

# Papers presented by the statistics department in national and international fora in 2014 and 2015

Supplement to the Statistical Bulletin  
March 2016



BANCO DE PORTUGAL  
EUROSYSTEM

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# Foreword

The current issue of the *Supplement to the Statistical Bulletin* compiles a number of articles and technical papers prepared by the staff of the Statistics Department of the *Banco de Portugal*, which were presented in 2014 and 2015 at various national and international fora and reflect the diversity of the statistics under the Statistics Department's responsibility.

The articles and technical papers included in this Supplement refer to the data available at the time they were prepared and/or presented and, therefore, may not necessarily correspond to the most recent available data.

This issue of the Supplement comprises four sections: **I** Commitment to Quality; **II** Micro-databases – Potential for statistics; **III** National Financial Account Statistics; and **IV** Compiling statistics – Special case studies.

To guide the reader throughout the collection of papers, a brief summary is provided for each one.

## I Commitment to Quality

**Agostinho, António and Miguel, Alexandra, “Quality indicators and quality measurement to foster and enhance cooperation between users and producers”, European Conference on Quality in Official Statistics, Wien, Austria, 4 June 2014**

One of the main purposes of the Statistics Department of the *Banco de Portugal* is to ensure the production of high quality statistics aiming at fully meeting users' needs. With this purpose, the Statistics Department developed quality manuals addressed to users of *Banco de Portugal* statistics to promote deeper knowledge and increased transparency of compilation processes and quality control procedures in place. This quality communication allows users to increase confidence and analytical interpretation of the statistics compiled, thus promoting a more efficient and proper use of the statistical information released.

This paper focuses on the main procedures and best practices currently implemented to ensure the quality of the statistical compilation, allowing a better understanding of its results, seeking to mitigate the possibility of misinterpretation and, simultaneously, contributing to consolidate the confidence of users in the statistics produced by *Banco de Portugal*.

## II Micro-databases – Potential for Statistics

**Lima, Filipa, Correia, Inês and Batista, Rodrigo, “Non-financial sector indebtedness”, JOCLAD XXI, Lisbon, Portugal, 11 April 2014**

The monthly publication of statistics concerning the non-financial sector indebtedness was one of the most outstanding achievements of the Statistics Department of *Banco de Portugal* in the recent years. Combining different dimensions of analysis, through the use and matching of the databases within the Department, it allows an innovative insight to the indebtedness of the sector. In this paper we briefly present the compilation methodology and some of the results that can be drawn from the data.

**Cadete de Matos, João, “Reaping the benefits of using integrated micro-data for statistical purposes... and beyond”, Conference on European Statistics Stakeholders, Rome, Italia, 24 November 2014<sup>1</sup>**

One of the most significant characteristics of our times is the constantly changing environment. From to medicine to biotechnology, computers to cell phones, there are numerous areas where

change has been deep and long-lasting. More than the wide scope of change itself, it is also about the speed and the rhythm with which reality keeps evolving: the changes our sons will witness in the course of their lives will likely be broader than what we are currently observing and even more so compared to what our forefathers experienced.

The financial world is perhaps one of the most affected areas by the increased pace of innovations. This calls for central banks to be particularly attentive in the fields of financial supervision and regulation, but it also demands from the statistical function to be able to devise solutions that are able to quickly adjust to this developing and demanding landscape, as well as to new and unforeseeable data needs.

Against this background, this paper discusses how the *Banco de Portugal* 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. The granular nature of such information, together with a good 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 and users' requests.

The use of integrated micro-databases for statistical purposes constitutes the cornerstone of the Bank's long-term strategy as regards its statistics. We believe that this approach will pave the way to better address the challenges that lie ahead in this field, whichever they may be.

Lima, Filipa and Drumond, Inês, "How to keep statistics' customers happy? Use micro-databases!", Irving Fisher Committee – Narodowy Bank Polski Workshop, Warsaw, Poland, 14-15 December 2015

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 upmost 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.

### III National Financial Account Statistics

Cadete de Matos, João, "Brief note about the use of Census information on non-financial corporations to compile national financial accounts", Workshop on developing and improving sectoral and financial accounts, Istanbul, Turkey, 29 May 2014

The *Banco de Portugal* (hereinafter referred as "the Bank") has full access to census data on Portuguese non-financial corporations (NFCs). This information has a high degree of granularity and is collected annually through an innovative solution that was the result of a joint effort by four public entities in Portugal, including the Bank.



The next section of this note discusses briefly the main features of this institutional arrangement that makes it possible for the Bank to have very detailed data on NFCs, as well as the drivers behind the development of such system and the key factors that explain the success of the initiative.

The third part of the note addresses the use of NFCs' census data to the compilation of national financial accounts, specifically the NFCs' account and, to a lesser extent, the account of the households (HHs).

**Cadete de Matos, João, "Innovative solutions in compiling financial accounts", Workshop on developing and improving sectoral and financial accounts, Istanbul, Turkey, 30 May 2014**

There are many challenges facing the central banks' statistical function of our days. On the one hand, the global financial crisis and the ensuing sovereign debt crisis have highlighted that there is much to be done regarding the coverage of the data produced today and users have been requesting more comprehensive and detailed information. On the other hand, reality is also increasingly more complex and portraying it in a precise and timely fashion has become a more demanding task.

Technological development has given us powerful tools, which are fundamental to tackle the tasks that lie ahead – the range of Information Technology (IT) solutions available today would be unthinkable a few years ago. However, in order to reap the benefits of the enormous potential technology has put at our disposal, we need additional ingredients: knowledgeable people, an efficient organization and data management. Together, these elements will pave the way for the future.

This paper discusses several organizational issues that have shaped national financial accounts production at the *Banco de Portugal* in recent times, and which are mostly related to an integrated approach to statistical compilation. This integrated approach concerns not only the data model used, but also – and perhaps foremost – the internal organization of work, in particular the setup of a multidisciplinary team, responsible for the compilation of national financial accounts.

**Lima, Filipa and Monteiro, Olga "How do macro-financial linkages adjust in times of adjustment? – evidence from Portugal", 6th International Finance and Banking Society Conference on Alternative Future for Global Banking, Lisbon, Portugal, 18-20 June 2014**

The financial and economic crisis, characterised by disruptions in the capital flows of key sectors of the economy, have unveiled the need for an analytical tool capable of measuring, in addition to the financial soundness of the various sectors of an economy, their interrelations and interactions. As Plašil and Kubicová (2012) put it, the analysis of the links between economic sectors fosters a better understanding of the process of contagion across the economy and helps to reveal potential weak spots in the system. In this respect, Recommendation 15 of the G20 data gap initiative calls for a strategy to promote the compilation and dissemination of the balance sheet approach, flow-of-funds, and sectoral data more generally. Using financial accounts' data for Portugal, the main focus of this paper is to assess how inter-sectoral financial linkages have changed from 2007, before the eruption of the financial crisis, to 2013, two years after the Economic and Financial Assistance Programme for Portugal. We base our analysis on the so-called flow-of-funds, which, as Bodie *et al.* (2010) demonstrate, can be seen as a special deterministic case of Contingent Claim Analysis (CCA). The Power-of-Dispersion Index and the Sensitivity-of-Dispersion Index, as proposed by Tsujimura and Mizoshita (2004) and Okuma (2012), are also computed. We conclude that the adjustment of the Portuguese economy has brought significant changes not only in terms of the economic sectors' balance sheets and net lending/borrowing but also, and more importantly, in terms of their interlinkages. Flow-of-funds is thus a powerful analytical tool to measure these changes.

Lima, Filipa, Monteiro, Olga and Branco, Sérgio “What changed in financial intermediation in the aftermath of the crisis? – Evidence from Portugal”, 5th Conference of the Financial Engineering and Banking Society (FEBS), Nantes, France, 11-13 June 2015<sup>2</sup>

In this paper we focus on the role of financial intermediaries in the context of a highly indebted economy undergoing an overall adjustment process. We start by providing a broader view of the financial sector aligned with the new system of national accounts (ESA 2010/2008 SNA), which incorporate a series of improvements to the previous standards. In addition, given that one of the main objectives of the Economic and Financial Assistance Programme for Portugal for the banking sector was to “maintain liquidity and support a balanced and orderly deleveraging in the banking sector”, we will analyse the changes that occurred in the balance sheet of the banking sector – including not only commercial banks but also the central bank. In particular, the interlinkages between them will also be addressed. Based on statistical data published by *Banco de Portugal*, we argue that in the most recent years the main changes experienced by the Portuguese financial intermediaries can be summarised as follows: (i) the more relevant role of the central bank in terms of monetary policy operations carried out within the framework of the Eurosystem, in response to high primary liquidity demand by Portuguese credit institutions, in a context of financial market instability; and, (ii) the deleveraging in the banking sector, denoting changes in banks’ business models where, on the liabilities side, previous sources of funding (international financial markets) were replaced by funds provided by the central bank and by an enlarged deposit base, and, on the assets side, the credit reduction differed according to the type of borrower, with small and medium enterprises and state-owned enterprises experiencing a sharper credit contraction than non-financial holdings, large companies and exporting firms.

Cadete de Matos, João “Using financial accounts to better understand sectoral financial interlinkages”, 1st Conference on “Statistics for Economic and Financial Analysis”, Santiago, Chile, 29-30 September 2015

The global financial crisis of 2008 exposed the existence of serious data gaps in a set of important domains for macroeconomic policy analysis. One of such domains relates to sectoral accounts, more specifically, sectoral balance sheet data and flow of funds information (*vd.* recommendation 15 of the G20 Data Gaps Initiative). In fact, such information is an important analytical tool for macroeconomic analysis and financial stability purpose in a context characterized by an increased financial interconnectedness between economies and high financial positions of the different sectors. This paper presents the new compilation methods of financial accounts data at the *Banco de Portugal*, including from-whom-to-whom matrices and flow of funds information, and the powerful uses of such information to better understanding sectoral financial interlinkages and in supporting policy decision making.

## IV Compiling Statistics – Special case studies

Gonçalves, Homero, Lourenço, Mário and Silveira, Vítor “High-growth enterprises in Portugal”, JOCLAD XXI, Lisbon, Portugal, 11 April 2014

In an economic crisis, such as the most recent one, examples of success and growth, counter-cyclical to the general recessive environment, are often used as beacons for other companies towards a path of recovery. Information available at *Banco de Portugal* allows the identification of a set of companies with high growth rates and of its distinctive features, as well as of the economic activities within which its presence is most noteworthy.

**Cordeiro, Pedro, Magalhães, Cloé and Poiares, Rita “Quarterly time-series from Central Balance Sheet Database”, JOCLAD XXI, Lisbon, Portugal, 11 April 2014**

The Central Balance Sheet Database of *Banco de Portugal* (CBSD) is a repository of annual and quarterly individual information of accounting and statistical nature, covering a wide range of non-financial corporations (NFC) for the period 1990-2013 (annual data until 2012). The methodology for the compilation of quarterly time-series has recently been improved, to obtain quarterly financial indicators representative of the population of NFC operating in Portugal.

**Cadete de Matos, João “Stock and Flow Integration – Practice and Data Requirements in Europe”, Meeting of the IMF Government Finance Statistics Advisory Committee, Washington, D.C., USA, 9-10 March 2015<sup>3</sup>**

The accounts of General Government are part of a larger framework which ensures consistency, namely between stocks and flows. In particular, the consistency between deficit and debt should be guaranteed when presenting the results of government accounts.

Usually, government deficit over a certain period is not equal to the change in government debt in the same period, although the same trend is expected. In principle, debt increases when a deficit is observed, and decreases when a surplus occurs. However, there are differences between the government deficit and the change in government debt, known as deficit-debt adjustments, which can in some cases be rather significant. For instance, from the end of 2009 to the end of 2013, the total increase in European Union<sup>4</sup> government debt (also known as “Maastricht debt”) amounted to 14 percentage points of GDP, whereas the accumulated euro area government deficit amounted to around -12% of GDP. The difference between the change in debt and the cumulated deficit was thus -2 percentage points of GDP over the period or -0.5 percentage points of GDP on average per year for the European Union as a whole.

This comment examines the differences between the government deficit and the change in government debt in more detail, giving a special emphasis on the practice and data requirements in Europe.

**Batista, Rodrigo and Colaço, Ricardo “Financing of NFCs – A comparison with other economic indicators”, JOCLAD XXII, Setubal, Portugal, 10-11 April 2015**

From December 2009 until the end of 2014, loans granted by the resident financial system to Portuguese non-financial corporations (NFC) have shrunk by almost 24%. In this paper we present an analysis of the NFC loans’ evolution and compare it with related economic indicators. We further break it down by economic activity and geographical region, and observe notorious heterogeneity in the behaviour of credit and other variables across the different regions and activities.

**Antunes, Patrícia and Pisco, Rita “Casting a light on shadow banking activity in Portugal”, JOCLAD XXII, Setubal, Portugal, 10-11 April 2015**

In line with most recent debates on financial stability, the present study analyses the shadow banking activity in Portugal using the available statistical information. Empirical data shows a significant growth of activity from 2001 until 2010, with an increase of 30% to 63% as a percentage of GDP mainly driven by securitisation operations; at the end of the 3rd quarter of 2014 it amounted to 46% of GDP. Nonetheless, these values are smaller than the ones registered in other economic and financial jurisdictions.

**Cadete de Matos, João, Branco, Sérgio and Morais, Filipe “Conceptual issues related to the definition of government debt”, ISI2015 – 60<sup>th</sup> World Statistics Congress, Rio de Janeiro, Brazil, 26-31 July 2015**

This paper discusses several concepts with regard to the definition of public debt, in particular possible changes related to the delimitation of the public sector and to the range of financial instruments included and its valuation.

Firstly, it describes the different definitions of government debt that can be found in macroeconomic statistics. It considers the advantages and disadvantages of the various concepts, namely by taking into account the different coverage of entities and instruments and the different ways to value them.

This analysis is supplemented by looking at net debt measures, which are especially relevant in times of financial crisis, when governments tend to hold more financial assets. From here, the paper examines the arguments that support possible changes in the government debt definition, in particular on some conceptual issues raised recently regarding the definition of the so-called Maastricht debt, which is the concept commonly used in Europe to measure the indebtedness level of a country's general government. In this respect, recent discussion focused on the possible inclusion of trade credits in the definition of the Maastricht debt and the possible valuation of debt at nominal value rather than face value.

Possible advantages of taking into account, for fiscal policy purposes, the debt of the whole public sector rather than just the debt of the general government sector are also analysed. In a nutshell, we can say that the latter indicator may be seen as showing a more comprehensive and accurate portrait of the financial position of governments. Finally, the challenge that contingent liabilities may pose to the definition of public debt is addressed.

**Cadete de Matos “The Portuguese Central Credit Register: a powerful multi-purpose tool, relevant for many central bank's functions”, Irving Fisher Committee – Narodowy Bank Polski workshop, Warsaw, Poland, 14-15 December 2015**

The Portuguese Central Credit Register (CCR) – managed by the Statistics Department of the *Banco de Portugal* – contains monthly granular information on credit on a borrower-by-borrower basis and includes, in some cases, details that provide loan-by-loan information with a virtually complete coverage.

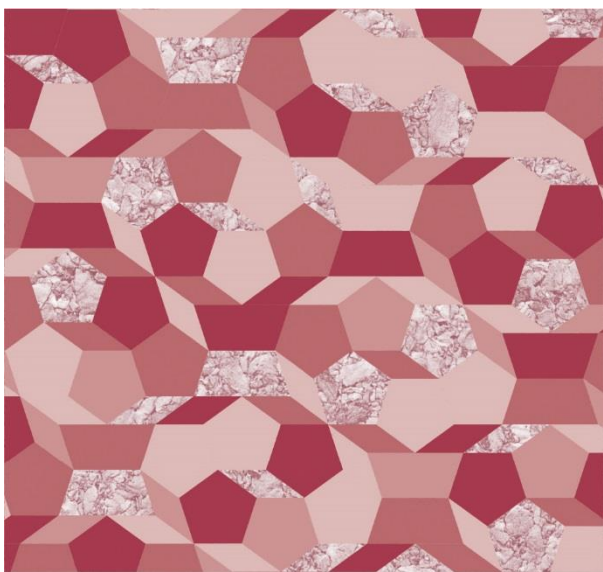
These features have enabled the *Banco de Portugal* to use its CCR data for a variety of purposes, namely, (i) to compile very comprehensive statistics on credit, with breakdowns by institutional sector of the borrower, branch of activity, purpose, size of the firms, location/region and amount of credit (ii) to assess credit concentration and distribution; (iii) to measure overdue loans and overdue loans' ratio; (iv) to understand the risks underlying banks' balance sheets; (v) to create an in-house credit risk assessment system in the *Banco de Portugal*.

Given these multi-purpose uses, the Portuguese CCR has proved to be a powerful tool, relevant for many central bank's functions, namely for financial supervision and stability, monetary policy, economic research and compilation of statistics.

## Notes

1. In 2014 two additional papers covering the same subjects were presented. For the sake of efficiency we opted to include in this Supplement only one of the three papers given their similitude. The two papers not included in this Supplement are: J. Cadete de Matos (2014), The information model at *Banco de Portugal*: innovative and flexible data solutions, presented at the CEMLA Meeting on Financial Information Needs for Statistics, Macprudential Regulation and Supervision in Mexico City on 15 May and J. Cadete de Matos (2014), The Information Model at *Banco de Portugal* - Using micro-data to face Central Banks' challenge, presented at the ISI Regional Statistics Conference in Kuala Lumpur on 17 November.
2. This paper was also presented at the 7th Conference of IFABS 2015, that took place in Hangzhou, China, 27-29 June 2015.
3. This comment by João Cadete de Matos was given on Session 5 - Balance Sheet and Debt Data - of the Meeting of the IMF Government Finance Statistics Advisory Committee.
4. Composition of 28 countries.





## I Commitment to quality

Quality indicators and quality measurement  
to foster and enhance cooperation  
between users and producers





# Quality indicators and quality measurement to foster and enhance cooperation between users and producer\*5

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## 1. Introduction

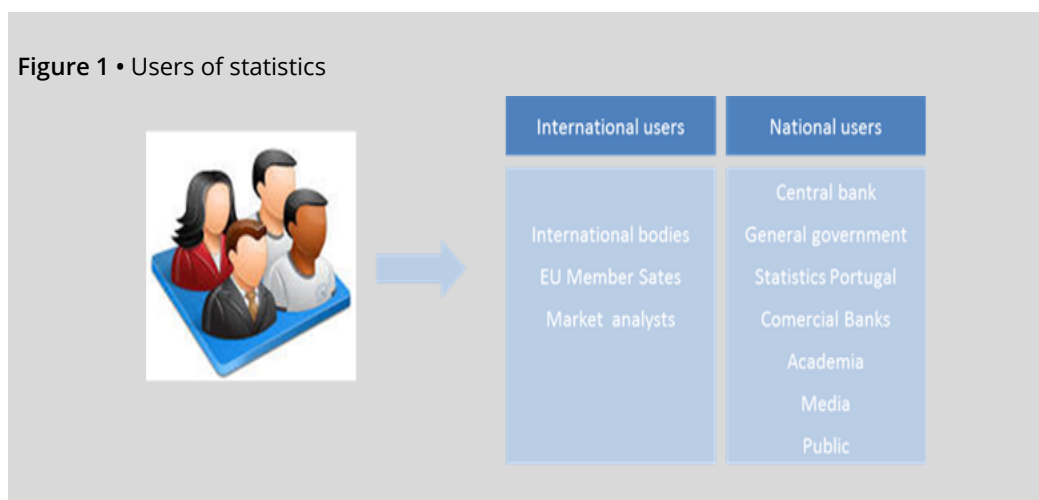
One of the main purposes of the Statistics Department of the *Banco de Portugal* is to ensure the production of high quality statistics aiming at fully meeting users' needs. With this purpose, the Statistics Department developed quality manuals addressed to users of *Banco de Portugal*' statistics to promote deeper knowledge and increased transparency of compilation processes and quality control procedures in place. This quality communication allows users to increase confidence and analytical interpretation of the statistics compiled, thus promoting a more efficient and proper use of the statistical information released.

This document will focus on the main procedures and best practices currently implemented to ensure the quality of the statistical compilation, allowing a better understanding of its results, seeking to mitigate the possibility of misinterpretation and, simultaneously, contributing to consolidate the confidence of users in the statistics produced by *Banco de Portugal*.

## 2. Cooperation between users and producers

Statistical compilers are always focused on the dimensions of data quality. In fact, the quality dimensions cover all aspects of how statistics meet user needs and their expectations concerning the information disclosed.

Users such as international organizations, the general government, banks, media and the general public (in particular, firms and universities) expect to obtain reliable data upon which they can base their own decisions. Users also expect to get timely data, otherwise the data will be useless. Moreover, they need to know if statistics will be revised in order to increase the accuracy and what is the revisions policy followed by the *Banco de Portugal*.

**Figure 1 • Users of statistics**

Statistical communication is an essential aspect of statistical and financial literacy. Statisticians are often accused of speaking their own language and not be fully understood by the media or the general public. Thus, statisticians need to communicate using accessible language and terminology that are easily recognized by various segments of users.

To allow an easy and quick access to the statistics, *Banco de Portugal* (BdP) developed an Interactive Statistics Database (BPstat | Online Statistics) on the BdP website. This service offers several facilities and options allowing a user-friendly navigation through the statistical information about the Portuguese economy. Through BPstat, users can access a wide range of series comprising these statistics and corresponding metadata and create their own alerts and tables in the Personal Area, after proper registration.

A good statistical communication is also crucial for a greater involvement of institutions that report data on regular basis, contributing to increased efficiency of statistical compilation systems and to improve the quality of statistics. In this context, it is worth mentioning the creation of a "Corporate Area" on the BdP website, a privileged system of direct communication between companies and the *Banco de Portugal*, with impact on reducing the costs of reporting and statistical compilation. This service aims to facilitate regular reporting and enhance the quality of elementary information, promoting, simultaneously, a wider use of statistics in particular through the development of feedback information to reporting entities.

