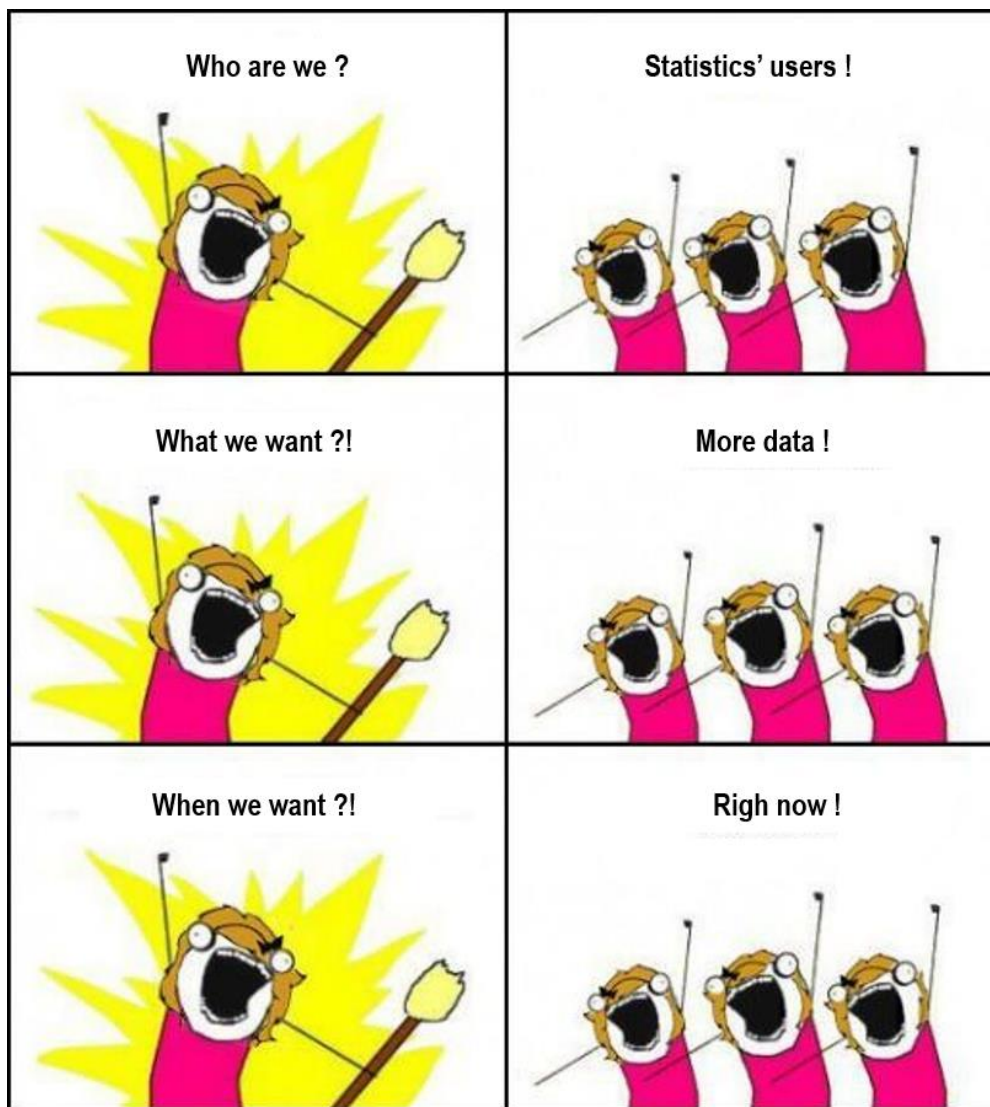
Session 3: *Closing data gaps for financial stability assessment: the importance of micro level data sources and harmonization*