In the last years, the Statistics Department of the BdP has developed several initiatives to improve the communication quality of their statistics. Statistical information is released on a continuous basis on the BdP website with the constant concern of statistics disclosing in a clear and comprehensible manner, in tables and graphs to facilitate analysis and enable correct interpretation of results. In this context, BdP has conducted several initiatives addressed to the specialized media in the economic area (workshops with journalists), thematic conferences for companies and universities and other actions aiming at clarifying on the compilation and dissemination process of statistics by the BdP.

Another initiative in the framework of statistical communication relates to the publication of quality manuals to help users to improve their understanding of statistics and foster cooperation between users and producers.

### 3. Quality manuals

The quality manuals were developed mainly in a user's oriented perspective and in a statistical quality control context, to promote a deeper knowledge and an increased transparency of both, the production processes and the quality control procedures in place. Its goal is to raise the understanding of the main procedures and best practices used in the compilation of these statistics, by making it possible to better capture their results, reducing the probability of misunderstandings and, at the same time, helping to consolidate the users' understanding of and confidence in *Banco de Portugal* statistics.

Up to now two documents (Supplements to the Monthly Statistical Bulletin), have been prepared and published on the field of statistical quality control: "Quality management in *Banco de Portugal's* statistics", January 2012, and "Quality management in monetary financial institutions' balance sheet statistics", September 2013, available only in Portuguese.

The quality manuals are generally in line with the principles and indicators of the Public Commitment on European Statistics by the European System of Central Banks and contain information about the main characteristics and quality aspects of statistics:

#### 3.1. Legal and institutional environment

The institutional environment affects significantly the integrity and credibility of the statistical production. The aim of this section is to make known the existing legal framework that gives full authority to the Bank in collecting information for statistical purposes (instructions and warnings issued by the Bank).

The legal framework for *Banco de Portugal* statistical production is:

- The Organic Law of *Banco de Portugal* to collect information for the production and dissemination statistics;
- The Law on the National Statistical System recognizes *Banco de Portugal* as a statistical authority and enshrines its tasks in the scope of the national statistical system; and,
- The mandate of the ESCB to collect information for the production and dissemination of European statistics.

The principle of the confidentiality of individual data is explicitly set out in the Law of the National Statistical System, in the Code of Conduct of *Banco de Portugal* and in the Legal Framework of Credit Institutions and Financial Companies (to which *Banco de Portugal* is subject). This principle is enforced in the Organic Law with the obligation of professional secrecy which obliges the Bank staff.

#### 3.2. Methodological framework and statistical sources data

For users it's important to know that the methodological framework for the statistical process follows the internationally accepted standards, guidelines or good practices. The goal of this section is to explain the methodological basis of the statistical process (concepts and definitions, scope, classification/sectorisation and basis for recording, among others) and if there is any deviation from the existing methodological rules. It also describes the sources used for the compilation of statistics and if the collection information, from all entities considered as relevant, is of a census nature (covering the universe under observation) or uses sampling techniques (covering only a subset of representative bodies necessary for extrapolation using appropriate statistical techniques).

The methodological framework used for the various statistics:

- Follows the internationally accepted standards, guidelines or good practices;
- Standard concepts, definitions, scope, classification/sectorisation are consistent with European statistics; and
- The choice of sources, statistical methods and decisions about the dissemination of statistics follows statistical considerations.

### 3.3. Quality control procedures

The processes used for the collection, processing and dissemination of statistics constitute the core of all statistical systems. The purpose of this chapter is to describe issues related to quality control procedures and organizational arrangements implemented in the different phases of the statistical production process (data collecting, data processing and analysis and statistics dissemination).

Quality management is a constant priority shared at all levels in the Statistics Department and several procedures and working arrangements are in place to provide an effective statistical quality control. The statistical quality control in place in the Statistics Department has two levels:

#### 3.3.1. Procedures outside the production cycle

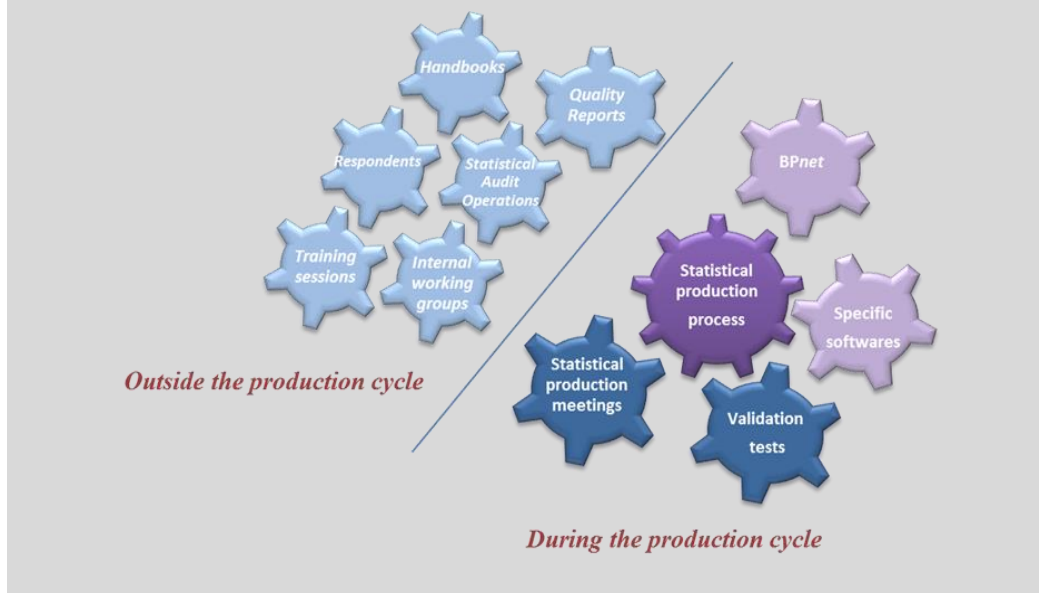
- Appointment of contact persons in the reporting institutions for each specific statistical data submission. On the other hand, the Bank also informs the reporting institutions of their counterparts in the central bank;
- detailed reporting instructions and handbooks are also delivered to the reporting institutions;
- regular meetings and training sessions with the reporting institutions;
- Quality Assessment Reports, produced to assess the quality of current statistical compilation;
- internal working groups to deal with transversal issues relevant for different areas of statistical production; and,
- periodic audit operations to the statistical systems conducted by the Bank's Audit Department or by the Statistical Department (audit operations focused on the analysis of the statistical characteristics of the compilation systems – these operations are made by the Statistical Audit Unit);

#### 3.3.2. Procedures during the production cycle

- BPnet - a secure electronic communication system between *Banco de Portugal* and financial institutions;
- Corporate Area - a BdP website solution of direct communication between companies and *Banco de Portugal*;
- specific designed software to facilitate data submission to the *Banco de Portugal* and allowing the automatic validation of the files received from reporting entities;
- as a result of the analysis and quality control developed by the teams, several validation tests are performed on individual and/or aggregated data in the different phases of data processing (sources data, intermediate data and final statistical data), and follows mainly three approaches: temporal consistency (analysis of the temporal evolution – month-on-month and year-on-year rates of variation and outliers control), internal consistency (coherence within a set of source data) and external consistency (cross-checking with source data from other sources);

- regular statistical production meetings in order to facilitate data sharing discussion and coordination among all staff.

**Figura 2 • The statistical quality control system**



### 3.4. Quality indicators to assess the statistical compilation

In order to assess the quality of compiled and disseminated statistics, the Statistics Department developed a set of quality indicators for the various statistics. This assessment focuses on statistical results, basing the analysis on a series of quality indicators, taking into account their specific nature and critical points in their compilation process. To this end, the Data Quality Assessment Framework's basic structure (the IMF's benchmark to assess statistical quality) is used as the key reference for this analysis.

The results obtained from such quantitative indicators might help compilers to set priorities in order to improve the quality of statistics and may help users to understand better the quality of data to anticipate the possible size and direction of forthcoming revisions and to evaluate the impact of using different datasets in their analysis.

The assessment analysis is broken down into five assessment levels: statistical analysis measures, revision analysis, internal consistency, external consistency and consistency over time.

#### **Statistical analysis measures**

At this level, the goal is to assess whether results for statistics adequately reflect the economic reality, using for that purpose statistical description and analysis measures to assess the quality of statistical calculations. Charts are used to assess developments (internal, external and temporal validation) of the main statistical results and to analyze discrepancies and outliers.

#### **Revision analysis**

The goal is to measure the impact of revisions and the degree of confidence that users can place in the early publications of statistics. For this assessment, specific quality indicators are used to

compare the first and last versions released. With these indicators it's possible to assess the size/magnitude of such revisions.

### Internal consistency

At this level, the aim is to ensure the internal consistency of statistics by monitoring the residual items. By definition, these items include aspects with a residual nature and sometimes have significant values, which should be analysed with particular care.

Internal consistency may also be evaluated in terms of comparison of flows with stocks in order to monitor price changes, currency fluctuations and other adjustments.

Statistics compiled by *Banco de Portugal* are also consistent within the dataset. Therefore, and strictly in conceptual terms, concepts, definitions and classifications used to compile statistics do not vary, regardless of the frequency of the corresponding statistics.

### External consistency

In the field of external consistency, comparative analysis procedures are performed using BP's and similar statistics from other sources, when available (cross-checking statistics for comparable phenomena), in order to ensure the overall quality of information disclosed by the *Banco de Portugal*.

Still in the domain of external consistency, but now to ensure the consistency with other sources of information, it must be referred the cross-checking between statistical information and accounting data, received by *Banco de Portugal* for supervisory purposes.

With these procedures it's possible to ensure consistency of the information published.

### Consistency over time

With regard to the time consistency analysis, the goal is to ensure that there are no series breaks in the released data, e.g. due to significant changes in the sources, methodology and/or compilation system.

Significant changes in methodology, sources of information or statistical data collection systems are properly planned, so as to mitigate the effects associated with series breaks, thus ensuring that data remain consistent over time.

Explanatory notes are published as a rule in the Statistical Bulletin on the Bank's website, explaining the main changes in the statistical results.

## 4. Concluding remarks

A key factor in the future success of an organization is its reputation with regard to the quality of its products. Organizations must be dedicated to achieve ongoing improvements in order to meet customer needs as they evolve. As applied to statistics, quality encompasses all aspects of how well statistics meet users' needs and their expectations about the information content of the disseminated data.

In the light of all the aspects that were presented, it seems obvious that a lot of time and resources are currently dedicated to quality control issues in the Statistics Department of *Banco de Portugal*, and in our view, high quality standards have been attained so far. This success is largely the result of all staff's firm commitment towards the central priority of statistical quality control, a highly demanding and time consuming activity. Nevertheless, there is always room for further improvements.

In conclusion, it's not enough to have high quality compilation and dissemination statistical systems. It's also essential to share with users, the knowledge about the production and quality control processes that ensure the compilation of good statistics. Quality manuals on statistics are one way to increase the quality of communication for statistical users.

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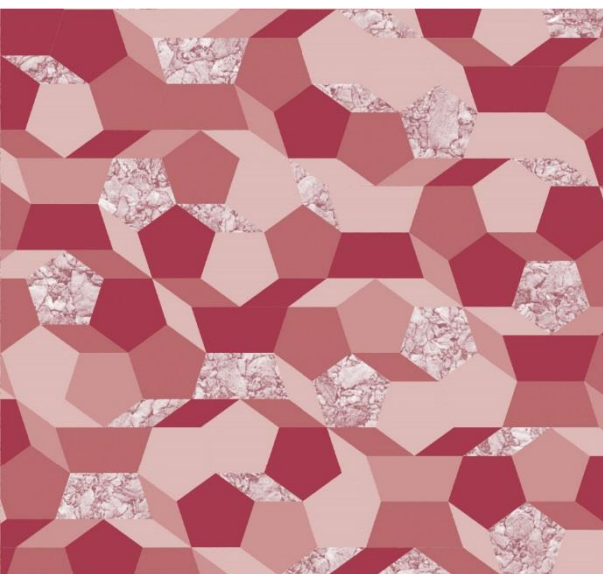
## Notes

\* European Conference on Quality in Official Statistics, Wien, Austria, 4 June 2014

5. The analyses, opinions and findings of this paper represent the views of the authors, which are not necessarily those of the *Banco de Portugal* or the Eurosystem. Any errors and omissions are the sole responsibility of the authors.







## Micro-databases: potential for statistics

Non-financial sector indebtedness

Reaping the benefits of using integrated  
micro-data for statistical purposes...  
and beyond

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



# Non-financial sector indebtedness\*6

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## Abstract

The monthly publication of statistics concerning the non-financial sector indebtedness was one of the most outstanding achievements of the Statistics Department of *Banco de Portugal* in the recent years. Combining different dimensions of analysis, through the use and matching of the databases within the Department, it allows an innovative insight to the indebtedness of the sector. In this paper we briefly present the compilation methodology and some of the results that can be drawn from the data.

**Keywords:** Central bank statistics, Indebtedness, Micro-data, Non-financial sector

## 1. Introduction

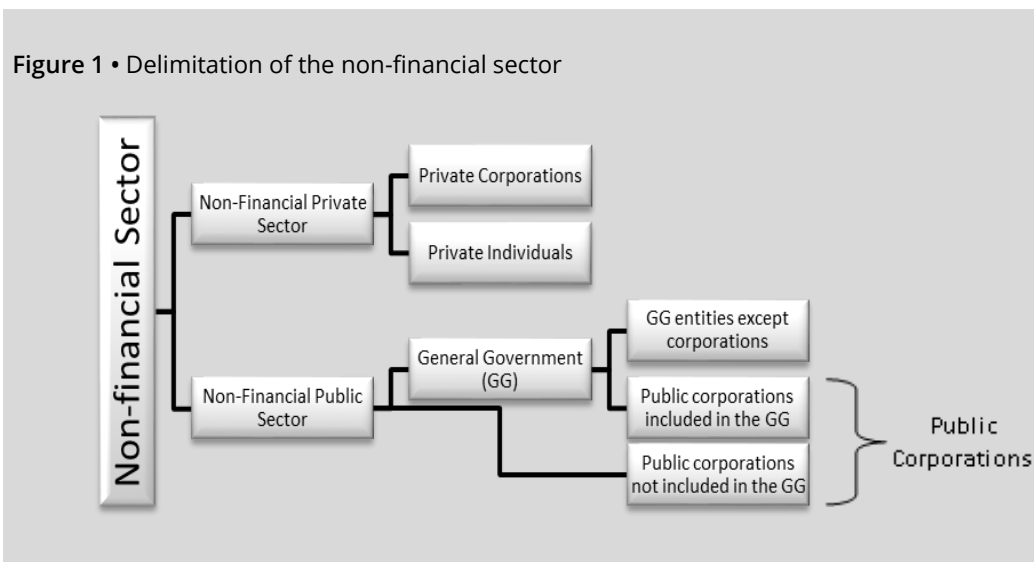
The thorough assessment of the current Portuguese economic and financial context by the three international organisations participating in the EU/IMF Financial Assistance Programme (FAP) proved to be quite demanding in terms of information requirements, with increasing requests for more detailed information. These requests focused in several areas of the economy with a special attention being drawn upon the indebtedness levels, not only for the general government, but for the entire non-financial sector. In February 2012, *Banco de Portugal* initiated the publication of the new chapter K and section A.20 of the Statistical Bulletin on the debt of the non-financial sector (Figure 1). This publication reflects the concerns of *Banco de Portugal* in making accessible to the public the information required by the international organisations.

This new chapter provides an innovative insight to the indebtedness of the non-financial sector since, for the first time, it provides data for several dimensions of analysis, namely: debtor and creditor sectors, type of financial instrument, original maturity, economic activity and size of the company. These dimensions are crossed between them offering information at an unprecedented level, even when comparing at an international level.

## 2. Methodological framework

This approach to data compilation requires some preconditions. Starting by the classification of the debtor according to its institutional sector, it is necessary to define the non-financial sector. The non-financial sector is composed of several entities that can be separated into two distinct

groups, public or private entities, according to their ownership. Within the private sector, the debtors can be allocated to the private corporations sector, in case they are a company, or otherwise to the private individuals sector. Within the public sector the allocation is made considering whether or not the entities are within the scope of the general government. It is important to mention that the public corporations can either be inside or outside the general government sector (Figure 1). The private corporations are also classified according to their sector of activity and their size.



Information on the debtor side is crossed with that on the creditor's so that it is possible to measure how much funding is being channelled by which creditor to which debtor. Five categories of creditors are specified, four of them resident (general government, financial sector, corporations, private individuals) and the last concerning external creditors. The data is further broken down by financial instrument and original maturity.

As stated in the Statistical Press Release, "the concept of debt presented in this new chapter includes loans, debt securities and trade credits. In the case of general government, it includes also saving certificates, Treasury certificates and other Treasury liabilities. The values presented are based on end-of-period positions valued at nominal value, excluding accrued interest" [BANCO DE PORTUGAL (2012)]. Unless stated otherwise, the data refer to non-consolidated debt.

### 3. Databases and mapping

The combination of the several dimensions of analysis is only possible with the use and matching of data available from the several databases managed by the Statistics Department of *Banco de Portugal*. Besides the direct contribution given by the different data sources to the final output, there are information flows between the data sources themselves, where the aggregated data are complemented by data coming from micro-databases. For example, we map information provided by the Central Balance Sheet Database (CBSDB) to the Central Credit Register (CCR) so that we can breakdown bank loans by the private companies' size. This upgrade to the information of the CCR micro-database will afterwards be used to allow an allocation of the information from Monetary and Financial Statistics.

Crucial in this process is the correct matching between the different databases, for which a unique key identifier is used from a common list of entities. This key identifier is the element that allows a

coherent classification of the debtors (size, economic activity sector, institutional sector) in the different micro-databases (CBSD, CCR, securities database and external operations database).

## 4. Statistical analysis

Looking at the results, it is possible to see that the debt-to-GDP ratio of the Portuguese non-financial sector has increased from 346% in 2007 to 445% in 2013 (Figure 2).

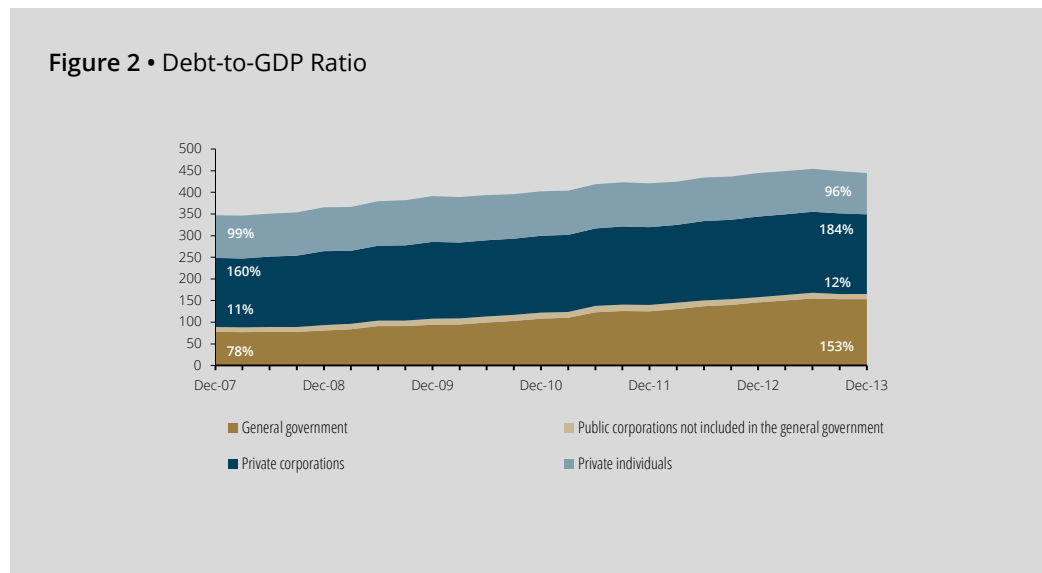
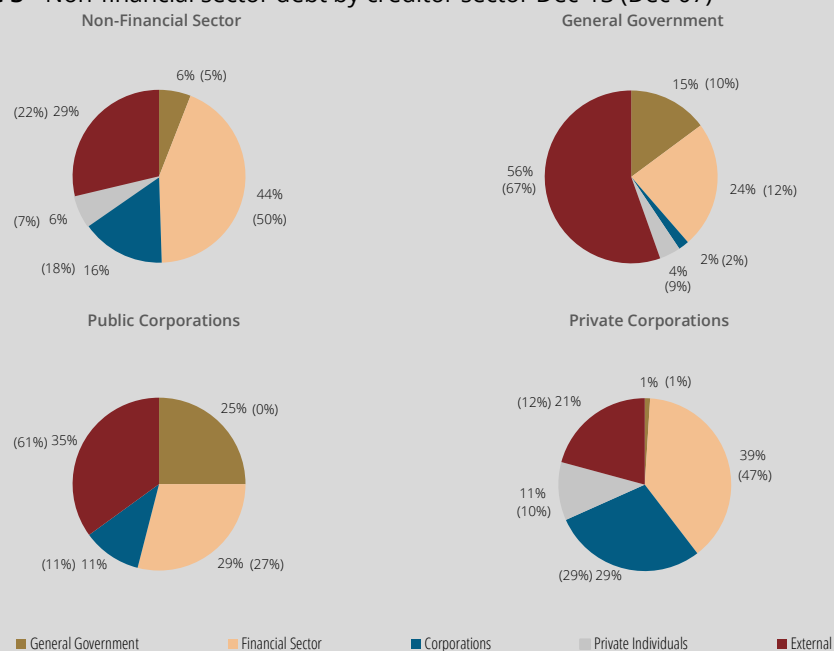
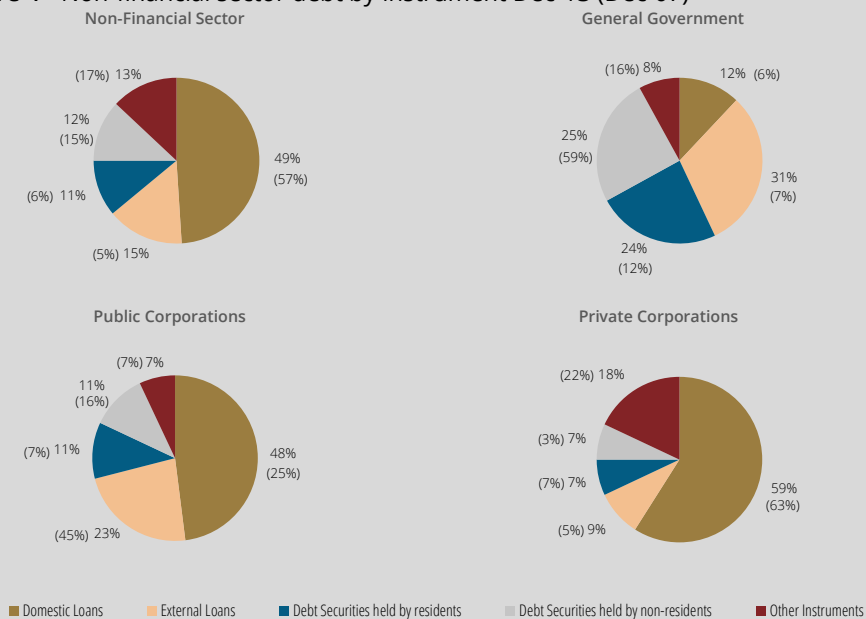


Figure 2 shows the composition of the non-financial sector debt. While the structure did not vary, both the general government and the private companies registered significant increases, +75 percentage points (p.p.) and 24 p.p., respectively. For private individuals, there was a small decrease from 2007 to 2013 from 99% to 96% of the GDP. Public companies not included in the general government remained stable at 12% of GDP.

Figure 3 shows, for each type of debtor, the structure of the creditors at end-2013. The detail by type of instrument is presented in Figure 4. Data for end-2007 are in parenthesis.

**Figure 3 • Non-financial sector debt by creditor sector Dec-13 (Dec-07)**

From the figure it is observable that the share of the external sector in the debt of the general government decreased from 67% in 2007 to 56% in 2013, whereas the weight of the financial sector increased by 12 p.p.. Regarding private corporations, the share of the external sector almost doubled, from 12% to 21%, in the same period, whereas the financial sector decreased its weight by 10 p.p.. For public corporations, the funding distribution across creditor's sector changed considerably, with an increase from almost 0% to 25% in the share of the funding coming from the general government while the share coming from the external sector decreased by 26 p.p..

**Figure 4 • Non-financial sector debt by instrument Dec-13 (Dec-07)**

The financing structure of the general government changed significantly between 2007 and 2013: while the external sector is still the main creditor, debt securities (59% at end-2007, 25% at end-2013) were replaced by loans granted under the FAP (7% at end-2007, 31% at end-2013); internal financing was mainly done through debt securities (+13 p.p.). For public corporations, domestic loans (mainly granted by the general government) represented at end-2013 the largest share (48%, 25% at end-2007) while at end-2007 external loans dominated (45%, 23% at end-2013). For private corporations, domestic loans decreased from 63% at end-2013 to 59% at end-2007, compensated by both external loans and debt securities held by non-residents (+4 p.p. each).

## References

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### Notes

\* JOCLAD XXI, Lisbon, Portugal, 11 April 2014

6. The analyses, opinions and findings of this paper represent the views of the authors, which are not necessarily those of the *Banco de Portugal* or the Eurosystem. Any errors and omissions are the sole responsibility of the authors. The data used in this paper refers to the data available at the time it was prepared and/or presented and, therefore, may not necessarily correspond to the most recent available data.





# Reaping the benefits of using integrated micro-data for statistical purposes... and beyond\*7

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## 1. Introduction

One of the most significant characteristics of our times is the constantly changing environment. From medicine to biotechnology, computers to cell phones, there are numerous areas where change has been deep and long-lasting. More than the wide scope of change itself, it is also about the speed and the rhythm with which reality keeps evolving: the changes our sons will witness in the course of their lives will likely be broader than what we are currently observing and even more so compared to what our forefathers experienced.

The financial world is perhaps one of the most affected areas by the increased pace of innovations. This calls for central banks to be particularly attentive in the fields of financial supervision and regulation, but it also demands from the statistical function to be able to devise solutions that are able to quickly adjust to this developing and demanding landscape, as well as to new and unforeseeable data needs.

Against this background, this paper discusses 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. The granular nature of such information, together with a good 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 and users' requests.

The use of integrated micro-databases for statistical purposes constitutes the cornerstone of the Bank's long-term strategy as regards its statistics. We believe that this approach will pave the way to better address the challenges that lie ahead in this field, whichever they may be.

## 2. Statistics in the future

Managing highly detailed and granular databases is the first step of a broader twofold approach; the second is to build a fully integrated data infrastructure. This new integrated management of information model is expected to generate many benefits. On the one hand, it should eliminate unjustified redundancies and lead to the definition of efficient mechanisms for compiling information. On the other hand, it should contribute to the improvement of the data quality and integrity, as well as facilitate the dissemination and agile consultation of the information.

## 2.1. Why micro-data?

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

Accordingly, a move towards micro-data has gradually been advancing at the Bank in recent times, based on and profiting from the many micro-databases managed by the Statistics Department. For instance, the Securities Statistics Integrated System (SSIS) is a security-by-security and investor-by-investor database of both securities holdings and issues. Other such examples are the Central Credit Register (CCR) – which contains granular information on e.g. credit exposures – and the Central Balance-Sheet Database (CBSD) – which holds accounting and financial information covering (almost) exhaustively the population of non-financial corporations (NFCs).

All of the aforementioned databases provide very complete information concerning their respective domains and are extremely rich. However, to reap the maximum potential of these databases, it is essential to take the additional step and, instead of viewing them in isolation as standalone data repositories, linking them in a single fully integrated high granular data system. By linking the information contained in each individual database, this data system will boost the potential associated with each one, enabling the crossing of data on different institutional sectors and financial instruments.

### **Clear benefits for statistical production...**

This fully fledged integrated system, encompassing granular data of all institutional sectors and financial instruments, serves the purposes of the different statistical domains, which can, in turn, feed the system with the information they produce, while at the same time tapping into the system for the information they need. In particular, to the extent that they put together all sectors of the economy in a single framework, in an integrated and balanced manner, national financial accounts stand to benefit significantly from such a data system.

Figure 1 schematically illustrates this point. It displays a matrix with institutional sectors in column and financial instruments in row. The dimensions that are currently covered by the Bank's micro-databases are highlighted in green, while those that are deemed feasible in the short/medium-run are highlighted in yellow. In more detail, the SSIS gives us granular information on all kinds of securities; the CCR has micro-data regarding loans to all sectors; the CBSD gives us a complete view on the non-financial sector assets and liabilities; the Balance Sheet Information (BSI) on Financial Corporations has granular information on the assets and liabilities of the sector; the BoP/IIP system supplies micro-data on the assets and liabilities of the Rest-of-the-World sector. To complete the few gaps in this matrix, it would be feasible to get information on "Insurance and Technical Reserves" and also more granular information regarding the "General Government" sector. However, our most immediate goal is to get granular data on "Currency and Deposits", which would allow us, in the shortest possible time span, to have very reasonable micro-data coverage of the economies' total financial assets and liabilities.

To sum up, a significant amount of this endeavour is well underway and only a few steps – some of which require legal support – are needed to achieve full completion, mostly concerning the household sector.

**Figure 1 • National financial accounts – Assets and liabilities, by institutional sector and instrument**

		NFC		FC		GG		HH + NPISH		RoW	
		A	L	A	L	A	L	A	L	A	L
Goal	Currency and deposits										
→ SSIS	Securities										
→ CCR	Loans										
→ SSIS	Shares and other equity										
→ FEASIBLE	Insurance technical reserves										
	Other accounts										
		↑ CBSD		↑ BSI		↑ FEASIBLE				↑ BoP/IIP	

Note: NFC – Non-financial corporations; FC – Financial corporations; GG – General government; HH – Households; NPISH – Non-profit institutions serving households; RoW – Rest of the world; SSIS – Securities Statistics Integrated System; CCR – Central Credit Register; CBSD – Central Balance Sheet Database; BSI – Balance sheet information; BoP/IIP – Balance of payments and international investment position.

### ... but also for users and for analytical purposes

Providing more complete and detailed statistics in response to users' needs is a fundamental objective to be pursued by the statistical function. This became particularly evident, namely with the eruption of the global financial crisis, which sparked a whole array of new data needs.

One illustrative example where the features of micro-data have proved to be very useful is in the analysis of the non-financial sectors indebtedness. Using the available micro-databases, namely the CBSD, the SSIS and the CCR, and taking advantage of the reference tables and related administrative sources, the Bank started to publish, in the beginning of 2012, very detailed statistics on non-financial sector indebtedness, with several different breakdowns. First of all, information on the counterparty financing sectors is provided, so as to ascertain the risk exposures of creditor sectors, as well as possible funding strains of debtor sectors. Second, credit to NFCs is broken down according to maturity, as well the economic activity sector and enterprise size; along the same lines, household sector loans are also disaggregated by purpose (housing loans versus consumption and other purposes). Finally, special attention is paid to the public sector. For instance, different public debt definitions are provided – consolidated, non-consolidated, Maastricht debt (relevant for Excessive Deficit Procedures), including/excluding state-owned enterprises.

Another example concerns the usefulness of merging accounting information at the firm level from the CBSD with data from the CCR, as means to analyze the drivers of firms' credit risk. This line of research allows identifying emerging risks in banks' portfolios, as well as creating modelling tools for the forecasting of default probabilities. In fact, 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 global 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, namely Austria, Belgium, Germany and Spain.

More broadly, and to sum up, micro-data applications have several other uses in many different fields of central banking. Besides being vital for economic and financial research, they have been progressively gaining a more relevant role in other areas, such as financial stability and supervision activities, monetary policy and risk assessment.

## 2.2. How to integrate micro-databases

Needless to say that achieving such architecture is no easy task, one which cannot be accomplished overnight. Attaining these goals hinges on an effective cooperation between different functions of the Bank, based on 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. In what follows, I will go through these aspects in more detail.

### **Governance structure**

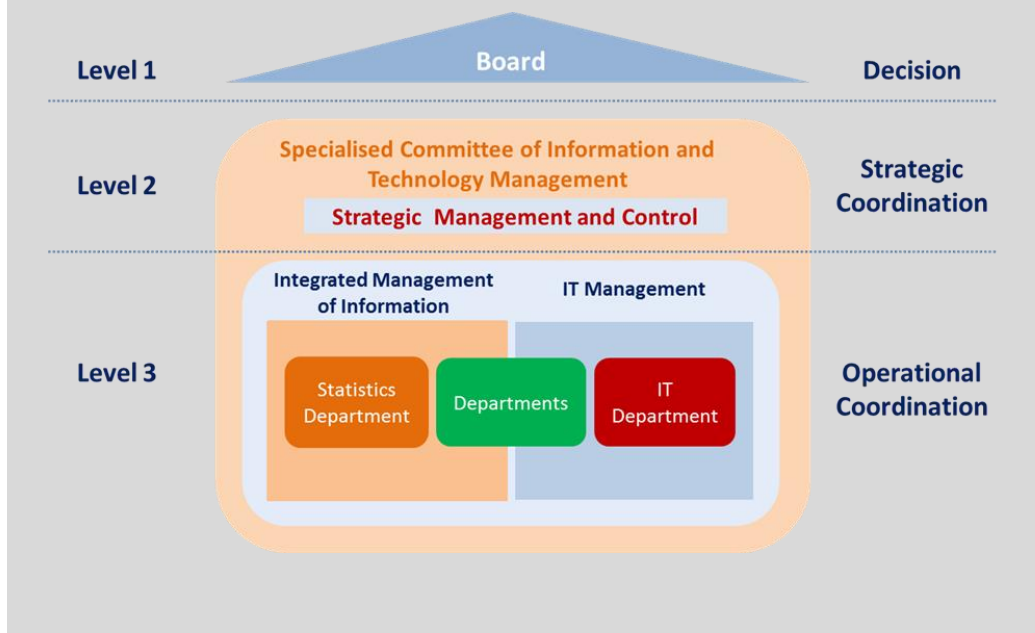
The definition of an Information Governance Structure aims to ensure a proper alignment between the strategic and operational levels of decision, which are mediated by the information management level of decision.

The Statistics Department is in charge of the operational management, including:

- a. Coordinating and monitoring the process of collecting quantitative information from external entities.
- b. Ensuring the central point of contact of the Bank with external entities on the reporting of quantitative information.
- c. Promoting, in conjunction with the IT Department and the user departments, the:
  - Organization of information architectures, namely by identifying objects, features and respective relationships and configuring the domains of integration to manage.
  - Definition of concepts and creation of metadata associated with different information objects in order to avoid duplication and facilitate the understanding/utilization of information.
  - Creation of catalogues/dictionaries/repositories of information available on particular operating systems.
- d. Monitoring the interaction and timely reporting of information to and from external entities.
- e. Analyzing the changing needs of quantitative information identified by other departments.
- f. Guaranteeing the quality of information, defining indicators of their use and ensuring its relevance and auditability.

In this context, the various departments that are originators/users of information have the decentralized responsibility, in collaboration with the department responsible for the centralized management of information, of analyzing in a critical manner the information and metadata that is most important for them and ensure its 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.

Figure 2 • The governance structure



### Relationships management

Given the large number of stakeholders, a 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:

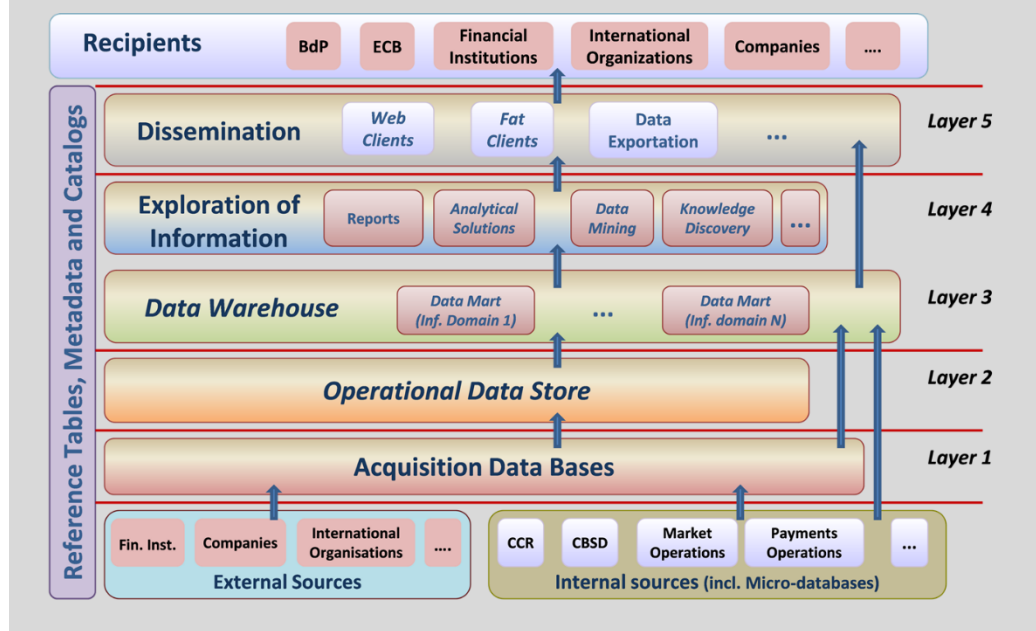
- Coordinating and monitoring the process of collecting quantitative information from external entities.
- Ensuring the central point of contact of the Bank with external entities on the reporting of quantitative information.

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 first 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 infrastructural base of the information management – the so-called Information Architecture – should also be mentioned in this context. Its main aim consists of ensuring the quality, auditability and manageability of the data. It also serves 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 occur from the 3rd to the 4th layer, as can be seen in Figure 3. To successfully integrate the different domains, reduce the production burden and eliminate redundancies, it is important to develop high quality reference tables and to maintain up-to-date metadata and catalogues.

Figure 3 • The information model



### 3. Concluding remarks – the shape of statistics to come

The Statistics Department has been pursuing a strategy centred in the integrated management of highly granular data. We believe that this approach will provide us with the necessary tools to answer both aggregated and highly detailed queries. Moreover, crossing the different data dimensions will also lead to higher quality standards and efficiency, minimizing the reporting burden. Furthermore, we believe this is extremely useful for our users, both internal and external, to the extent that it enables us to provide tailor-made data with a shorter reaction time.

We cannot anticipate what the future will bring. But the good news is that, to a significant extent, we do not need to consult oracles: we can prepare ourselves to better respond to whatever comes along without necessarily knowing what we will be facing. For that to be possible, we need to proactively invest in becoming flexible. In other words, we can endow ourselves with systems and tools with a sufficient level of manoeuvrability that will enable to adapt swiftly to whatever comes along.

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## Notes

\* Conference on European Statistics Stakeholders, Rome, Italia, 24 November 2014

7. I would like to thank Daniel Carvalho and Luís D'Aguiar, of the Statistics Department, for their valuable contributions to this paper. The analyses, opinions and findings of this paper represent the views of the author, which are not necessarily those of the *Banco de Portugal* or the Eurosystem. Any errors and omissions are the sole responsibility of the author.





# How to keep statistics' customers happy?

## Use micro-databases! \*8

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### Abstract

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. 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:

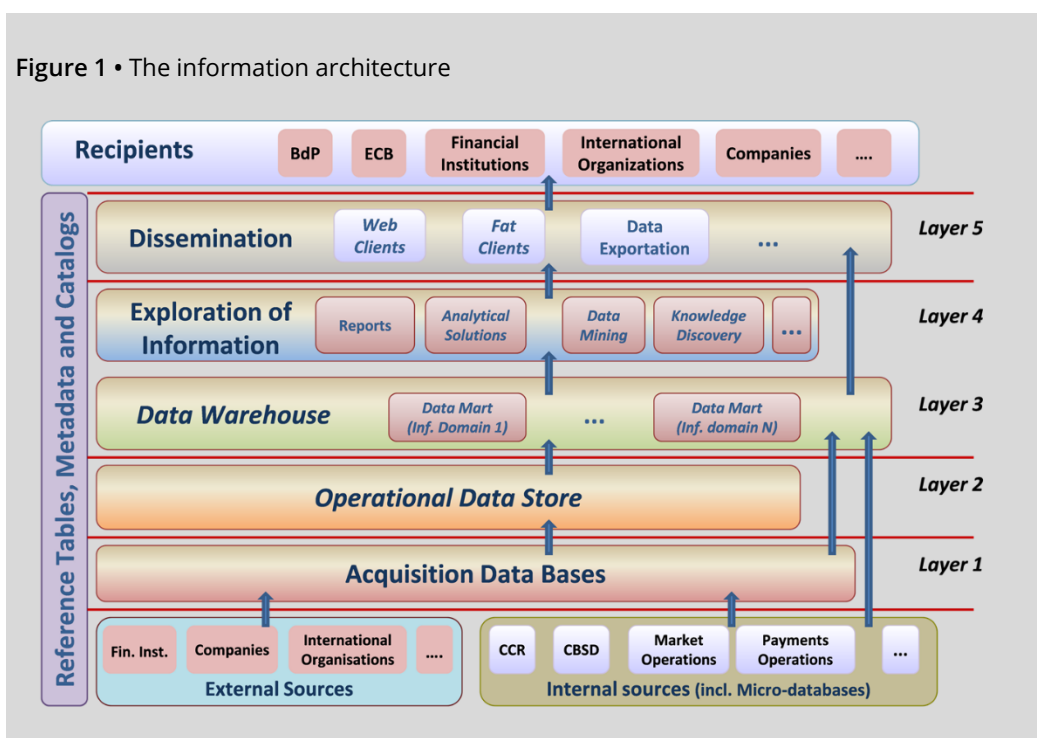
- a. Information is a key asset of the Bank so it must be managed in an integrated way.

- 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.



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.

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,<sup>9</sup> 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 Bulletin<sup>10</sup> 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,<sup>11</sup> 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 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

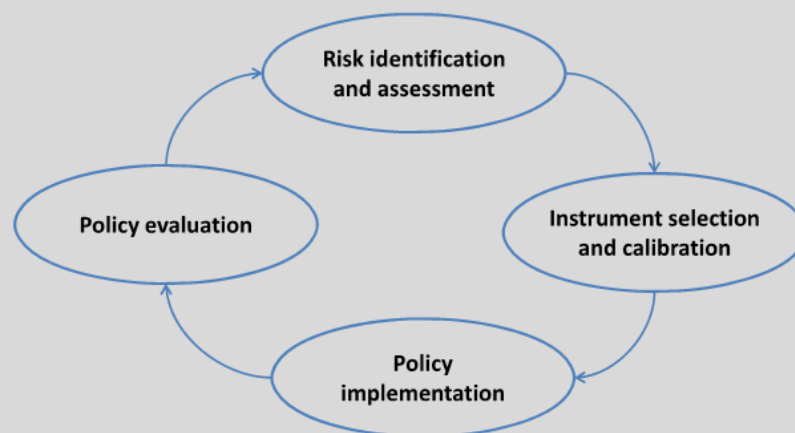
One of the main lessons learned from the recent financial and economic crisis was the need to monitor not only each individual financial institution but also to follow very closely the strong interlinkages between financial institutions, on the one hand, and between those financial institutions and non-financial 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.

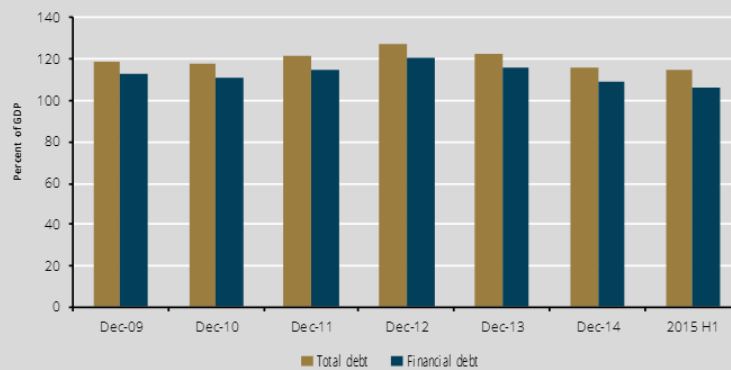
#### **The importance of statistical tools for financial stability: an example based on the Portuguese non-financial corporate sector and the underlying links with the banking sector**

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)**

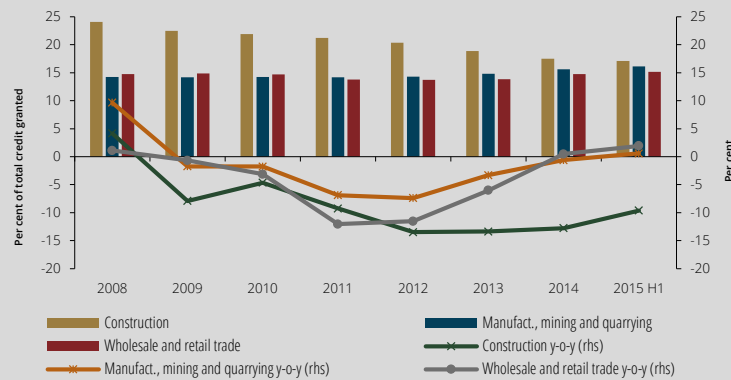
Source : *Banco de Portugal*

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).