Warsaw, 14 December, 2015



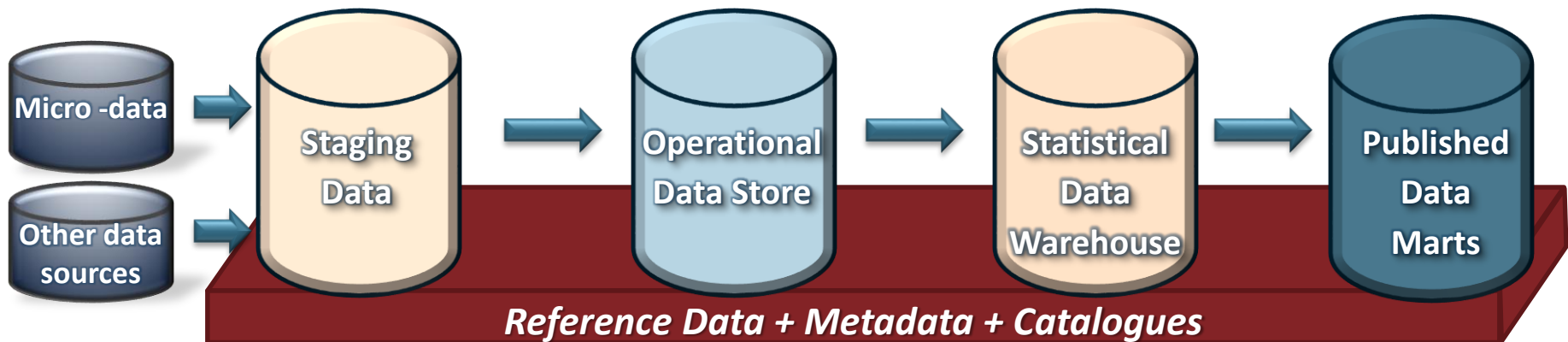
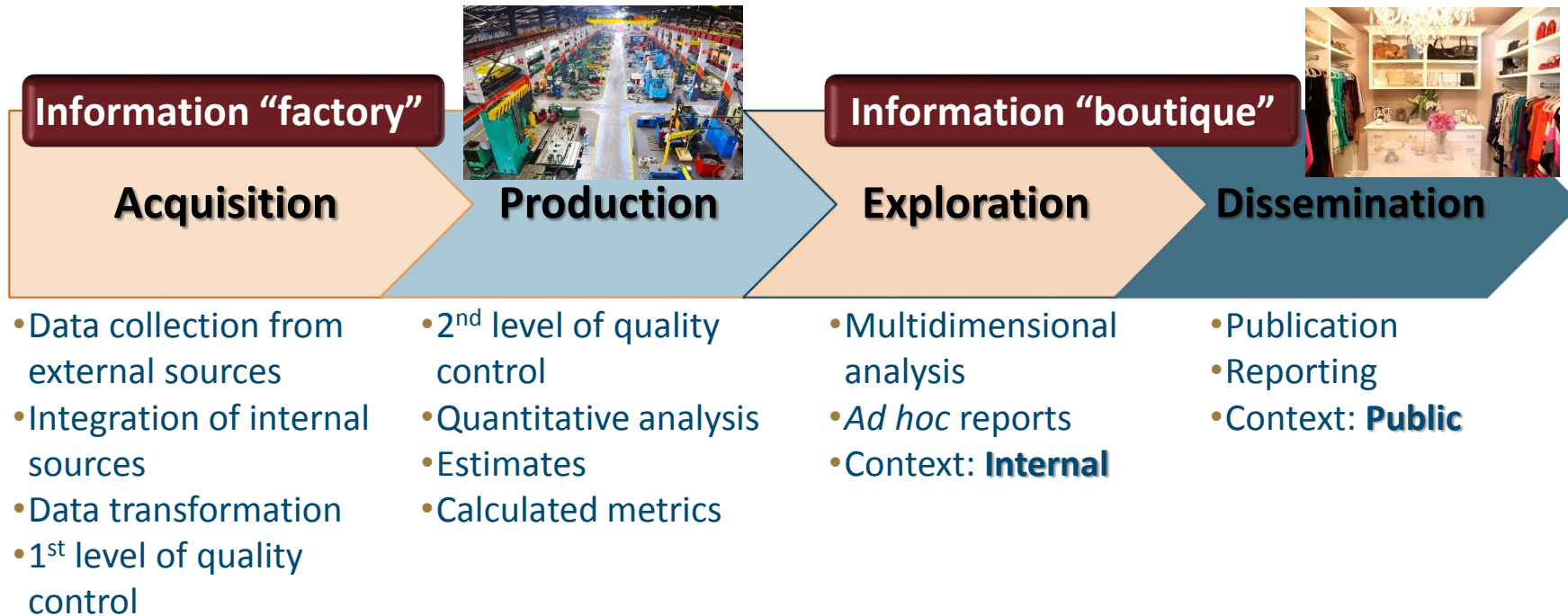
Outline