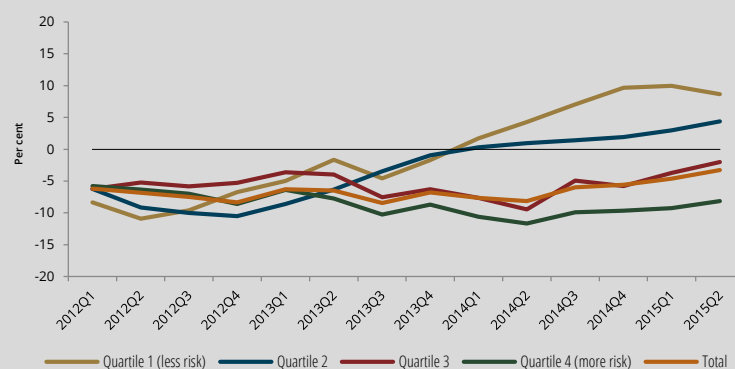
**Figure 4 • Share and annual rate of change of credit granted to construction, manufacturing and retail trade sectors**



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**



Source : Banco de Portugal

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

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).**<sup>12</sup> 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.

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## Notes

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8. The analyses, opinions and findings of this paper represent the views of the authors, which are not necessarily those of the *Banco de Portugal* or the Eurosystem. Any errors and omissions are the sole responsibility of the authors. The data used in this paper refers to the data available at the time it was prepared and/or presented and, therefore, may not necessarily correspond to the most recent available data.

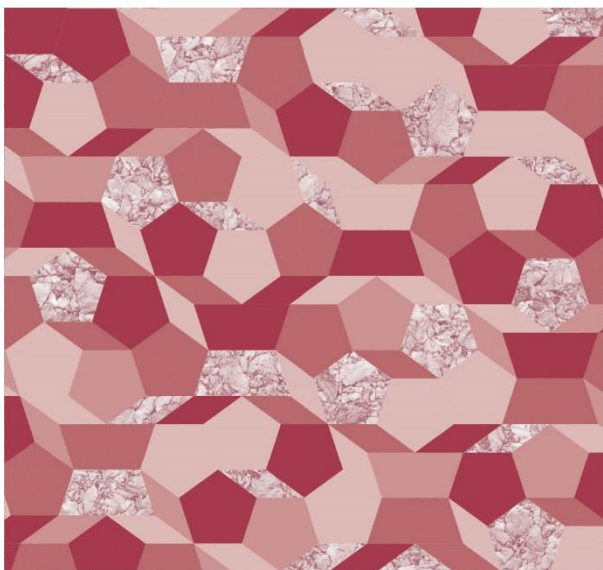
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## National financial accounts statistics

Brief note about the use of Census information  
on non-financial corporations to compile national  
financial accounts

Innovative solutions in compiling financial  
accounts

How do macro-financial linkages adjust  
in times of adjustment? – Evidence from Portugal

What changed in financial intermediation  
in the aftermath of the crisis?  
– Evidence from Portugal

Using financial accounts to better understand  
sectoral financial interlinkages





# Brief note about the use of Census information on non-financial corporations to compile national financial accounts\*<sup>13</sup>

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## 1. Introduction

The *Banco de Portugal* (hereinafter referred as “the Bank”) has full access to census data on Portuguese non-financial corporations (NFCs). This information has a high degree of granularity and is collected annually through an innovative solution that was the result of a joint effort by four public entities in Portugal, including the Bank.

The next section of this note discusses briefly the main features of this institutional arrangement that makes it possible for the Bank to have very detailed data on NFCs, as well as the drivers behind the development of such system and the key factors that explain the success of the initiative.

The third part of the note addresses the use of NFCs’ census data to the compilation of national financial accounts, specifically the NFCs’ account and, to a lesser extent, the account of the households (HHs).

## 2. Census information on NFCs

Given its experience in collecting and managing balance-sheet data from NFCs, the Bank had been interested for a long time in promoting a simplified reporting system for corporate annual accounts. With this purpose in mind, in 2002 the Bank started making contacts with the Ministry of Justice and invited Statistics Portugal (the Portuguese central statistical office) to join the project.

Only in 2005, in the context of an ambitious program of administrative simplification carried out in the field of Justice, it was possible to obtain governmental support for the project. A working group comprising experts of four distinct public entities — the Ministry of Justice (as project leader), the Ministry of Finance, the *Banco de Portugal* and Statistics Portugal — was set up at that time with the aim to define and monitor the overall project. In April 30, 2007 the new system was launched, under the name IES – Informação Empresarial Simplificada (literally meaning “Simplified Corporate Information”).

Seven years later, it is safe to say that the results achieved with IES since its inception clearly justified the option taken. Along with other factors, the good institutional co-operation among the public entities involved in the project and the subsequent reduction of the respondents’ reporting burden were instrumental to the success of the initiative.

IES allows companies to fulfil four different reporting obligations, to four distinct public entities, through one single electronic submission and at one moment in time. It is a paper-free submission of information of accounting, fiscal and statistical natures that companies have to remit to the Ministry of Justice, the Ministry of Finance, Statistics Portugal and the Bank.

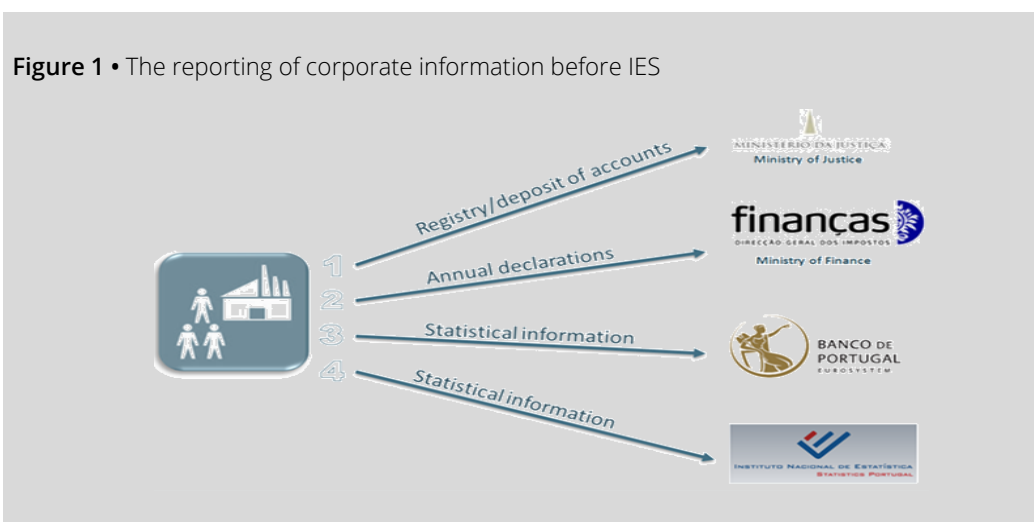
Following IES implementation, these institutions no longer directly request the annual data included in IES. In fact, starting in 2007, the Bank decided to discontinue its annual survey and to reduce the Surveys on Direct Investment. Similarly, Statistics Portugal stopped surveying companies about annual data included in IES.

IES makes it simpler, for both the suppliers (companies) and the entities receiving the data. Formerly, companies were obliged to remit nearly the same information about their annual accounts to four different public entities in four different moments in time and according to four different formats:

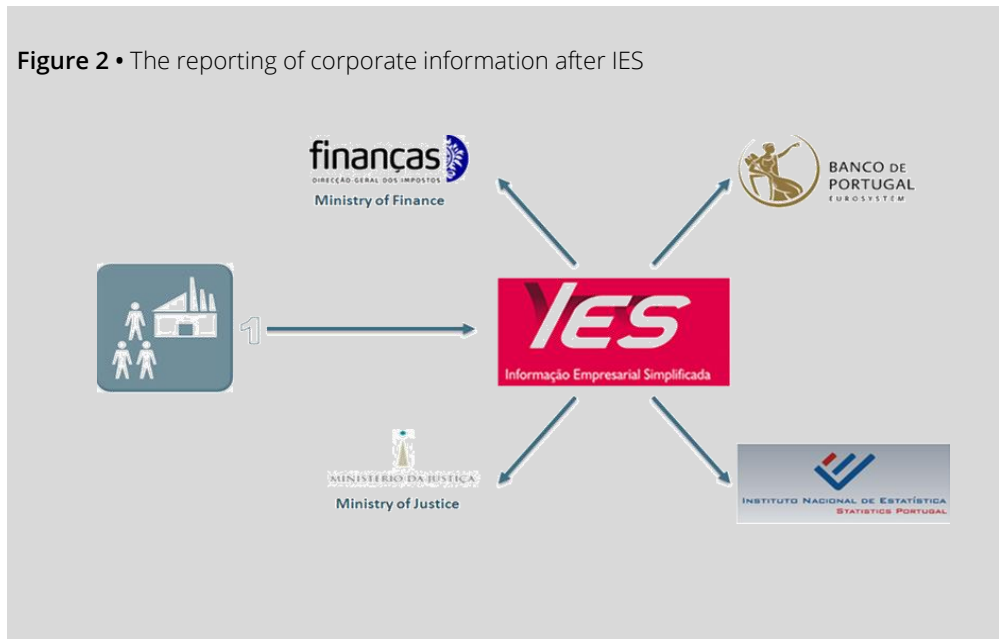
- The legal deposit of accounts, on paper, was to be provided to the commercial registers of the Ministry of Justice;
- The annual declaration on accounting and fiscal data had to be sent, electronically, to the Ministry of Finance;
- Statistical information derived from accounting data for a subset of companies had to be reported to Statistics Portugal; and
- Statistical information derived from accounting data for a subset of companies had to be submitted to the *Banco de Portugal*.

IES replaced separate reports that were previously sent by firms to fulfil their statutory obligations to the aforementioned public entities. These included the following obligations: trade registers and provision of notaries' services, accounting statements and tax returns and production of statistics.

These reports were sent by companies independently to the four public entities, and the submitted data was not completely harmonized, with each public entity having different requirements (Fig. 1).



Following IES implementation, the annual business accounting data requirements of the four public entities involved in the initiative were integrated in a single report, to be submitted online and entirely paper-free by companies only once a year (Figure 2). The statement is submitted by each company with a delay of about seven months after the end of the reference period.

**Figure 2 • The reporting of corporate information after IES**

The main drivers for the development of the IES system were:

- Increasing the efficiency of the reporting process, namely by reducing the reporting burden and simplifying various statutory obligation for the companies,
- Minimizing the costs for the public entities through the optimization of existing resources by implementing the concept of shared service;
- Improving the quality of statistics.

The operationalization of IES had to take in mind the unavoidable costs of change but the impact on users was minimized and a smooth transition from the previous to the current system was ensured.

Information obtained through IES encompasses over 370,000 corporations a year, corresponding to a coverage rate of approximately 100% of all NFCs. Information collected through IES is chiefly of an accounting nature, based on the financial statements and the respective annexes set out in the accounting standards. Additionally, it also comprises a range of data with further detail on the activity and situation of the corporations, as necessary for statistical purposes.

**Figure 3 • Impact of IES**

	Before IES	After IES
<b>Banco de Portugal (CBSD)</b>		
Companies (level of adherence)	5 %	100 %
Formats	Mostly automatic	Fully automatic
Timeliness	10/12 months	6 ½ months
Level of detail	> 600 items	> 3000 items
<b>INE – Statistics Portugal</b>		
Companies (level of adherence)	15 %	100 %
Formats	Paper/electronic	Fully automatic
Timeliness	12/18 months	6 ½ months
<b>Register of Annual Accounts (Moj)</b>		
Companies (level of adherence)	23 %	100 %
Formats	Manual (paper)	Fully automatic
Points of access	312 commercial registry offices	Online
Monitoring/control	Practically impossible	Totally possible
System	One of the most old-fashioned	One of the most advanced

Under the IES, data submitted by NFCs are integrated in the Bank's Central Balance Sheet Database (CBSD), which discloses aggregate statistics based on such data.<sup>14</sup> Also, CBSD data is used as input for several statistical products – inter alia, national financial accounts compilation, which will be discussed in the next section.

IES has brought about several advantages for all stakeholders involved. Firstly, regarding the companies themselves, IES has contributed significantly to streamline their reporting requirements, avoiding redundancies, thus decreasing the reporting burden and also simplifying their tax and other statutory obligations. For the four public entities involved, data is now more “friendly”, *i.e.*, it is now much easier to conduct analysis and guarantee the quality of the data because it is reported online and in a harmonized template. For the Bank, IES has significantly increased the coverage of companies included in the CBSD (potentially, all companies report IES), which is undoubtedly a great plus to the production of statistics and the elaboration of different and flexible statistical products.

Overall, IES has been a success story and our experience allows us to identify some key factors that have certainly contributed to its success:

- Initiative, persistence, flexibility to change and think globally;
- Political commitment (leadership) eases the legislation process;
- Financial support;
- Investment in advanced expertise: techniques, skilled human resources and IT;
- Electronic submission;
- Inclusion of several needs (public entities);
- Early involvement and cooperation among all players.

### 3. National financial accounts compilation using IES data

There are two main complementing elements to compile NFCs and HHs accounts: counterpart information and own data sources.

Counterpart information refers to the appropriation of information from other sectors, in the cases where it is deemed of a superior quality, and whenever the counterpart is NFC or HH. Typically, both the NFC and the HH sector lie at the bottom of the hierarchical chain of counterpart information. This means that these sectors normally take the information of other sectors as given and incorporate it directly. More specifically, compilation of NFCs' accounts take on board counterpart information from:

- Financial corporations, i.e., balance sheet statistics from Monetary Financial Institutions (and from Other Financial Institutions);
- General government statistics;
- Rest of the World account, i.e., balance of payments and international investment position statistics.

In other words, NFC compilation takes on board the counterpart information of all other sectors/statistical domains except for HHs. In turn, HH account compilation uses counterpart information of all other sectors.

The second approach pertains to the use of data sources which are specific to these two sectors. This is where the Information contained in IES comes to play in terms of NFCs' account compilation: annual IES information – together with quarterly estimates based primarily on the Quarterly Survey on Non-Financial Corporations (ITENF). Finally, the Securities Statistics Integrated Systems provides information on securities holdings and issuance for the two sectors.

The interesting element of IES is that it is not only an own source for NFCs, but it also provides indirectly contributes to the HH account compilation as counterpart information, to the extent that some types of operations between the NFCs and the HH sector are collected in IES. There are two ways in which the information used from IES to compile the NFCs' account is also relevant for the HH sector:

- I. It helps identify HH equity stakes in NFCs, i.e., HH equity assets in NFCs' equity liabilities. In a country such as Portugal, where the structure of NFCs is heavily tilted towards small and medium-sized corporations, these figures represent an important share of HH equity holdings as well as of NFCs' equity liabilities.
- II. Secondly, loans received/granted by NFCs and granted/received by HHs are also collected in IES and are therefore used to determine assets and liabilities of NFCs and HH loans.

### 4. Concluding remarks

IES was an innovative solution that resulted from the cooperation of the Ministry of Finance, the Ministry of Justice, Statistics Portugal and *Banco de Portugal*. IES contributed to significantly reduce the companies' reporting burden and increased the quality of data that public entities receive from NFCs. For the Bank, IES has allowed access to new and more complete information on the Portuguese NFCs. The use of this information for the compilation of the NFC and HH sectors' financial accounts is an example of the statistical possibilities of such census information.

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## Notes

\*Workshop on developing and improving sectoral and financial accounts, Istanbul, Turkey, 29 May 2014

13. I would like to thank Luís D'Aguiar, António Silva and Daniel Carvalho, from the Statistics Department, for their valuable contributions to this note. The analyses, opinions and findings of this paper represent the views of the author, which are not necessarily those of the *Banco de Portugal* or the Eurosystem. Any errors and omissions are the sole responsibility of the author.

14. The CBSD has been managed by the Statistics Department since 1999 and, presently, manages two databases: (i) **the annual database** has annual accounting data of nearly all non-financial companies in Portugal (about 370 thousand companies) and contains all IES statements that have been submitted – this database has very detailed data (more than 3 thousand different items); (ii) **the quarterly database** has quarterly accounting data from around 3,500 corporations/year, representing almost 45% of the total turnover of the non-financial corporate sector and it comprises the answers to a quarterly survey conducted jointly by Statistics Portugal and by the Bank – this quarterly database covers about 70 items.

# Innovative solutions in compiling financial accounts\*<sup>15</sup>

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## 1. Introduction

There are many challenges facing the central banks' statistical function of our days. On the one hand, the global financial crisis and the ensuing sovereign debt crisis have highlighted that there is much to be done regarding the coverage of the data produced today and users have been requesting more comprehensive and detailed information.<sup>16</sup> On the other hand, reality is also increasingly more complex and portraying it in a precise and timely fashion has become a more demanding task.

Technological development has given us powerful tools, which are fundamental to tackle the tasks that lie ahead – the range of Information Technology (IT) solutions available today would be unthinkable a few years ago. However, in order to reap the benefits of the enormous potential technology has put at our disposal, we need additional ingredients: knowledgeable people, an efficient organization and data management. Together, these elements will pave the way for the future.

This paper discusses several organizational issues that have shaped national financial accounts production at the *Banco de Portugal* (hereinafter referred as "the Bank") in recent times, and which are mostly related to an integrated approach to statistical compilation. This integrated approach concerns not only the data model used, but also – and perhaps foremost – the internal organization of work, in particular the setup of a multidisciplinary team, responsible for the compilation of national financial accounts.

## 2. National financial accounts compilation at Banco de Portugal

### 2.1. A quick glimpse at history

In 1998, against the backdrop of the implementation of the European System of Accounts 1995 (ESA95), the Bank and the Instituto Nacional de Estatística (INE)<sup>17</sup> signed a protocol, carving out the roles of both institutions in the compilation of these statistics. Specifically, INE kept the responsibility of compiling the non-financial accounts whereas the Bank took over the responsibility for financial accounts. The rationale behind this division of tasks stems from the particular nature of each of the institutions' concerns and is supported by the existing arrangement at the European level, between the European Central Bank and the Eurostat.<sup>18</sup>

The above-mentioned protocol also enshrined a growing cooperation between both institutions given the need to achieve consistency across financial and non-financial accounts. Furthermore, in 2006, the Bank, the INE and the Ministry of Finance agreed on a joint working group on General Government Statistics, with experts from the three institutions. The working group is involved in

the preparatory work of Excessive Deficit Procedure notifications and provides methodological support on the recording of operations carried out by the General Government. Besides representing the Bank, the Statistics Department also chairs this task force.

National financial accounts are compiled in the National Financial Accounts Division of the Statistics Department (hereinafter referred as “the Division”). In 2004, the compilation of statistics on issues and holdings of securities was included in the Division, and in 2009 the Division was further expanded with the creation of the General Government Statistics Unit. Another major change was to come later, in 2009, with the creation of a multidisciplinary team for the compilation of financial accounts called *Estrutura de Missão das Contas Financeiras* (EMCF).

## 2.2. *Estrutura de Missão das Contas Financeiras* (EMCF)

The national financial accounts framework puts together the information of other statistical domains into a single standalone product. These accounts are derived from other primary statistics and are, therefore, at the end of the statistical production chain.

Because they draw on information from other primary statistics, the compilation of national financial accounts should, in principle, benefit from the input of experts in other statistical fields. Based on this notion, the idea of a new organizational format started to shape up, one where national financial accounts would be compiled by a multidisciplinary team, i.e., encompassing both national financial accounts experts – permanently allocated to these tasks – and experts from the different underlying primary statistics.

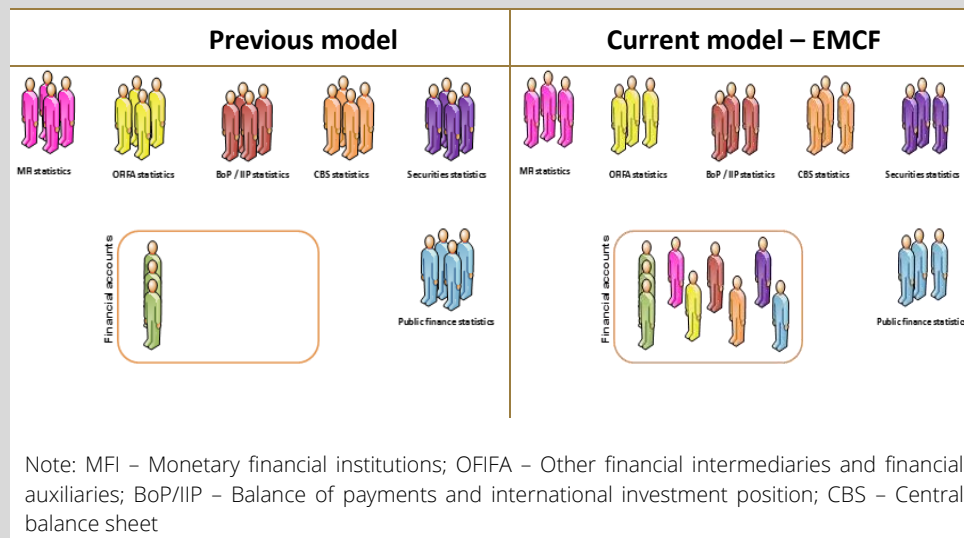
In late 2009, this new arrangement was effectively put in place at the Statistics Department, whereby a representative of all teams whose data is a source for financial accounts would be a part of the team responsible for the compilation of national financial accounts. Specifically, the EMCF is chaired by the Head of the Division and comprises, in addition to the Division’s substructures – i.e., the National Financial Accounts Unit, the General Government Statistics Unit and the Securities Statistics Unit –, experts from the Balance of Payments and International Investment Position Statistics Division, the Monetary Financial Institutions Statistics Unit, the Non-Monetary Financial Institutions Statistics Unit, the Central Balance Sheet Statistics Unit and the Methodological Development Unit.

Formally, the main objectives of the EMCF are the following:

- Definition of the underlying data requirements and thorough scheduling of financial accounts compilation tasks;
- Quarterly compilation of sectoral financial accounts;
- Ensuring consistency across the underlying information;
- Definition of appropriate methodological options;
- Critical assessment of results and consistency with the underlying statistics.

This elaborate structure comes at a cost of an unavoidable increase in the complexity involved with the coordination and management of such a team. Nevertheless, the experience gathered so far, in these almost five years, shows that the quality improvements far outweigh those costs.



**Figure 1 • National financial accounts compilation team**

On the one hand, an important feature of this model is that it generates a sense of shared responsibility across all team members. In the previous setup, members from other teams provided the needed primary information and their intervention ended at that stage; all subsequent compilation work was done by members of the National Financial Accounts Division, who were perceived as clients. With this new format, all team members become stakeholders of national financial accounts statistics and therefore also actively engaged in collectively contributing to the end-product: for instance, experts from the MFI Statistics Unit provide not only primary data but also are specifically responsible for the compilation of the MFI sector accounts, and more generally co-responsible for national financial accounts.

On the other hand, it is worth mentioning that sizeable gains concerning the consistency attained across the different statistical domains were achieved. In this sense, this initiative not only improved the quality of downstream statistics – national financial accounts – but also that of the set of upstream statistics – *i.e.*, of the statistics domains underlying the compilation of financial accounts.

### 2.3. Data model

National financial accounts compilation hinges on multiple aggregated data sources: MFI balance sheets, non-financial corporations' statistics, balance of payments and international investment position, among others. However, a move towards micro-data has gradually been developing at the Bank in recent times. The approach has been twofold: first, to manage highly detailed and granular databases; and second, to build a fully integrated data infrastructure.

The Statistics Department manages many micro-databases. For instance, the Securities Statistics Integrated System is a security-by-security and investor-by-investor system of both securities holdings and issues. Other such examples are the Central Credit Register – which contains granular information on e.g. credit exposures – and the Central Balance Sheet Database – which holds accounting and financial information covering (almost) exhaustively the population of non-financial corporations (NFCs).

In broad terms, the long-standing aim of this approach is to have a fully fledged integrated system, encompassing granular data of all institutional sectors and financial instruments, which can then

serve the purposes of the different statistical domains. These, in turn, feed the information they produce into the system, while at the same time tapping the system into the information they need.

Figure 2 schematically illustrates this point. It displays a matrix with institutional sectors in column and financial instruments in row. The dimensions that are currently covered by the Bank's micro-databases are highlighted in green, while those that are deemed feasible in the short/medium-run are highlighted in yellow. Clearly, a significant amount of this endeavour is well underway and only a few steps – some of which require legal support – are needed to achieve full completion, mostly concerning the household sector.

**Figure 2 • National financial accounts – Assets and liabilities, by institutional sector and instrument**

		NFC		FC		GG		HH + NPISH		RoW	
		A	L	A	L	A	L	A	L	A	L
Goal	Currency and deposits										
→ SSIS	Securities										
→ CCR	Loans										
→ SSIS	Shares and other equity										
→ FEASIBLE	Insurance technical reserves										
	Other accounts										
		↑ CBSD		↑ BSI		↑ FEASIBLE		↑ BoP/IIP			

Note: NFC – Non-financial corporations; FC – Financial corporations; GG – General government; HH – Households; NPISH – Non-profit institutions serving households; RoW – Rest of the world; SSIS – Securities Statistics Integrated System; CCR – Central Credit Register; CBSD – Central Balance Sheet Database; BSI – Balance sheet information; BoP/IIP – Balance of payments and international investment position.

In fact, a general and encompassing approach to achieve many of the goals and challenges that the central banks' statistical function faces today is through the wide usage of micro-databases. There are many advantages of using micro-data, covering most of the statistics production chain, spanning from the compilation processes to the dissemination policy.

From an input perspective, a micro-data collection system has important advantages in terms of the burden imposed on reporting institutions: not only is it more effective to request micro-data and carry out different rearrangements afterwards, but also it reduces significantly the burden on the reporting agents. Moreover, moving to more granular reporting forms is a change often requested by the respondents themselves, since the information to submit in this case can be more easily derived from their own internal information systems, thus implying fewer costs for the reporting institutions.

From an output perspective, a high level of data granularity might help meeting future information requirements from already existing data. Also, integrating the different databases greatly increases the range of possibilities as regards the level of complexity and detail of statistical products. Furthermore, detailed reporting gives more flexibility in defining and creating different outputs and enables users to define their own data queries according to their specific needs. Hence, this approach accomplishes two important things: providing the data that users need while at the same time considering the format in which users want to receive the data.

## 2.4. New data needs, new challenges

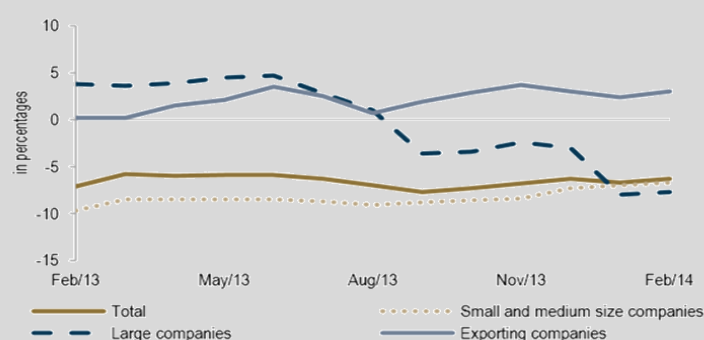
The set up of the EMCF was a milestone in the process of integration of all information available in the Statistics Department.

A particular example of how the efficiency gains associated to this organizational format spilled over arose with the 2011-2014 EU/IMF Financial Assistance Programme to Portugal. The latter 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, inter alia: creditor sector, financial instrument, original maturity, industrial sector and size.

Using the available micro-databases, namely the Central Balance-Sheet Database (CBSD), the Securities Statistics Integrated System (SSIS) and the Central Credit Register (CCR), and taking advantage of the reference tables and related administrative sources, the Bank was able to go beyond what was requested and started to publish, in the beginning of 2012,<sup>19</sup> very detailed statistics on non-financial sector indebtedness. These new statistics are published on a monthly basis in the Statistical Bulletin under “Chapter K – Indebtedness of the non-financial sector” and present breakdowns by sector, companies size, exporting vs non-exporting companies, financing sector, types of loans, loans maturities, etc. Figures 3 and 4 are a good example of the kind of information that we have started to publish.

Figure 3 • Non-financial sector indebtedness

	Dec-11	Dec-12	Sep-13	Dec-13	Sep-13	Dec-13
	(10 <sup>6</sup> euros)			(y. r. - in %)		
	1	2	3	4	5	6
<b>Total debt</b>						
1 General government	214 378	241 413	251 179	252 914	6.9	4.8
2 Public corporations	49 039	44 371	45 482	44 886	0.7	1.2
3 Public corporations included in general government <sup>(1)</sup>	23 290	25 374	27 161	26 717	7.5	5.3
4 Public corporations not included in general government	25 749	18 997	18 321	18 169	-7.9	-4.4
5 Non-financial public sector (1 + 4)	240 126	260 410	269 501	271 083	5.8	4.1
6 Private corporations	310 630	311 731	309 631	306 973	-1.0	-1.5
7 Micro, small and medium corporations <sup>(1)</sup>	179 524	170 969	166 994	165 251	-4.1	-3.3
8 Micro corporations (321 thousand)	78 436	77 058	75 642	75 062	-2.8	-2.6
9 Small corporations (39 thousand)	50 845	46 155	44 608	43 807	-5.4	-5.1
10 Medium corporations (6 thousand)	50 243	47 756	46 744	46 381	-5.0	-2.9
11 Large corporations <sup>(1)</sup> (1 thousand)	83 513	88 055	89 473	89 021	3.8	1.1
12 Non-financial holdings (3 thousand)	47 593	52 708	53 165	52 701	1.3	0.0
13 Private individuals <sup>(1)</sup>	173 892	167 115	161 688	159 918	-4.4	-4.3
14 of which: housing	122 928	118 392	114 965	113 869	-3.9	-3.8
15 Non-financial private sector (6 + 13)	484 521	478 846	471 319	466 891	-2.2	-2.5
16 Total - non-financial sector indebtedness (5 + 15)	724 648	739 255	740 820	737 974	0.6	-0.2

**Figure 4 • Loans to non-financial corporations, yearly rate**

The compilation of this statistical product is an accomplishment still unmatched by other European Union central banks and clearly illustrates the potential of the Bank's statistical system and of its related advantages. Two main features were instrumental in achieving such result: (i) the governance framework of the EMCF, which was fundamental to devise solutions and methods to adequately respond to the complexity of the additional data requirements; and (ii) a high level of granularity of the information available, together with several integrated micro level databases.

Furthermore, a new IT application – ABACO<sup>20</sup> – is currently under development at the Statistics Department. ABACO will not only tackle the data needs associated with the upcoming changeover to ESA 2010<sup>21</sup> in a more efficient way, but also provide additional features, such as drilling down to micro-level information. Most importantly, given the successful experience with non-financial sector debt, the application is designed to provide information on a monthly frequency.

### 3. Concluding remarks

The Bank's Statistics Department has pursued a strategy of integration of the different statistical domains, both in the format in which work and tasks are organized but also in the data model and structure put in place.

In turn, these two features have contributed to: (i) improved quality standards, alongside more detailed/complex and tailor-made statistics; (ii) higher consistency level across different statistical domains.

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16. See, for instance, the reports on data gaps by the Financial Stability Board.

17. INE is the Portuguese national statistical institute.

18. "In the area of financial accounts and related statistics within the framework of national accounts statistics, responsibility at the Community level is shared between the ECB (DG Statistics) and the Commission (Eurostat). Only the ECB (DG Statistics) will compile quarterly financial accounts for the euro area. The Commission (Eurostat) will ensure that all Member States meet their obligation to provide national financial accounts data under Council Regulation (EC) No. 2223/96. The ECB (DG Statistics) and the Commission (Eurostat) will consult and co-operate closely in view of this shared responsibility." Memorandum of Understanding on economic and financial statistics between the Directorate General Statistics of the European Central Bank and the Statistical Office of the European Communities (Eurostat), March 2003

19. Please see the press release on the new chapter on non-financial indebtedness.

20. ABACO stands for "Aplicação do *Banco de Portugal* das contas financeiras".

21. "The European System of National and Regional Accounts (ESA 2010) is the newest internationally compatible EU accounting framework for a systematic and detailed description of an economy. It will be implemented as from September 2014; from that date onwards the data transmission from Member States to Eurostat will follow ESA 2010 rules" (Eurostat). For more information on this subject, please see:

[http://epp.eurostat.ec.europa.eu/portal/page/portal/esa\\_2010/introduction](http://epp.eurostat.ec.europa.eu/portal/page/portal/esa_2010/introduction).



# How do macro-financial linkages adjust in times of adjustment? – Evidence from Portugal<sup>\*22</sup>

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## Abstract

The financial and economic crisis, characterised by disruptions in the capital flows of key sectors of the economy, have unveiled the need for an analytical tool capable of measuring, in addition to the financial soundness of the various sectors of an economy, their interrelations and interactions. As Plašil and Kubicová (2012) put it, the analysis of the links between economic sectors fosters a better understanding of the process of contagion across the economy and helps to reveal potential weak spots in the system. In this respect, Recommendation 15 of the G20 data gap initiative calls for a strategy to promote the compilation and dissemination of the balance sheet approach, flow-of-funds, and sectoral data more generally. Using financial accounts' data for Portugal, the main focus of this paper is to assess how inter-sectoral financial linkages have changed from 2007, before the eruption of the financial crisis, to 2013, two years after the Economic and Financial Assistance Programme for Portugal. We base our analysis on the so-called flow-of-funds, which, as Bodie *et al.* (2010) demonstrate, can be seen as a special deterministic case of Contingent Claim Analysis (CCA). The Power-of-Dispersion Index and the Sensitivity-of-Dispersion Index, as proposed by Tsujimura and Mizoshita (2004) and Okuma (2012), are also computed. We conclude that the adjustment of the Portuguese economy has brought significant changes not only in terms of the economic sectors' balance sheets and net lending/borrowing but also, and more importantly, in terms of their interlinkages. Flow-of-funds is thus a powerful analytical tool to measure these changes.

**Keywords:** macro-financial linkages; inter-sector linkages; balance-sheet approach; flow-of-funds

## 1. Introduction

The financial and economic crisis, characterised by disruptions in the capital flows of key sectors of the economy, have unveiled the need for an analytical tool capable of measuring, in addition to the financial soundness of the various sectors of an economy, their interrelations and interactions.

As Plašil and Kubicová (2012) put it, the analysis of the links between economic sectors fosters a better understanding of the process of contagion across the economy and helps to reveal potential weak spots in the system. The increasing strength of inter-sector exposures, on the one hand creates the infrastructure necessary for further financial development and economic growth, but on the other hand can make the economic system more vulnerable, especially in the event of

increased financial stress. In adverse conditions, inter-sector linkages generally contribute to the spread of contagion across the economy and amplify the direct impacts of risks that materialise.

In this respect, Recommendation 15 of the G20 data gap initiative calls for a strategy to promote the compilation and dissemination of the balance sheet approach, flow-of-funds, and sectoral data more generally. The use of an integrated approach for the compilation of financial flows and positions on a from-whom-to-whom basis is a key element of this strategy.

Using financial accounts' data for Portugal,<sup>23</sup> the main focus of this paper is to assess how inter-sectoral financial linkages have changed from 2007, before the eruption of the financial crisis, to 2013, two years after the Economic and Financial Assistance Programme for Portugal. We will base our analysis on the so-called flow-of-funds, which, as Bodie *et al.* (2010) demonstrate, can be seen as a special deterministic case of Contingent Claim Analysis (CCA).

The remainder of the paper is structured as follows: section 2 describes the methodological framework. In section 3 we analyse the main developments in the Portuguese economy for the period 2007-2013, focusing on how inter-sector exposures have evolved. We conclude in section 4 with some final remarks.

## 2. Methodological framework

Bodie *et al.* (2010) introduce the concept of contingent claim balance sheets for sectors and demonstrate that traditional macroeconomic flow-of-funds account can be recovered from the CCA equations as a special deterministic case. In their setup, which is consistent with the national financial accounts framework, at the national level, the sectors of an economy are viewed as interconnected portfolios of assets, liabilities, and guarantees—some explicit and others implicit. They view an economy as a set of interrelated balance sheets with four types of aggregated sectors—corporate, financial, household, and sovereign (that is, the combined government and monetary authorities). The four primary sectors of the economy are complemented by the foreign sector. The same general principles of contingent claims that apply to the analysis of a single firm can also be applied to an aggregation of firms. The liabilities of a firm, a portfolio of firms in a sector, or the sovereign, can be valued as contingent claims on the assets of the respective firm or sector or sovereign. The corporate sector refers to an aggregation of all non-financial firms.

Using the notation of Tsujimura and Mizoshita (2004) in a liability-oriented system<sup>24</sup>, this system of interlinkages can be expressed in matrix notation as:

$$= \begin{bmatrix} x_{11} & x_{12} & \cdots & x_{1S} \\ x_{21} & \ddots & & x_{2S} \\ \vdots & & \ddots & \vdots \\ x_{S1} & x_{S2} & \cdots & x_{SS} \end{bmatrix}, \sum_{j=1}^S x_{ij} = A_i \text{ and } \sum_{i=1}^S x_{ij} = L_j$$

where elements  $x_{ij}$  represent the magnitude of the exposures between the creditor's sector  $i$  and the debtor's sector  $j$ <sup>25</sup>. The row sums  $A_i$  correspond to the total assets of sector  $i$  to all debtor sectors (the asset side), and the column sums  $L_j$  correspond to the total financial liabilities of sector  $j$  regardless of the creditor's sector (the liability side).

Furthermore, as proposed by Tsujimura and Mizoshita (2004) and Okuma (2012),  $X$  can be used to calculate the Power-of-Dispersion Index (PDI,  $p_j$ ) and the Sensitivity-of-Dispersion Index (SDI,  $s_i$ ). The PDI indicates the influence of a unit of shock in  $j$  sector's financing demand on other sectors' financing demand. On the other hand, SDI indicates the influence of a unit of shock in total sector's financing demand on  $i$  sector's financing demand. These indices are defined as follows:



$p_j = \frac{\sum_{i=1}^S \gamma_{ij}}{\frac{1}{S} \sum_{j=1}^S \sum_{i=1}^S \gamma_{ij}}$ ,  $s_i = \frac{\sum_{j=1}^S \gamma_{ij}}{\frac{1}{S} \sum_{j=1}^S \sum_{i=1}^S \gamma_{ij}}$ , where  $\gamma_{ij}$  are the elements in matrix  $\Gamma$  given by:

$$\Gamma = (I - C)^{-1} = \begin{bmatrix} \gamma_{11} & \gamma_{12} & \cdots & \gamma_{1S} \\ \gamma_{21} & \ddots & & \gamma_{2S} \\ \vdots & & \ddots & \vdots \\ \gamma_{S1} & \gamma_{S2} & \cdots & \gamma_{SS} \end{bmatrix}, \text{ where } C \text{ is the so-called input coefficient matrix, whose elements are given by } c_{ij} = \frac{x_{ij}}{t_i}, \text{ and } t_i = \max(A_i, L_j).$$

The inverse matrix indicates an influence, both directly and indirectly, of a change in a sector's investing (assets') amounts on other sectors' investing amounts directly as well as indirectly.

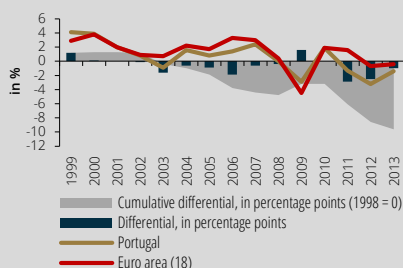
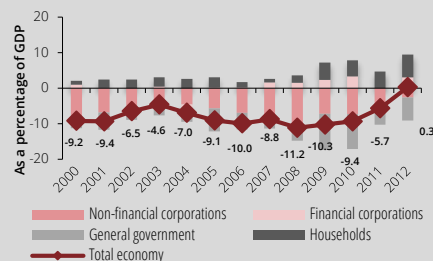
To construct matrix  $X$ , in this paper we use the quarterly financial accounts statistics<sup>26</sup> which, in addition to sector-level financial balance sheets, contain a detailed breakdown of financial assets and liabilities by creditor/debtor sector.

### 3. Inter-sectoral financial linkages in the Portuguese economy

Over the past decade, Portugal has deepened its divergence in terms of economic growth with respect to the euro area (Chart 1), mainly driven by the accumulation of external deficits and macroeconomic imbalances. As referred in the 2011 annual report of *Banco de Portugal*, the accumulated external indebtedness – made possible by the Portuguese participation in the euro area – arose from the behaviour of private agents and of public policies deeply inappropriate to the demands of the new regime arising from the adoption of the single currency. Indeed, the Portuguese economy had been a net borrower of funds from the rest of the world until 2011, as Almeida and Carvalho (2013) illustrate. Focusing on the period from 2000 to 2012 plotted in Chart 2, the average net borrowing of the economy was 7.8% of GDP. Despite some moderation in the early 2000s (2002 and 2003), net borrowing resumed its increasing trend immediately thereafter. Funding needs reached a maximum of slightly in excess of 11% of GDP in the midst of the global financial crisis in 2008. Although smaller, they remained high in 2009 and 2010.

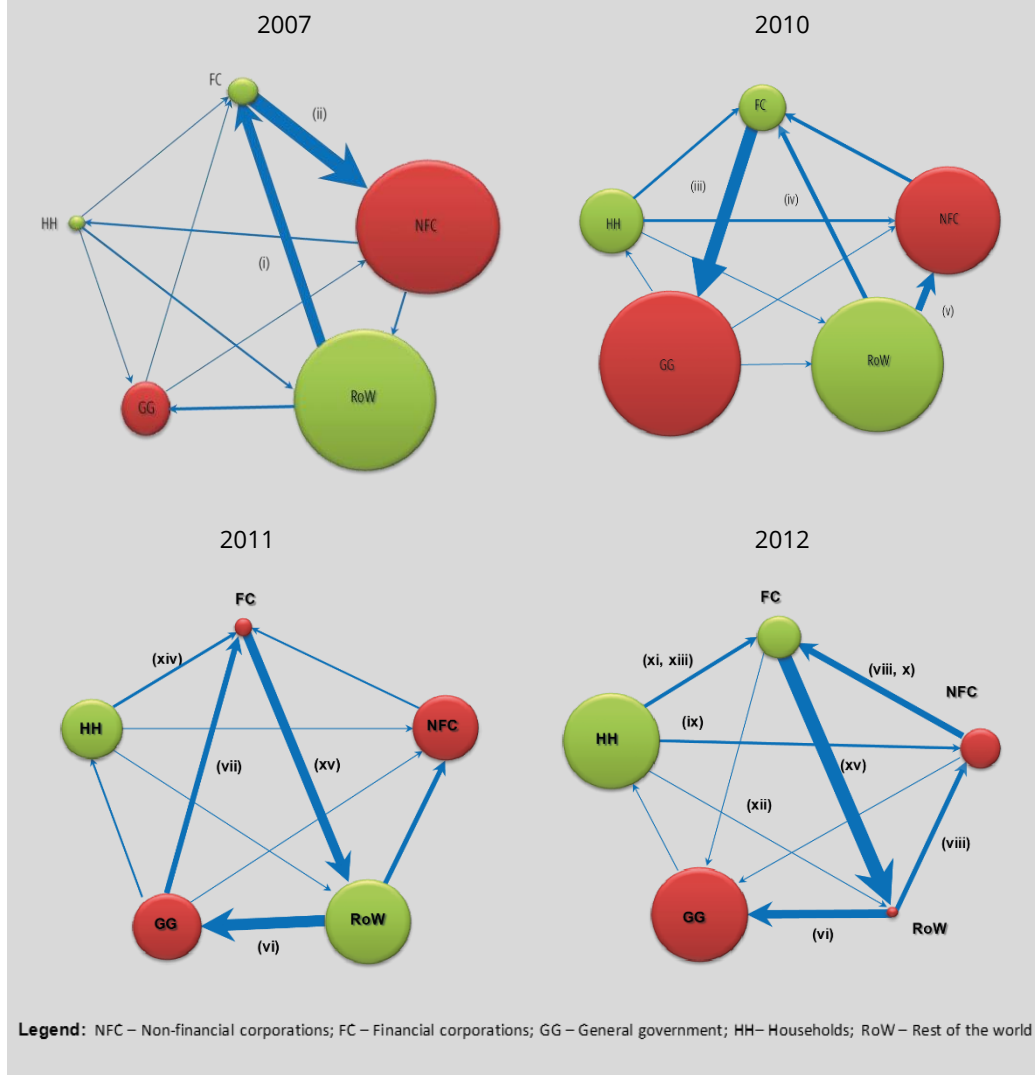
In the beginning of 2011, in the context of a new outbreak of the sovereign debt crisis in the euro area, there was a significant build-up of international investors' concerns over the sustainability of the public finances and the intertemporal dynamics of the Portuguese external debt. Deteriorating access conditions to international funding markets made the recourse to external financial assistance unavoidable, which was confirmed in the beginning of April 2011. The main purpose of the Economic and Financial Assistance Programme for Portugal is to guarantee the financing of the Portuguese economy for a period that allows implementing a gradual and structural correction of the imbalances in public finances and external accounts, in addition to preparing and implementing the structural reforms required to reverse the main structural impediments to the economy's growth potential.