1. Introduction
2. The information model at *Banco de Portugal*
3. Micro-databases: multi purpose tools
4. New tools for financial stability
5. Conclusions



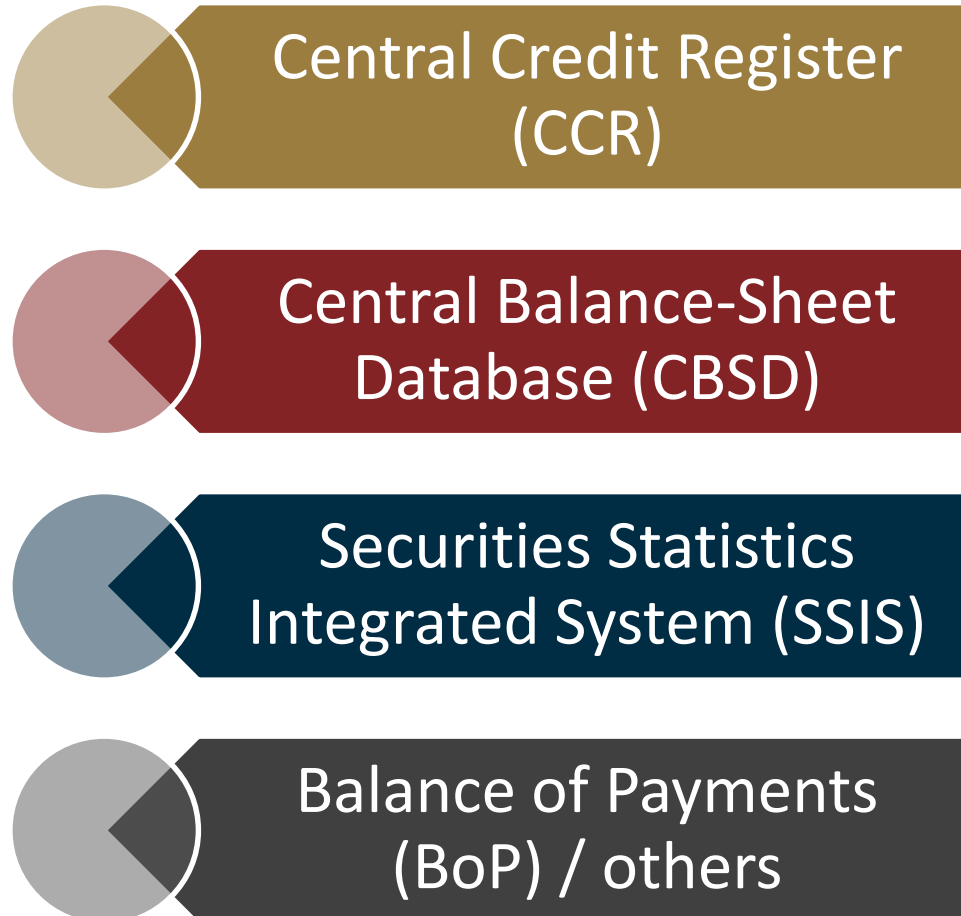


2. The information architecture model



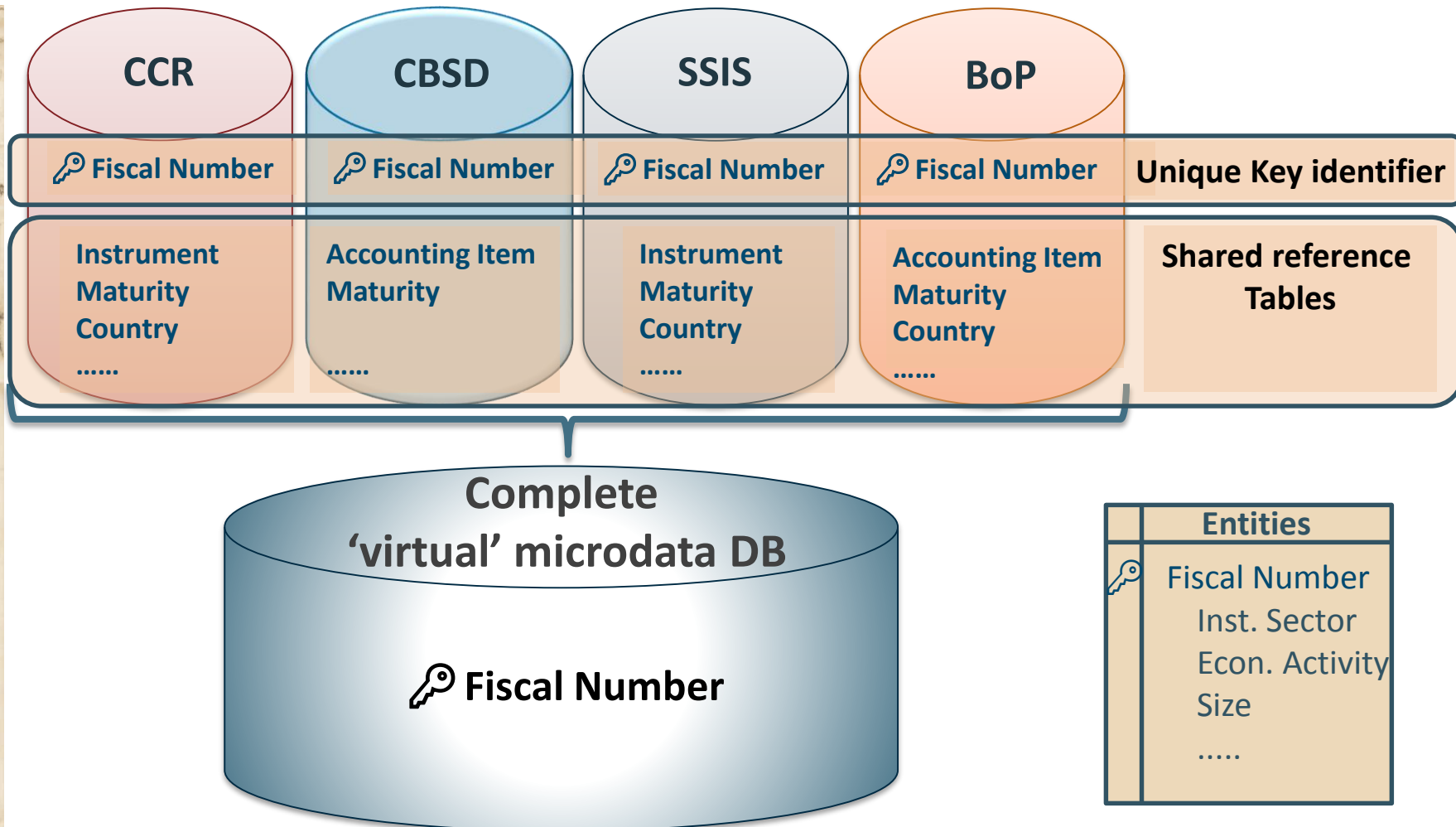


Main micro-databases managed by the BdP Statistics Department





Micro-databases: pre-requisites for data integration



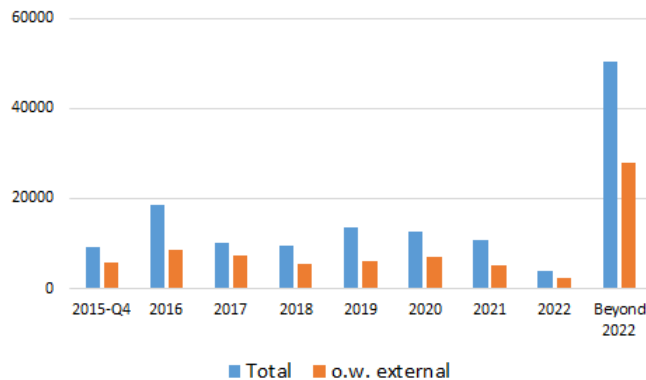


From *ad hoc* requests to new statistical products

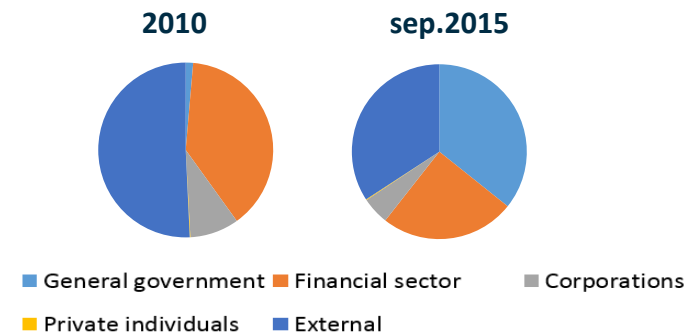
- **16-Sep-08:** a day to remember for the Securities Statistics Integrated System (SSIS)
 - ➔ in less than 24 hours BdP:
 - Assessed the exposure of Portuguese investors to the Lehman Brothers Group
 - Informed the ECB of additional ISIN codes
- **2011-2014: financial assistance programme**
 - Quarterly amortisation plans of public debt and SOEs
 - New chapter to the Statistical Bulletin on the “non-financial sector indebtedness”
 - ✓ Monthly
 - ✓ Debtor and creditor institutional sectors; instrument; original maturity; NACE; size



Public debt – amortisation plan (EUR millions)

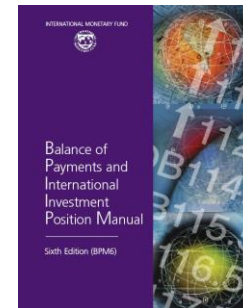


SOE's creditors - structure





Micro databases proved essential to several other projects



Sixth Edition (BPM6)