The Portuguese economy suffered a strong contraction which intensified during the course of the year, reflecting an adjustment of public and private sector balance sheets, despite robust export growth.

**Chart 1 • Growth differential with the euro area, real growth rates of GDP****Chart 2 • Net lending (+) / Net borrowing (-) in % of GDP**

In 2012 the combination of a strong contraction in domestic demand with a remarkable robustness of exports implied a significant adjustment of the goods and services account which benefited the overall external balance. The decline in the external borrowing requirements reflected a reduction of the rate of investment in the economy and an increase in the domestic savings rate. In fact, in 2012 the Portuguese economy recorded a positive external balance of 0.3 per cent of GDP (measured by the global surplus of the current and capital accounts); this surplus occurred after an upward trend observed since 2009, mainly influenced by the evolution of the international trade in goods. Reference should also be made to the fact that the external financing profile was substantially different from that observed since the inception of the euro area, with the financial account being funded through a reduction of financial assets vis-à-vis the rest of the world, in contrast to the usual funding through an increase in external liabilities. This profile accentuates the trends observed since the onset of the international financial crisis in 2007, reflecting the increasingly lower international financial integration of the Portuguese economy.

Chart 3 illustrates the flow-of-funds (net) between the various sectors,<sup>27</sup> comparing the year 2007 with 2010, 2011 and 2012. The diameter of the circle is proportional to the financial saving of each sector (filled in green if positive and red if negative). The arrows illustrate the inter-sector relations and the direction of the net financing; the width is proportional to the size of these relations.

**Figure 3 • Flow-of-funds, 2007 – 2012**

In 2007, the most relevant inter-sector flows were registered in the financing provided by the rest of the world to the financial corporations (i), which channelled those funds mainly to the non-financial corporations (ii).

In 2010, contrarily to what had happened in 2007, the inter-sector flows revealed a greater involvement of the financial corporations, in particular the banking sector, in financing the general government (iii) which, in turn, resorted to the rest of the world (primarily to the Eurosystem) to obtain funds (iv). The rest of the world financing was mainly directed to the non-financial corporations (v) and the financial corporations (iv).

In 2011 and 2012, as Lima *et al.* (2013) describe, a significant change in the financial savings was observed as well as in the inter-sector flows. The efforts to reduce the general government deficit are observable in the chart together with the external financing of Portuguese public debt through the assistance programme. In the context of the Portuguese Economic Adjustment Programme, the structure of financing of general government (2011 and 2012) contrasts significantly with that of the previous years, particularly in terms of the sharp increase in (external) loans and in the net redemption of securities other than shares (mainly held by non-residents). The non-financial corporations' net borrowing was significantly reduced and the households maintained the savings

trend. As already referred above, in 2012 the Portuguese economy recorded a net external lending as illustrated by the red circle of the rest of the world.

More specifically, those movements first arose when the Economic and Financial Assistance Programme to Portugal started, in the second quarter of 2011: in 2011 and 2012, the borrowing needs of general government were satisfied essentially by the Programme (vi). In this framework, general government obtained external loans amounting to 35.4 and 27.6 euro billion, respectively in 2011 and 2012. This effect was partially compensated by the net repayment of public debt securities held by non-residents. In 2011, part of the loans received under the Economic and Financial Assistance Programme which had not been used, were channelled to financial corporations, through domestic deposits (vii).

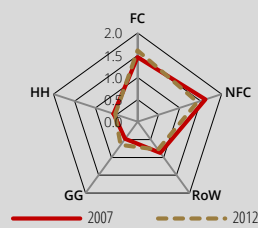
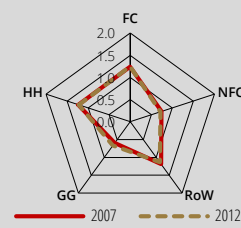
Non-financial corporations, the institutional sector presenting the second largest borrowing needs in 2012, were financed, in net terms, by the rest of the world and households. In the first case, the most significant inter-sector flows in 2012 were justified partly by the sale to non-residents, by financial corporations, of shares of non-financial corporations (viii). In the second case, it is noteworthy the investment, by households, in debt securities issued by non-financial corporations (ix). The net repayment of loans granted by the financial corporations to the non-financial corporations contributed significantly to the net financing of the non-financial corporations to the financial corporations (x).

In 2012, households were net lenders of corporations (financial and non-financial) and of the rest of the world. In the three cases, there was an increase of the investment, by households, in debt securities issued by entities of those sectors (xi, ix, xii). The net lending of households was also influenced, positively, by the net repayment of loans and, negatively, by the divestment in insurance technical reserves (xiii), in both cases vis-à-vis financial corporations. These movements are distinct from those occurred in 2011, when deposits increased and there was a reduction in investments funds shares/units and in insurance technical reserves (xiv).

In the financial corporations sector, in 2011 and 2012 there was a reduction of investments from non-residents, namely in deposits with resident banks and in securitisation units issued by securitisation funds (xv), following the redemption of securitisation operations occurred in previous years.

Chart 4 and Chart 5 below depict, respectively, the Power-of-Dispersion Index (PDI) and the Sensitivity-of-Dispersion Index (SDI), as proposed by Tsujimura and Mizoshita (2004) and Okuma (2012), for 2007 and 2012.<sup>28</sup>

The PDI indicates the direct as well as indirect demand for funds in total induced by the increment in demand for funds (excess-investments in terms of objective economy) by  $j$  th institutional sector. The SDI indicates the direct as well as indirect demand for funds in the  $i$  th institutional sector induced by the total sector's financing demand.

**Chart 4 • The Power-of-Dispersion Index (PDI)****Chart 5 • Sensitivity-of-Dispersion Index (SDI)**

**Legend:** NFC – Non-financial corporations; FC – Financial corporations; GG – General government; HH – Households; RoW – Rest of the world

Despite the international financial crisis and the adjustment of the Portuguese economy, which involved the gradual deleveraging of the financial sector, larger domestic savings and the efforts to reduce public deficit, between 2007 and 2012, both PDI and SDI remained barely the same. Interestingly, Tsujimura and Mizoshita (2004) note that, in their analysis, “The most prominent thing is that, the location of the plots on the diagram show minimal change despite the laps of time.” (1954-1999), which is an indication of the structural nature of these indices.

The financial sector exhibits, for both PDI and SDI, values greater than 1, confirming their role in the financial intermediation process. The non-financial corporations, show, for the PDI, also a value above 1, which can be explained by the fact that they are acting as financial intermediaries for their affiliated companies; this is particularly relevant in the case of Portugal, where, at the end of 2012, 60% of total liabilities are held against companies within the same sector. For the SDI, it is worth noting the prominent role of the rest of the world, together with the households and the financial sector, in satisfying the financing needs of the economy.

## 4. Concluding remarks

As pointed out by Castrén and Kavonius (2009), the financial crisis that erupted in August 2007 has highlighted the need for tools that can analyse risks and vulnerabilities in financial systems in a holistic way. While regular and detailed analysis of the main sectors of the financial system is necessary for the identification of developments that may threaten financial stability, it is clearly not sufficient. Modelling the interlinkages between the sectors is equally important as this aims at revealing the channels through which local shocks can propagate wider in financial systems. Integrated accounts and from-whom-to-whom analysis are thus a necessary pre-condition.

The main events that hit the Portuguese economy in the past (namely, historically low interest rates, increase in the leverage ratios, declining savings' rate, low economic growth) and in 2010 regarding the liquidity crisis and the sovereign debt problem that intensified in the course of 2011, are better understood in a setup where the interlinkages between the different players can be measured. The adjustment of the Portuguese economy has been mirrored in significant changes not only in terms of the economic sectors' balance sheets and net lending/borrowing but also, and more importantly, in terms of their interlinkages. Flow-of-funds are a powerful analytical tool to measure these changes.

To the extent that flow-of-funds can be viewed as a special deterministic case of CCA, it should be considered as a starting point for the standard CCA analysis, e.g., introducing the risk dimension and risk-transmission across sectors (which is out of the scope of this paper<sup>29</sup>).

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## Notes

\* 6<sup>th</sup> International Finance and Banking Society Conference on Alternative Future for Global Banking, Lisbon, Portugal, 18-20 June 2014

22. The analyses, opinions and findings of this paper represent the views of the authors, which are not necessarily those of the *Banco de Portugal* or the Eurosystem. Any errors and omissions are the sole responsibility of the authors. The data used in this paper refers to the data available at the time it was prepared and/or presented and, therefore, may not necessarily correspond to the most recent available data.

23. For details on data sources and compilation procedures refer to Lima and Monteiro (2011).

24. See also Okuma (2012). Plašil and Kubicová (2012) notation corresponds to an asset-oriented system.

25. The relationship between the two sectors is not symmetrical with regard to financial assets and liabilities. If one sector is a major creditor of another sector, it does not mean that it is also its debtor in the same amount.

26. A full from-whom-to-whom detail (for all financial instruments) is compiled by the Statistics Department of *Banco de Portugal* from 2006Q4 onwards.

27. The rest of the world sector corresponds to the symmetric of the Total economy, i.e., of all institutional sectors resident in Portugal.

28. Calculated for stocks.

29. See Silva (2010) for an application to Portugal with data up to 2009.

# What changed in financial intermediation in the aftermath of the crisis? – Evidence from Portugal<sup>\*30</sup>

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## **Abstract**

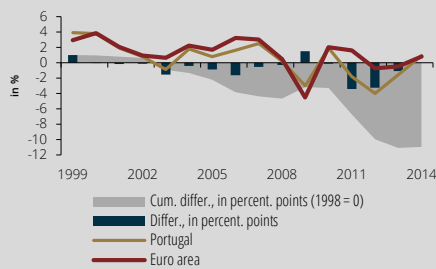
In this paper we focus on the role of financial intermediaries in the context of a highly indebted economy undergoing an overall adjustment process. We start by providing a broader view of the financial sector aligned with the new system of national accounts (ESA 2010/2008 SNA), which incorporate a series of improvements to the previous standards. In addition, given that one of the main objectives of the Economic and Financial Assistance Programme for Portugal for the banking sector was to “maintain liquidity and support a balanced and orderly deleveraging in the banking sector”, we will analyse the changes that occurred in the balance sheet of the banking sector – including not only commercial banks but also the central bank. In particular, the interlinkages between them will also be addressed. Based on statistical data published by *Banco de Portugal*, we argue that in the most recent years the main changes experienced by the Portuguese financial intermediaries can be summarised as follows: (i) the more relevant role of the central bank in terms of monetary policy operations carried out within the framework of the Eurosystem, in response to high primary liquidity demand by Portuguese credit institutions, in a context of financial market instability; and, (ii) the deleveraging in the banking sector, denoting changes in banks’ business models where, on the liabilities side, previous sources of funding (international financial markets) were replaced by funds provided by the central bank and by an enlarged deposit base, and, on the assets side, the credit reduction differed according to the type of borrower, with small and medium enterprises and state-owned enterprises experiencing a sharper credit contraction than non-financial holdings, large companies and exporting firms.

**Keywords:** financial intermediation; macro-financial linkages; balance sheet approach

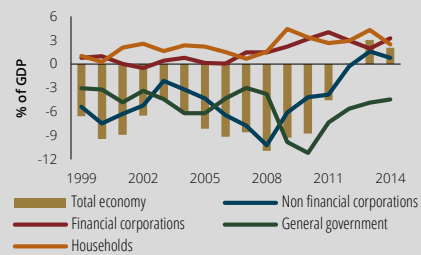
## 1. Introduction

The Portuguese economy has lagged behind the euro area average in most of the last 15 years, accumulating a differential of above 10 percentage points in terms of gross domestic product (GDP) growth (Figure 1).

**Figure 1 • Growth differential with the euro area, real growth rates of GDP**



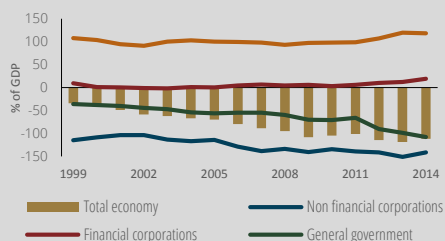
**Figure 2 • Net lending (+) / Net borrowing (-), by sector (% of GDP)**



During the same period, the Portuguese economy experienced insufficient domestic savings, which led to significant external deficits, reversed only from 2012 onwards (Figure 2). In particular, the borrowing needs of the general government are worth noting, with budget deficits around 10% of GDP in 2009 and 2010. Insufficient funds led also to the decrease of corporate investment which is visible from the path of the financial needs of non-financial corporations.

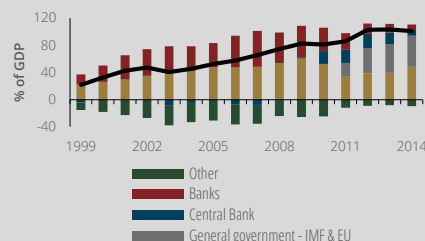
The accumulation of negative financial savings had an impact in the financial wealth of the economy and of the most indebted sectors, i.e., general government and non-financial corporations (Figure 3).

**Figure 3 • Financial wealth, by sector (% of GDP)**



Data sources: Banco de Portugal; INE; Portuguese Treasury and Debt Management Agency.

**Figure 4 • Net external debt, by sector (% of GDP)**



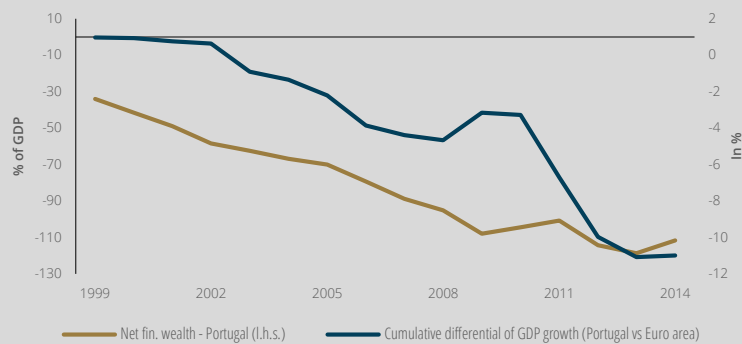
Consequently, external debt (Figure 4) has also increased, mostly on account of the general government. From 2008 onwards, as a consequence of the global financial crisis and the sovereign



debt crisis, regular access by domestic banks and the general government to the international financial markets became more difficult. The shortage of market financing has been overcome in two ways: through central bank financing in the context of the Eurosystem (addressed to banks) and through the Economic and Financial Assistance Programme for Portugal (the Programme) agreed in May 2011 with the European Union (EU) and the International Monetary Fund (IMF).

The link between excessive debt and low growth is noticeable when looking at Portuguese data for the period 1999-2014 (Figure 5) – Portugal's net financial wealth shows a marked decreasing trend since 1999, and the accumulation of the GDP growth differential between Portugal and the euro area has also been declining since that year (except for 2009 and 2014).

**Figure 5 • Financial wealth and growth (% GDP)**



Data sources: *Banco de Portugal*; Eurostat; INE; authors' calculations.

It is therefore in this context that the Portuguese economy can be regarded as an interesting case. We will illustrate what has been the role of the financial intermediaries and how their balance sheets have changed. In particular, the interlinkages within the banking sector – including the central bank – will be thoroughly analysed. This is of special interest given that one of the main objectives of the Programme for the banking sector was to “maintain liquidity and support a balanced and orderly deleveraging in the banking sector”. This objective was part of a more ambitious goal of achieving a sounder macroeconomic framework for the Portuguese economy. In particular, besides deleveraging of the banking sector, the main goal was to reduce the fiscal and the external deficits.

We use data published by *Banco de Portugal*,<sup>31</sup> both in its Statistical Bulletin and in *BPstat* | Statistics Online, namely data on national financial accounts, central credit register statistical information, non-financial sector indebtedness and international investment position. For the purpose of data classification, we follow the European System of Accounts (ESA), the internationally agreed standard set of recommendations on how to compile measures of economic activity in accordance with strict accounting conventions based on economic principles.

In this framework, financial corporations are institutional units principally engaged in the provision of financial services, including financial intermediation. The new European system of accounts 2010 (ESA 2010), which is the European counterpart of the 2008 SNA adopted by the United Nations Statistical Commission, has introduced a more detailed classification of the financial corporations sector. This sector is now divided into nine subsectors (as opposed to five in the ESA 95 or the 1993 SNA), according to the activity of the unit in the market and the liquidity of its liabilities. They are shown in Table 1 (S.121

to S.129). The arrows and the dotted line relationship show the general correspondence between ESA 95 and ESA 2010 classifications of the financial corporations' subsectors. A substantial number of holding companies and special purpose entities (SPEs), which were previously classified as non-financial corporations, are now included in the financial corporations sector. This change results from the fact that these entities are not directly involved in the main activity of their investees, and act only as asset management companies or financial vehicles.

**Table 1 • Correspondence between ESA 95 and ESA 2010 financial corporations' subsectors**

ESA 95 Financial corporations sub-sectors				ESA 2010 Financial corporations sub-sectors	ECB labels
Central Bank	S.121	→	S.121	Central Bank	MFIs
Other Monetary and Financial Institutions	S.122	↘	S.122	Other Monetary and Financial Institutions	
			S.123	Money market funds	
Other financial intermediaries	S.123	↘	S.124	Non-Money-Market Investment Funds	OFIs
		↘	S.125	Other financial intermediaries	
Financial auxiliaries	S.124	→	S.126	Financial auxiliaries	
		→	S.127	Captive financial institutions	ICPFs
Insurance corporations and pension funds	S.125	↘	S.128	Insurance corporations	
		↘	S.129	Pension Funds	
Non-financial corporations	S.11		S.11	Non-financial corporations	

In this paper we will thus focus on the financial account of the financial sector and its main sub-sectors, while analysing also their exposures to non-residents. One additional aspect that will be relevant for the purpose of this paper is that of consolidation, which refers to the elimination of transactions occurring between units that are grouped together and to the elimination of financial assets and the counterpart liabilities between them. Therefore, making use of both consolidated and unconsolidated data we will be able to derive the interlinkages between the different subsectors that form the financial sector.

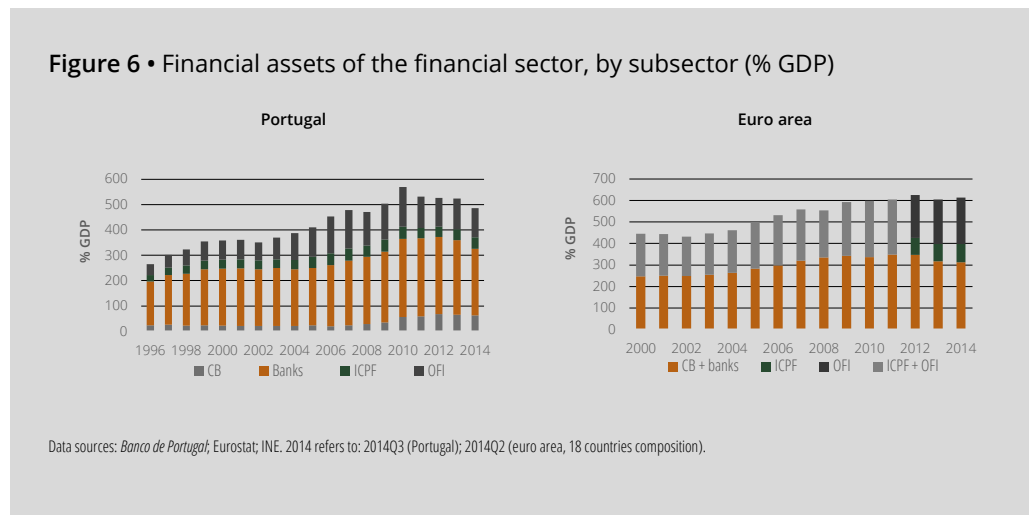
The remainder of the paper is organised as follows: in section 2 we characterise the Portuguese financial sector and its evolution in the recent past, addressing in particular the deleveraging process that characterises the most recent years; the international exposure of the Portuguese financial sector will also be analysed in this section. The interlinkages within the sector are analysed in section 3 before concluding with section 4.

## 2. Measuring the financial sector in the Portuguese economy

For the sake of simplicity, in this paper we consider four main players within the financial sector: i. The central bank (CB); ii. Other monetary financial institutions (from now on referred to as “banks”); iii. Insurance companies and pension funds (ICPFs); and, iv. Other financial institutions (OFIs).