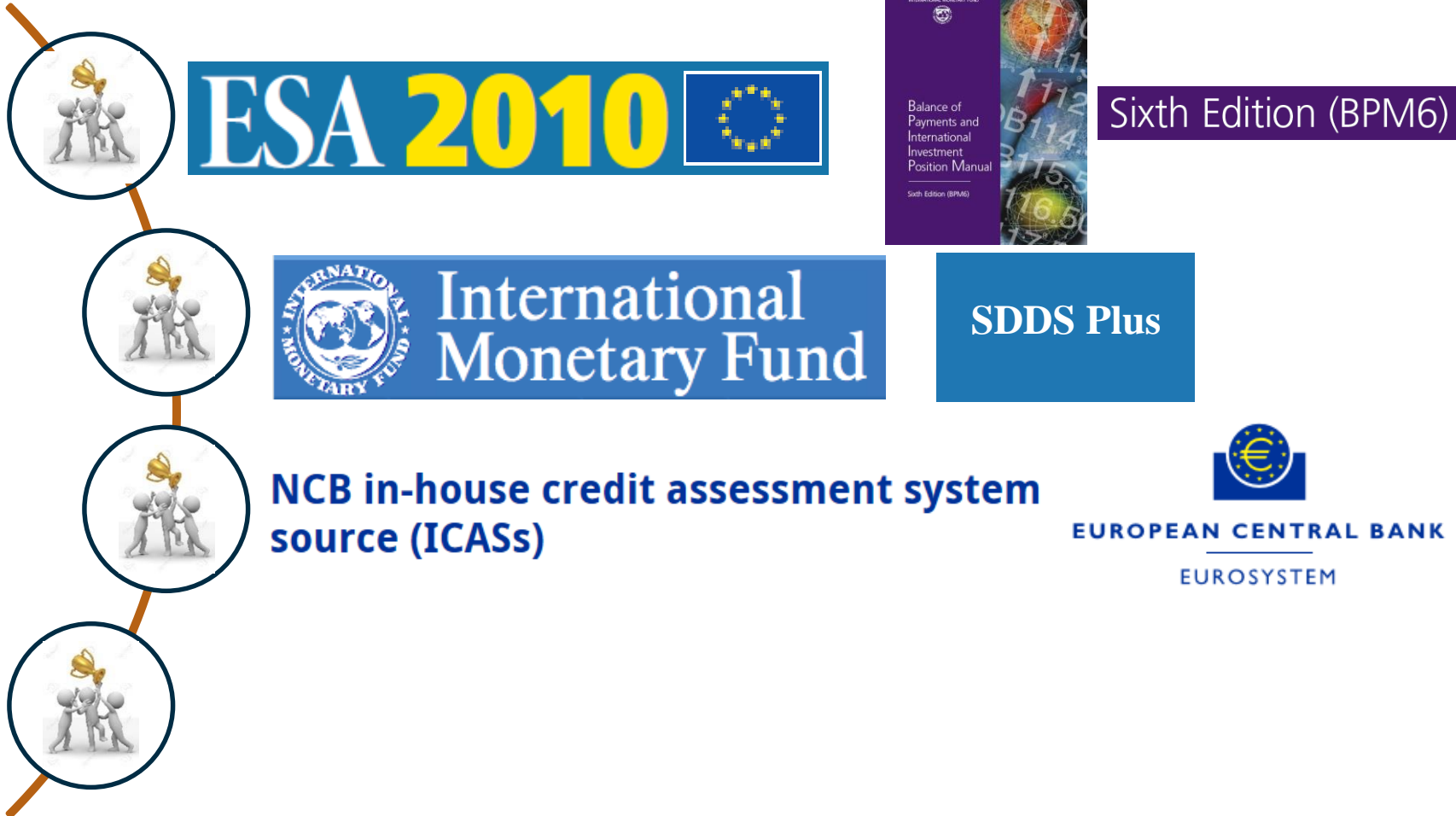


Micro databases proved essential to several other projects





Micro databases proved essential to several other projects

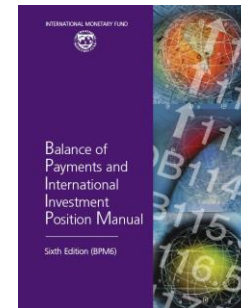




Micro databases proved essential to several other projects



ESA 2010 



Sixth Edition (BPM6)



 **International Monetary Fund**

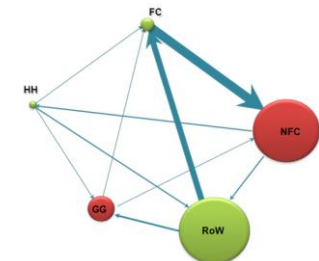
SDDS Plus



NCB in-house credit assessment system source (ICASS)

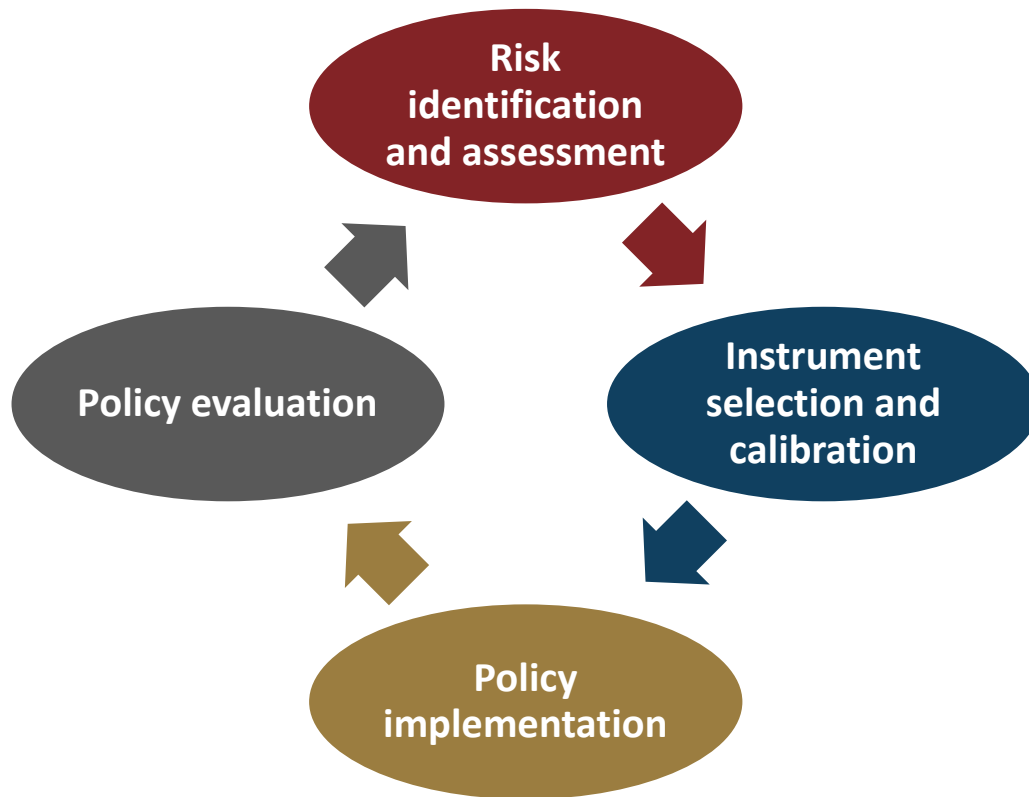


Improvements in other domains, e.g., flow of funds





Macroprudential policy



- Which data, variables and analytical tools to use at each stage?