### 2.1. Balance sheet approach

We start by measuring the weight of the financial sector in terms of (unconsolidated) financial assets in % of GDP (Figure 6). It is also possible to observe how the structure within the sector has evolved over time. We use data from national financial accounts, available in Chapter F of the *Banco de Portugal's* Statistical Bulletin and in *BPstat* | Statistics Online.



Financial corporations in Portugal have increased their weight in the economy over the last 20 years, reaching a peak of 570% of GDP in 2010. For the period 2010-2014, the relative weight of the financial sector in Portugal is slightly below the one in the euro area. In terms of composition by subsector, banks are, by and large, the main players in the Portuguese financial sector, representing more than 50% of the total. Nonetheless, this share has been diminishing overtime due to the increase of the relative importance of OFIs, especially until 2010, and, since then, to the increase of the CB weight – a trend that is detailed in section 2.3, with a focus on the external exposure. Banks' total assets actually reduced in 2013 and 2014, in the context of the deleveraging process of their balance sheets as established by the Programme. Section 2.2 provides additional evidence on the deleveraging over the Programme period according to borrower type. Turning to the type of financial instruments held by financial corporations, Figure 7 highlights several differences across sectors.

Starting with the **CB**, it is noteworthy the trend observed since 2009, with a sharp increase in deposits. This evolution is mainly due to monetary policy operations in the context of the Eurosystem, which we address in more detail in section 2.3.

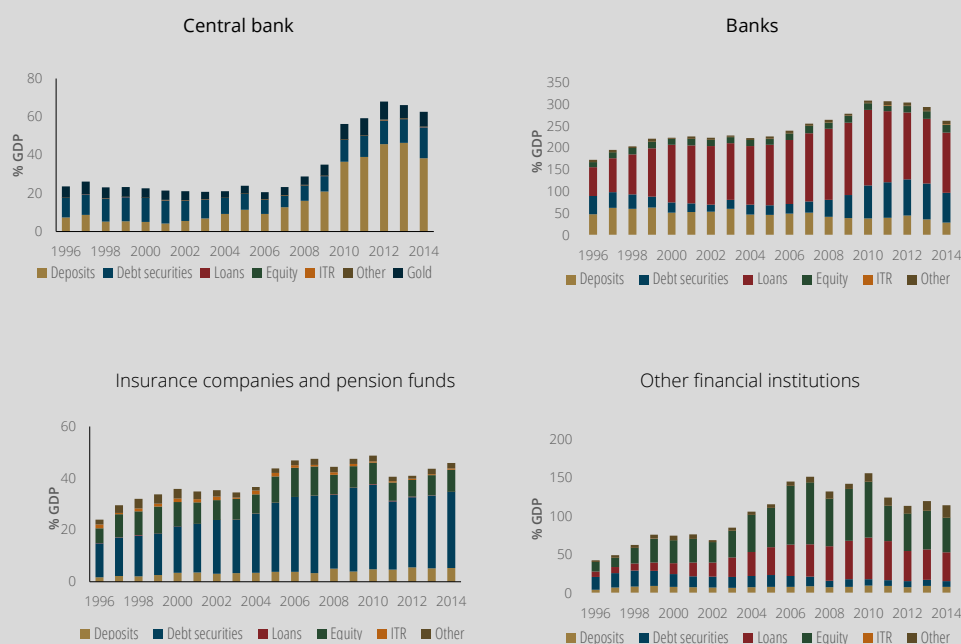
Regarding **banks**, by their own nature, loans represent the largest share on the assets' side, being the main driver of the growth pattern exhibited since 1996. In 2009, it can be observed an increase in terms of holdings of debt securities, due to the purchase of domestic public debt by Portuguese banks. During the Programme, banks faced the challenge of deleveraging their balance sheets

while maintaining an adequate flow of credit to the economy. According to the European Commission (2014), at the beginning of the Programme, banks' aggregate loan-to-deposit (LTD) ratio was well above 160%, implying the need for an immediate deleveraging in order to lower the dependence on wholesale funding. Ambitious deleveraging targets have been met, with the LTD ratio now around 117%. The smoothness of the deleveraging process, coupled with steps to lower banks' funding costs – the introduction of a cap on deposit remuneration, capital injections to strengthen the lenders' CET1 (common equity Tier 1) ratios and the Eurosystem long-term (3-year) refinancing operations (LTROs) – have helped to maintain a supply of credit to healthy and viable firms. While there has been evidence of supply constraints, a decline in the demand for loans has been a key driver behind lower credit volumes since the beginning of the Programme.

**ICPFs** nearly doubled their financial assets between 1996 and 2010, investing mostly in debt securities. In 2011 the sector experienced a significant contraction in the activity, explained not only by actual withdrawals from the beneficiaries but also by holding losses associated to public debt caused by the sovereign debt crisis. Additionally, private pension funds were transferred to Social Security during the period. In 2013 and 2014 the sector seems to have been recovering at a relatively smooth pace. David and Lima (2011) provide a more detailed analysis of the Portuguese ICPF financial assets and liabilities.

Finally, **OFIs**, due to the fact that they comprise a large number of holdings companies and head-offices, have in their aggregate balance sheet mainly the equity participation in their subsidiaries. The loans granted by this sector include: (i) loans granted by holding companies and head-offices to their subsidiaries; (ii) loans granted by credit institutions specialized in certain types of credit (e.g., consumption, micro-credit, small businesses, etc.) that do not qualify as banks because they are not allowed to receive deposits from the public; and, (iii) securitized loans, originally granted by banks, which are then recorded in the balance sheet of the securitization vehicles classified as OFIs.

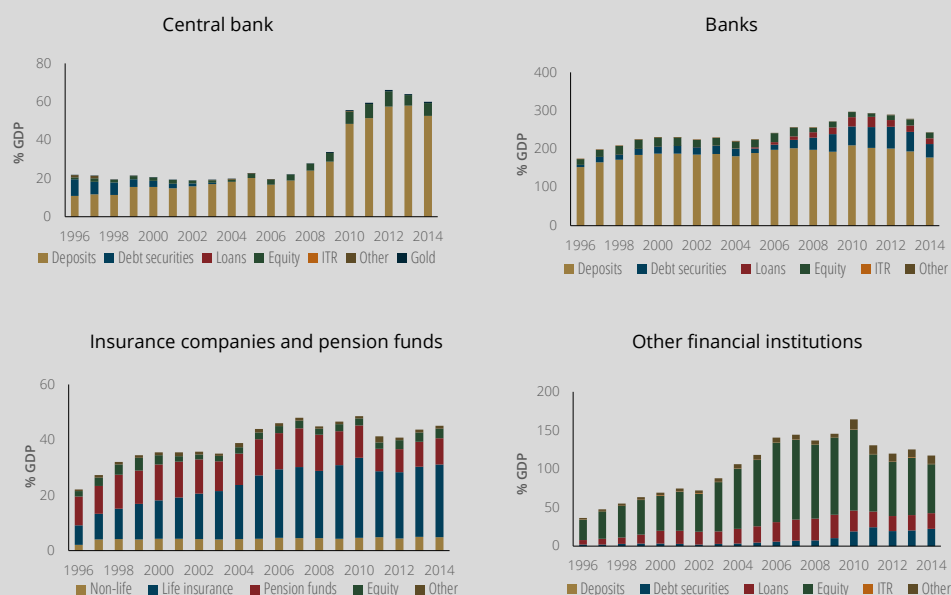
**Figure 7 • Composition of financial assets of the Portuguese financial sector, by sub-sector (% GDP)**



Data sources: Banco de Portugal; INE.

Figure 8 illustrates the sources of funding for each of the subsectors. Both the **CB** and the **banks** have deposits as their main funding source. In September 2012, *Banco de Portugal* (BdP) set up a platform to revive interbank lending, which was well received among Portuguese lenders. Nevertheless, Portuguese banks remained heavily reliant on Eurosystem funding, the bulk of which was accessed in the form of LTROs at the end of 2011 and early in 2012. Additionally, in the case of banks, it is noteworthy the recent increase recorded in debt securities issued. In fact, according to the European Commission (2014), as sovereign yields declined banks took advantage of an improvement in market sentiment and began issuing unsecured long-term bonds in November 2012. By the end of the Programme, four out of six of the biggest Portuguese banks had carried out successful bond issuances. Banks' funding and capital plans forecast a further reduction in reliance on Eurosystem funding by the end of 2015 and in the following year.

**Figure 8 • Composition of liabilities of the Portuguese financial sector, by subsector (% GDP)**



Data sources: Banco de Portugal, INE.

The bank retail deposit base (non-financial corporations and households) expanded during the Programme period. Between April 2011 and November 2014, deposits for those sectors increased by 8.3%, reflecting an increase of 11.8% in household deposits that was partially offset by a 4.1% decline in corporate deposits. In the early part of the Programme, banks made aggressive efforts towards meeting the end-2014 target of a LTD ratio of 120%. The commercial strategy was similar across the board, bidding up deposit remuneration in order to increase rapidly the deposit base. The BdP intervened to slow down the spiralling cost of deposits and required additional capital whenever a bank offered deposit remuneration well above the equivalent Euribor rate.<sup>32</sup> Consequently, the remuneration for new deposits declined, also halting and partly reversing (in 2012 and 2013) the considerable portfolio shifts that moved resident funds from insurance products into banks' savings books.

Due to their own nature, **ICPFs** issue insurance technical reserves (ITRs). By type of business, we can see that non-life insurance remained barely unchanged at around 5% of GDP; life insurance

grew from 7% of GDP in 1996 to 26% of GDP towards the end of 2014, thus acting as the main driver of the sector expansion for the past two decades; pension funds grew at a very moderate pace between 1996 and 2007, decreasing afterwards to same level of 1996 (10% of GDP). The reduction in 2011 affected both life insurance and pension funds (by -5% of GDP each).

## 2.2. Deleveraging over the Programme period according to borrower type<sup>33</sup>

Total lending<sup>34</sup> to private and public companies fell from EUR 324.4 billion in March 2011 to EUR 297.6 billion in November 2014. The implied debt to GDP ratio fell from 180.8% to 171.7%.

While the aggregate number suggests that little deleveraging has taken place over that period, disaggregated data for the Programme period indicates a more heterogeneous picture – with small and medium enterprises (SMEs) and state-owned enterprises (SOEs) reducing their debt burden while non-financial holdings and large companies were able to expand or maintain their debt. The reduction in indebtedness was first and foremost evident in the 344,000 micro-companies<sup>35</sup> and the 34,000 small companies which saw their debt decrease by almost 20%.

In terms of the overall loan exposure to the domestic financial sector, 46% of the companies in Portugal owe less than EUR 20,000 and two thirds owe less than EUR 50,000. Typically smaller companies are heavily constrained in substituting bank lending by other forms of external financing. Hence, these companies may have faced significant difficulties in refinancing their bank loans over the past three years. This seems to be confirmed by the large share of overdue loans below EUR 20,000, which in September 2014 amounted to 23.7%, while this rate was only 11.4% for loans above EUR 5 million. However, in terms of the number of firms with overdue loans the distribution is more even: 33% of firms with loans below EUR 20,000 have overdue loans while for firms with loans above EUR 5 million this share is 36.5%. More striking is the increase over time: in march-2011, those percentages were 24.9% and 21.3%, respectively. Portugal's 6,000 medium-sized enterprises had EUR 7.8 billion less in funds by November 2014 than at Programme start. On the other hand, Portugal's 1,000 largest companies, to which 1/3 of all corporate private sector credit was granted, barely changed their funding over the Programme period (-1% in November 2014).

The 9% reduction in private companies' debt results from differing behaviour between foreign and domestic lenders. Domestic loans to private companies decreased by 17.4% while foreign financed loans increased by 47.0%. Domestically held bonds went down by 10.3% whereas bonds held by foreigners increased by 62.5%. Overall, during the Programme period, foreign lenders substituted for Portuguese lenders.

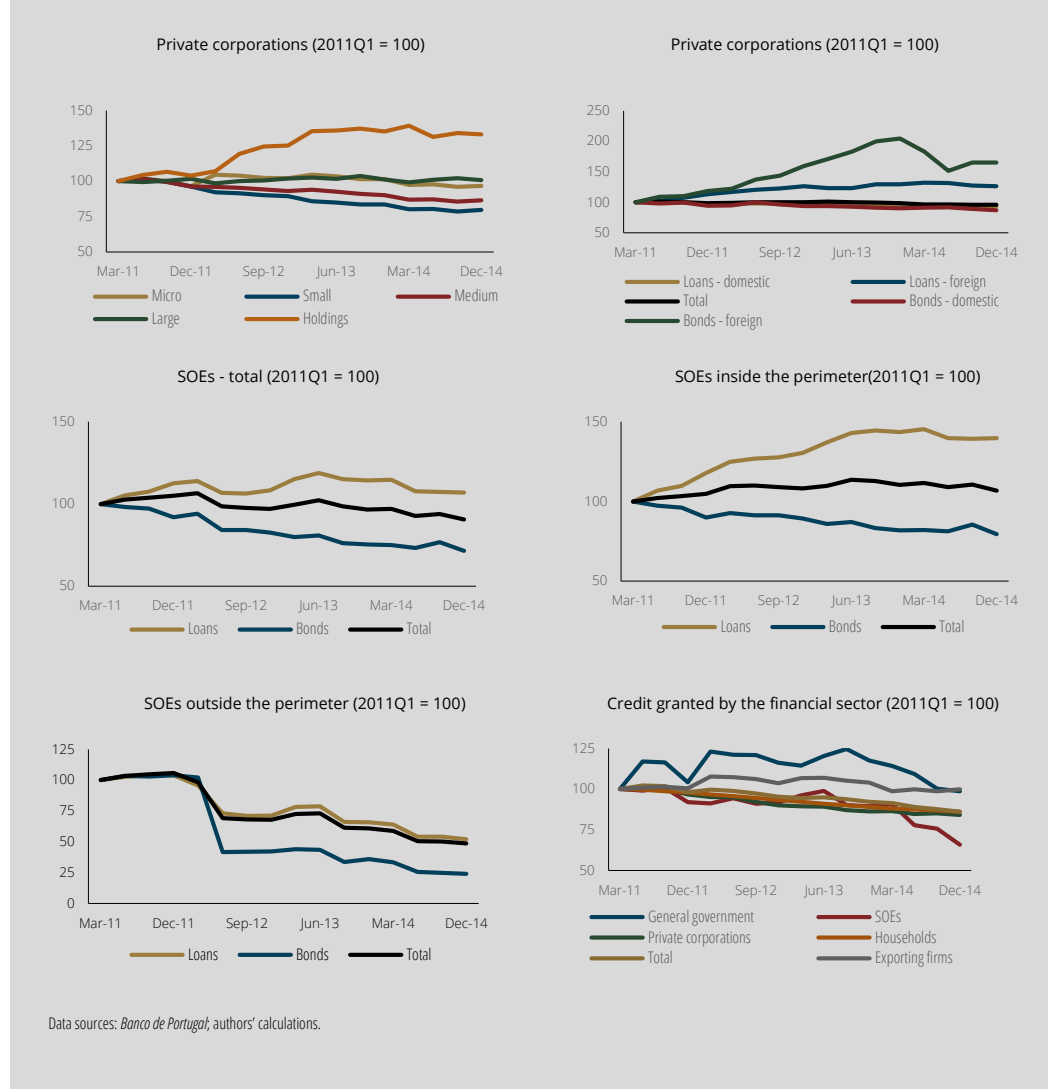
Total lending to SOEs<sup>36</sup> declined by EUR 3 billion to EUR 45.7 billion over the Programme period. Whereas companies included in the general government perimeter increased their debt by 10%, those outside the perimeter nearly halved their debt. Bonds issued decreased by 77% for companies outside the general government's perimeter, while they declined by only 17% for those counted within the perimeter. Loans to SOEs declined by 45% for those outside but increased by 40% for those inside the perimeter. The decline in SOEs outside the perimeter also reflects the impact of privatisations, *i.e.*, SOEs that became private companies during this period.

Households' debt reduced by 11% since the beginning of the Programme.

Focusing on the lending granted by the domestic financial sector, private companies experienced a reduction of 20%, SOEs of 27% and households 14%. Within the private sector there are nevertheless divergent behaviours, with non-financial holdings and large companies being able to expand or maintain their debt. By economic activity, deleveraging happens faster for some activities

(e.g., construction) as their over-indebtedness is higher. Interestingly, loans granted to exporting companies have evolved more favourably.

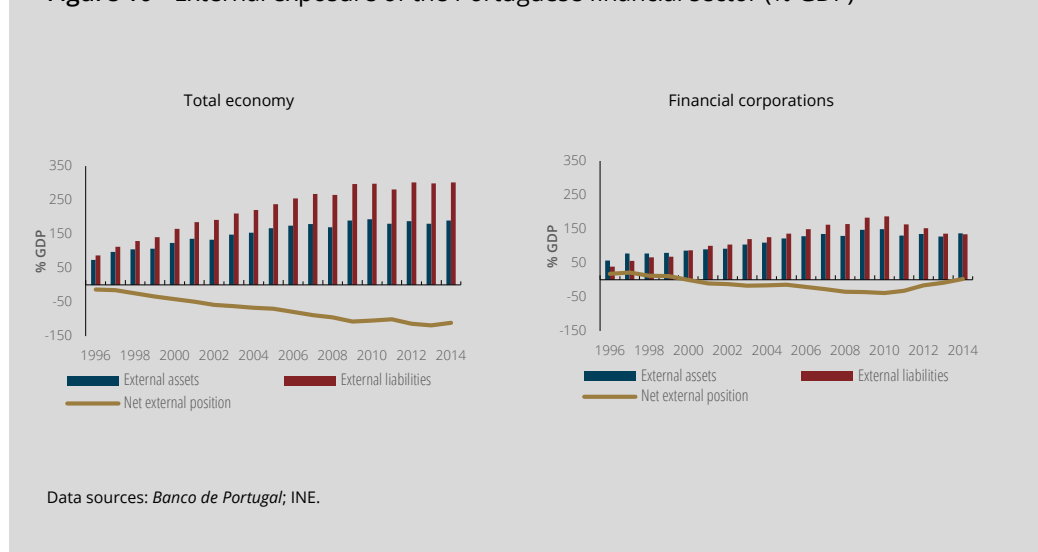
**Figure 9 • Deleveraging over the Programme period according to borrower type**



## 2.3. External exposures

In this section we analyse the evolution of external assets and liabilities for each subsector of the Portuguese financial sector. We use data from Chapter C.3 of the *Banco de Portugal's* Statistical Bulletin and from *BPstat* | Statistics Online on the international investment position where data for other non-financial sectors (e.g., general government; households; and, non-financial corporations) are also available. Detail on the main items can also be found: (i) direct investment; (ii) portfolio investment; (iii) other investment; (iv) derivatives; and, (v) reserve assets. For the purpose of this paper we focus on the features of the financial corporations' subsectors without detailing in terms of the main components.

On average, the financial sector represents 73% of the economy's external assets. Concerning external liabilities, its share went up from 45% in 1996 to 63% in 2010, to turn back to 44% in 2014 (Figure 10). However, the external exposure of the Portuguese financial sector as a whole is driven by very different behaviours from each of its subsectors (Figure 11).

**Figure 10 • External exposure of the Portuguese financial sector (% GDP)**

Until 2009, the **CB** exhibited a positive net external position; from 2010 onwards the net external position is negative. Nonetheless, it is possible to identify two distinct phases: first, 2010-2012, where the growth of external liabilities is not accompanied by an increase in the external assets at the same pace, thus leading to a deterioration of the net external position; and second, 2013-2014, where we can observe a decrease of external liabilities, thus contributing to improve the net external position, reaching towards the end-2014 a relatively balanced net external position. This evolution reflects the role of the central bank as an intermediary in the Eurosystem financing to resident banks: it is recorded as a liability of *Banco de Portugal* against the Eurosystem and an asset against the resident banks (see also Section 4). In fact, according to the *Banco de Portugal's* Annual Reports (2010-2013), “In 2010 there was an increase in positions relating to monetary policy operations. This reflects the current market situation, which is marked by a continued increase in the demand for liquidity in the money market. In a context of financial market instability, liquidity management by Portuguese credit institutions, like in other countries, continued to be translated into high primary liquidity demand throughout the whole year, evidenced by a sharp rise in the relative value of the main refinancing operations and longer-term refinancing operations. The increase in claims related to monetary policy operations during the review period also reflects a rise in the portfolio of securities held for monetary policy purposes. The growth of claims related to monetary policy operations causes a very sharp rise in the Bank's intra-Eurosystem liabilities.” As for 2013, “The total (net) balance of monetary policy operations, carried out within the framework of the Eurosystem, recorded a significant reduction in 2013 compared with 2012 (€-5,956 million), reversing the growth trend seen in the past few years. The significant decline in the amount outstanding of these operations was chiefly due to the decrease in the provision of liquidity to domestic credit institutions (€-4,920 million) in the context of the deleveraging process of their balance sheets.”