→ The availability of micro-data and the link between the macro (“macro aggregates”) and the micro (“micro-data”) is crucial for macroprudential policy.

→ Allows policy makers and analysts to **focus on the links:**

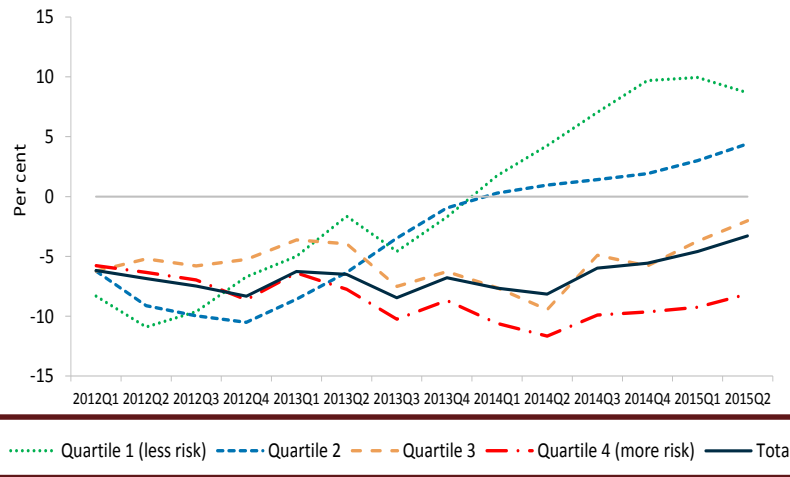
- Across financial institutions
- Between the financial and the non-financial sector



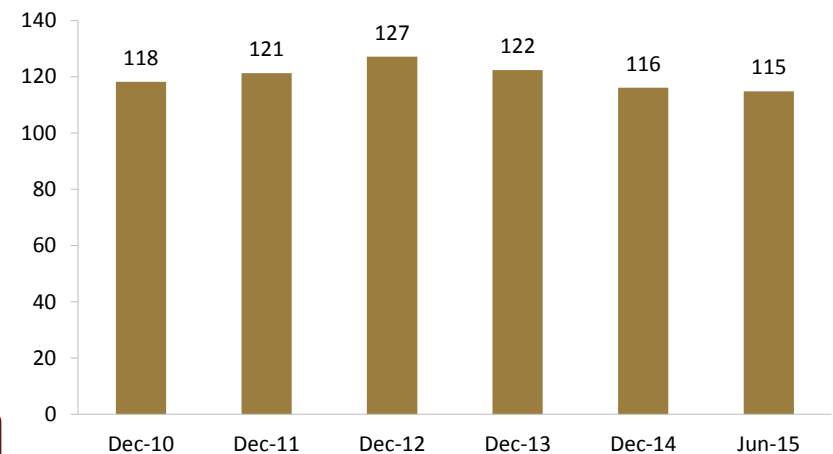
An example based on the Portuguese non-financial corporate sector and the underlying links with the banking sector

Central Balance-Sheet Database, Central Credit Register and Financial Accounts

The "flow side"
Credit growth by NFC risk profile
(risk evaluated according to the Z-Score)



The "stock side"
NFC debt (% of GDP)





Joint work by the Financial Stability and the Statistics Departments

Corporate Debt Restructuring

Corporate Debt Restructuring - Statistical Data

1. Corporate Indebtedness, non-financial private corporations

1.1. Macro perspective

1.2. Micro perspective

1.2.1. Micro, small and medium corporations

o.w. Micro corporations

o.w. Small and medium corporations

1.2.2. Large corporations

2. Bank credit

Loans to private non-financial corporations, granted by resident financial sectors

3. Restructured and overdue credit

Indicators on quality of credit to non financial corporations - consolidated basis:

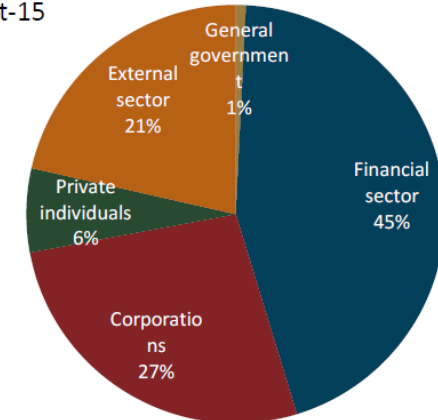
Credit to private non-financial corporations, granted by resident financial sectors

Securitization and outright credit sales

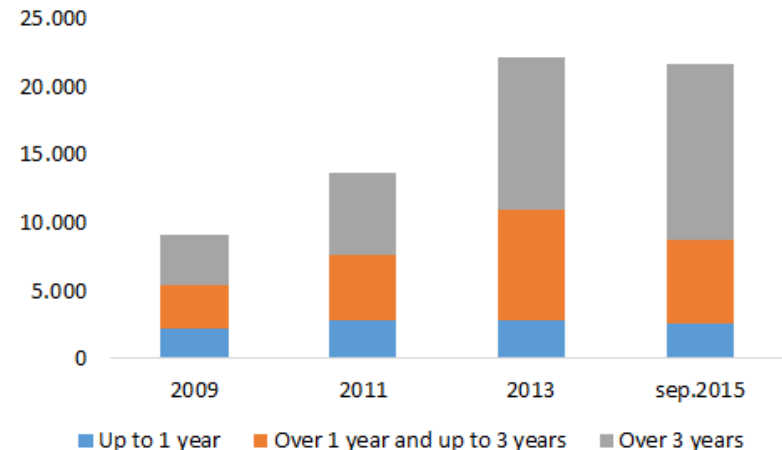
Corporate Indebtedness - Bridging different concepts

Table notes and metadata

NFC debt: Structure by creditor sector set-15

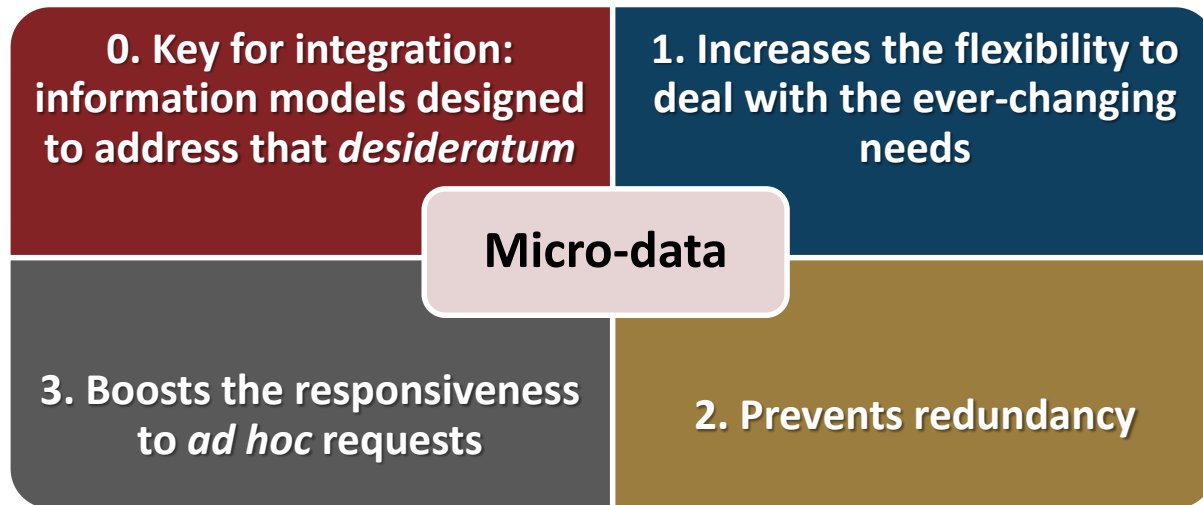


Overdue loans, by past due period (EUR millions)





Conclusions



... and let's not forget micro-data initiatives at the international level!

- *The Analytical Credit Dataset (AnaCredit)*
- *The Securities Holdings Statistics Database (SHSDB)*
- *The Legal Entity Identifier (LEI)*



Questions ?