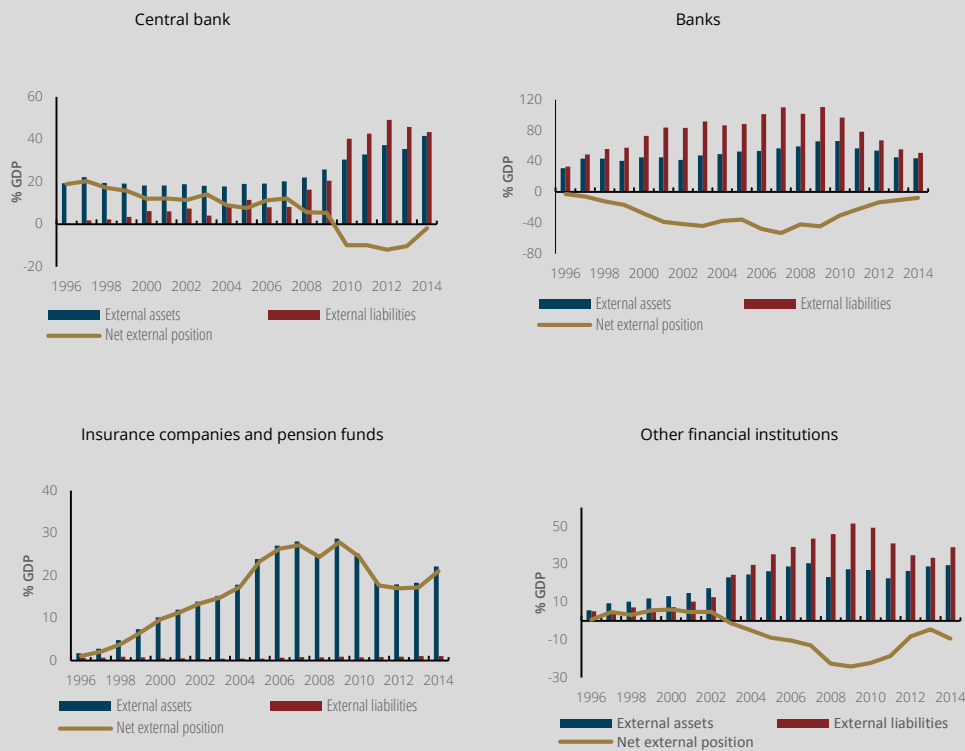
Regarding **banks**, the net external position exhibits a U-shaped line for the period under analysis. From an almost balanced situation in 1996, the banks' net external position reached -53% of GDP in 2007, mainly driven by the liabilities side (110% of GDP). The nearly balanced position registered towards the end-2014 is explained by the fact that banks' external liabilities almost halved to 54% of GDP. This results also from the deleveraging process of the banks' balance sheets.

**ICPFs** present a clear positive net external position throughout the period, which accompanied also the growth of this sector as depicted in Figure 7. The sharp contraction in 2010-2011 is linked



to the sovereign debt crisis denoting not only holding losses associated to public debt in the balance sheet of ICPF but also sales of this type of assets.

**Figure 11 • External exposure of the Portuguese financial sector, by subsector (% GDP)**



Data sources: Banco de Portugal; INE.

Finally, concerning **OFIs**, between 2003 and 2009 there was a strong dynamics of this sector *vis-à-vis* the rest-of-the-world, mainly as a result of securitisation operations carried out by Portuguese entities through a non-resident vehicle. The relevance of this phenomenon has been decreasing steadily since then, mainly due to the fact that ECB started to accept credit claims as collateral for monetary policy operations.

### 3. Unveiling financial sector interlinkages: consolidated vs. unconsolidated data

Comparing consolidated to unconsolidated figures, we are able to derive the interlinkages between the different subsectors that compose an aggregate sector. Those interlinkages can be divided into two categories: (i) intra-sector operations corresponding to the activity between entities classified within the same subsector (e.g., between bank A and bank B); (ii) inter-sector operations, which refer to operations between entities belonging to different subsectors of the aggregate sector under analysis (e.g., between bank A and insurance company C).

The following general formula applies:

$$X = \sum_{i=1}^n \sum_{j=1}^n A(i, j)$$

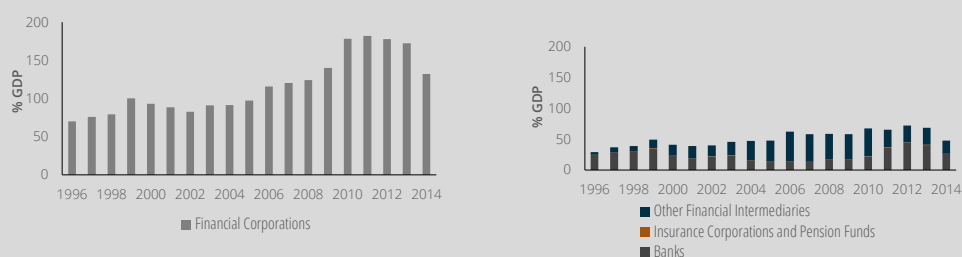
Where:

$X$  corresponds to total operations within sector  $X$  composed of  $n$  subsectors;

$\sum_{i=1}^n A(i, i)$  represents the sum of operations within each subsector  $i$  that belongs to sector  $X$ ;

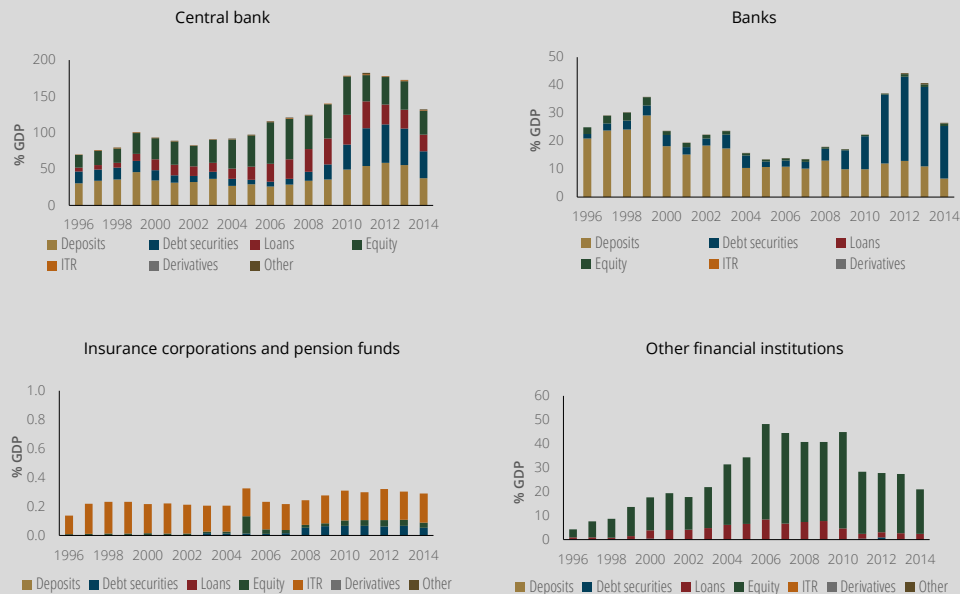
$\sum_{i=1}^n \sum_{j=1}^n A(i, j), i \neq j$  represents the sum of operations between subsector  $i$  and subsector  $j$  that belong to sector  $X$ .

**Figure 12 • Intra-sector stocks (% GDP)**



Data sources: *Banco de Portugal*; INE.

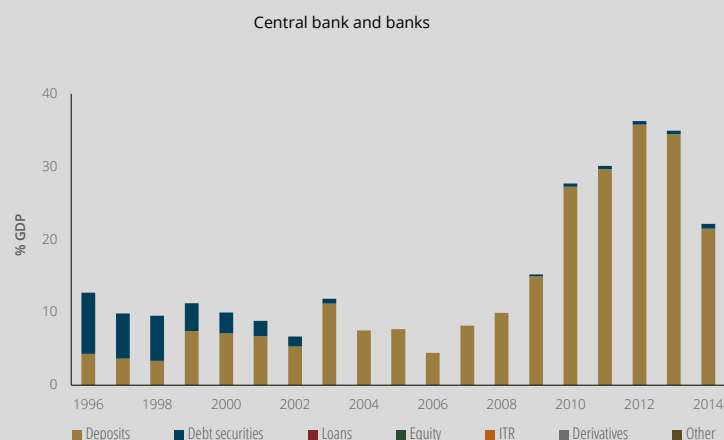
In Portugal significant intra-sector flows are observed for the financial corporations' sector (see Figure 12). Those flows are significantly larger than the sum of the intra-sector flows of the three main subsectors, denoting significant interlinkages between the different financial corporations' subsectors. This can be most likely explained by the existence of financial groups in Portugal typically composed by a diversity of entities operating in the different financial domains (banks, holding corporations, insurance companies, pension funds, etc.). The funding between the CB and banks also plays a role in this respect. In the case of the ICPFs sector in Portugal, intra-sector positions are rather small, which can be interpreted as evidence that reinsurance is mostly done with foreign insurance companies.

**Figure 13 • Intra-sector stocks, by subsector and financial instrument (% GDP)**

Data sources: Banco de Portugal, INE.

In terms of financial instruments, we have (see Figure 13): (i) deposits, mainly influenced by operations between banks and with banks and the central bank; (ii) debt securities, especially in the recent past, for banks' issues that remained with the issuer or were acquired by other banks, particularly after the sovereign debt crisis, as they could be used as collateral for monetary operations with the ECB; and, (iii) equity and loans, justified by intra-OFIs operations (with a significant importance of holding corporations) and relationship between OFIs and banks (usually belonging to the same financial group).

We focus now the study on the relationship between banks and the central bank (see Figure 14). Deposits are, by far, the most prominent financial transactions within the banking sector. As already referred, in the aftermath of the international financial crisis, Portuguese banks became highly dependent upon the central bank and the Eurosystem intermediation. In addition to the traditional deposit facilities, debt securities operations were also relevant, and, in particular, we can divide the time span under analysis into 3 sub-periods: (i) 1994-2004, where we observed liabilities of the central bank could be found in the banks' portfolio, related to the absorption of liquidity (these securities refer to the liquidity absorption operated at the moment the new regime ruling minimum cash reserves came into force in late 1994); (ii) 2004-2008, where no debt securities operations were recorded between the two subsectors; and (iii) 2009-to date, even though in very limited amounts, the central bank purchased some banks' bonds.

**Figure 14 • Inter-sector stocks (% GDP)**

Data sources: *Banco de Portugal*; INE; authors' calculations.

## 4. Concluding remarks

In the most recent years the main changes experienced by the Portuguese financial intermediaries are the following: (i) the role of the central bank in terms of monetary policy operations, carried out within the framework of the Eurosystem, in response to high primary liquidity demand by Portuguese credit institutions, in a context of financial market instability; and, (ii) deleveraging in the banking sector, denoting some changes in banks' business models where, on the liabilities side, previous sources of funding (international financial markets) were replaced by funds provided by the central bank and by an enlarged retail deposit base, and, on the assets side, the credit reduction differed according to the type of borrower, with SMEs and SOEs experiencing a sharper credit contraction than non-financial holdings, large companies and exporting firms.

Looking ahead, in the course of 2015 and 2016 the financial intermediation in Europe will be facing additional challenges. The January 2015 bank lending survey for the euro area indicated a further net easing of credit standards in the fourth quarter of 2014, with cross-country disparities decreasing in parallel with an increase in net demand for loans across all loan categories. Banks expect that these dynamics will continue in early 2015. Despite these improvements, lending to non-financial corporations remains weak and continues to reflect the lagged relationship with the business cycle, credit risk, credit supply factors and the ongoing adjustment of financial and non-financial sector balance sheets. In January 2015 the ECB announced an expanded asset purchase programme to include bonds issued by euro area central governments, agencies and European institutions, with combined monthly asset purchases to amount to €60 billion intended to be carried out until at least September 2016. Aimed at fulfilling the ECB's price stability mandate, this programme will see the ECB add the purchase of sovereign bonds to its existing private sector asset purchase programmes. Asset purchases provide monetary stimulus to the economy in a context where key ECB interest rates are at their lower bound. They further ease monetary and financial conditions, making access to finance cheaper for firms and households. This tends to support investment and consumption, and ultimately contributes to a return of inflation rates towards 2%.

The ECB monetary policy measures should support a further improvement in credit flows. This will affect not only the balance sheets of central banks, banks and debtors but also their interlinkages.

Monetary and financial statistics, balance of payments and financial accounts' data will thus be of utmost importance to assess and monitor these developments.

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## Notes

\* 5<sup>th</sup> Conference of the Financial Engineering and Banking Society (FEBS), Nantes, France, 11-13 June 2015

30. The analyses, opinions and findings of this paper represent the views of the authors, which are not necessarily those of the *Banco de Portugal* or the Eurosystem. Any errors and omissions are the sole responsibility of the authors. The data used in this paper refers to the data available at the time it was prepared and/or presented and, therefore, may not necessarily correspond to the most recent available data.

31. With reference to the January 2015 edition of the Statistical Bulletin. Data for 2014 refer to 2014Q3 unless stated otherwise.

32. The BdP required additional capital whenever a bank offered a deposit remuneration 300 basis points above the equivalent Euribor rate. In February 2012, the threshold was lowered to 225 basis points and thereby further strengthening the measure.

33. Based on the European Commission assessment of the Portuguese economy under its 2011-2014 EU/IMF adjustment programme, updated with the latest available data and the new sector classification according to ESA 2010.

34. Total lending includes loans, debt securities (nominal value) and trade credits granted by any creditor, financial and non-financial, both resident and non-resident. Data are non-consolidated. Data are available in Chapter K of the *Banco de Portugal's* Statistical Bulletin.

35. Classification based on the Commission Recommendation of 6 May 2003. Micro corporations: number of employees below 10 and turnover and/or annual balance sheet total not above EUR 2 million. Small corporations: number of employees below 50 and turnover and/or annual balance sheet total does not exceed EUR 10 million. Medium-sized corporations: number of employees below 250 and annual turnover not exceeding EUR 50 million and/or annual balance sheet total not exceeding EUR 43 million. Large corporations: remaining cases. Non-financial holdings are not classified by size.

36. State-owned enterprises both inside and outside the general government perimeter.



# Using financial accounts to better understand sectoral financial interlinkages<sup>\*37</sup>

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## Abstract

The global financial crisis of 2008 exposed the existence of serious data gaps in a set of important domains for macroeconomic policy analysis. One of such domains relates to sectoral accounts, more specifically, sectoral balance sheet data and flow of funds information (*vd.* recommendation 15 of the G20 Data Gaps Initiative). In fact, such information is an important analytical tool for macroeconomic analysis and financial stability purpose in a context characterized by an increased financial interconnectedness between economies and high financial positions of the different sectors. This paper presents the new compilation methods of financial accounts data at the *Banco de Portugal*, including from-whom-to-whom matrices and flow of funds information, and the powerful uses of such information to better understanding sectoral financial interlinkages and in supporting policy decision making.

**Keywords:** financial intermediation; macro-financial linkages; balance sheet approach

## 1. Introduction

Financial accounts are an integral part of the national accounts. They are a simplified statistical representation of the financing structure and net financial assets of the various institutional sectors and give an overview of the uses of the financial surpluses and the way deficits are financed. With additional information on the counterparts of financial operations, from-whom-to-whom matrices are possible to compile. The flow of funds is then constructed on the basis of these matrices, shows the interlinkages between institutional sectors and is, therefore, a powerful tool to support decision making in a macroeconomic level.

The compilation of the flow of funds demands the availability of detailed information for all institutional sectors, financial instruments and counterparts.

This note presents, in section 2, the managing of the compilation of financial accounts in the *Banco de Portugal*. In section 3 we explain the developments and uses of the flow of funds in the *Banco de Portugal*. In section 4, we show some examples of the use of financial accounts for analysis purposes, in particular concerning the financial sector. Section 5 concludes.

\* First Conference on "Statistics for Economic and Financial Analysis", Santiago, Chile, September 29<sup>th</sup>-30<sup>th</sup>, 2015.

## 2. Managing the compilation of financial accounts

Financial accounts are a component of the national accounts. Following a protocol signed in 1998, the responsibility for the compilation of national accounts is shared between INE – Instituto Nacional de Estatística (the Portuguese national statistical institute), for the non-financial accounts, and the *Banco de Portugal* for the financial accounts. The rationale for this arrangement is that the Portuguese central bank already produces a cluster of statistics necessary for the financial accounts. The two institutions have set up mechanisms for co-operation and consultation, necessary to ensure a high degree of consistency between the financial and the non-financial accounts. The situation is similar to other euro area countries, where the national central bank often has responsibility for compiling the country's financial accounts. The close collaboration between the *Banco de Portugal* and INE leads to better quality in the two types of accounts. This stems, for instance, from the cross-checking of primary information and statistical criteria in a way that reduces the possibility of statistical discrepancies.

Moreover, in the case of the general government institutional sector, an agreement of institutional cooperation between INE, the *Banco de Portugal* and the Ministry of Finance and Public Administration was put into place in 2006, to coordinate the compilation of the several statistics in the field of that institutional sector.

Financial accounts started to be published in Portugal in 2005 with an annual frequency. Later on, in 2007, quarterly financial accounts started to be disseminated.

In organizational terms, the compilation of financial accounts has been assigned to a unit, the Financial Accounts Unit, created in the Statistics Department of the *Banco de Portugal* specifically for this purpose in 1997. This unit used to be responsible for the collection of data and compilation of financial accounts for all the institutional sectors. As financial accounts statistics are derived from primary statistics, from both internal and external data sources, whenever the need arises for further clarifications on a specific development, the Financial Accounts Unit experts used to ask the producers of the primary statistics for further details. Although this model worked for the period until 2009, there was still room for improvement.

In 2009 a new organizational model of compilation of financial accounts was adopted with the goal of improving quality and consistency. A key element in the new institutional arrangement was the creation of a multidisciplinary team that included members from all the divisions of the Statistics Department. At the same time, a new unit on general government statistics was also created.

Under this new model, the collection of data and compilation of financial accounts for each institutional sector is a task attributed to the unit responsible for the compilation of the core primary statistics of the respective sector (see Figure 1), namely:

- Non-financial corporations sector – Central Balance Sheet Statistics Unit;
- Financial corporations sector – Monetary and Financial Statistics and Central Credit Register Division;
- General government sector – General Government Statistics Unit;
- Rest of the world sector – Balance of Payments and International Investment Position Statistics Division.

The compilation of the accounts for the households and non-profit institutions serving households sector is a task of the Financial Accounts Unit, which is also responsible for the aggregation, consistency, quality assessment and dissemination of this statistics.

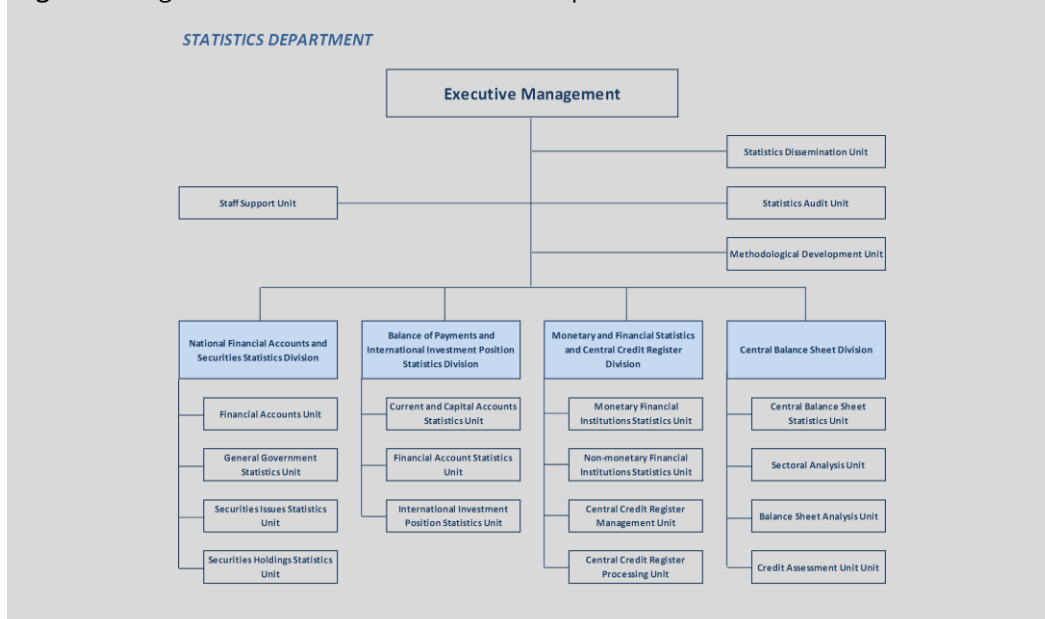
In this process, contributions are also provided by the securities statistics and methodological development experts.



While being more demanding in terms of coordination, the new organizational model for the financial accounts compilation has many advantages:

- More resources are allocated to the financial accounts compilation;
- Financial accounts become a shared responsibility and a collective effort of all the Divisions of the Statistics Department;
- Financial accounts compilers are no longer seen as a client by the other business areas;
- By integrating the production of the primary statistics and financial accounts, the overall quality of the statistics produced in the various statistical domains improved.

**Figure 1 • Organizational chart of the Statistics Department**



### 3. Flow of funds: development and uses

#### 3.1. Development of 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). These data comprises very rich and encompassing datasets, as they give an overall picture of the whole economy. Whereas most datasets are confined to specific sectors – e.g. monetary financial institutions statistics, balance of payments and international investment position statistics, general government statistics –, financial accounts (hence, by definition, flow of funds) are the only system where all institutional sectors are put together in a single framework, in an integrated and balanced manner. This enables to comprehensively track the relationships and interconnections between the different sectors of an economy.

The compilation of financial accounts in the *Banco de Portugal* is accomplished on a quarterly basis and is carried out using different sets of primary statistics, from internal and external sources. Starting with the former, the most important building blocks are monetary and financial statistics, balance of payments and international investment position statistics, central balance sheet database and securities statistics. Turning to external sources, information for general government accounts is one of the main inputs.

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 matrixes with information on creditor and debtor sectors, financial instrument and assets/liabilities.

One aspect that has been gaining relevance in recent times is the usage of micro-databases. There are, in general, numerous advantages to this approach for the architecture of most statistical systems. We highlight two main advantages in the specific context of financial accounts.

On the one hand, from an input perspective, they are important to ascertain counterparts and construct from-whom-to-whom matrixes. For instance, the Securities Statistics Integrated System is a security-by-security and investor-by-investor database, managed by the Statistics Department, with key and highly detailed information on securities data. The same also applies to other micro-databases, such as the Central Credit Register – which contains granular information on credit exposures – and the Central Balance Sheet Database – which contains accounting and financial information covering the universe for the specific institutional sector of non-financial corporations in Portugal.

On the other hand, from an output perspective, micro-databases and, in general, the availability of granular information, boost a higher degree of flexibility which facilitates exploring the data and constructing tailor-made data reports. For this reason, they can better address users' ad hoc requests. One particular domain where these features have proved to be very useful is in the provision of detailed data requests within the external Economic and Financial Assistance Programme to Portugal (hereinafter referred as to 'the Assistance Programme'). In fact, some of the data requests were only fulfilled on account of the highly detailed information available in the micro-databases managed by the Statistics Department of the *Banco de Portugal*. In general, micro-databases have a valuable use in flow of funds analysis, since they allow for the understanding of the interlinkages between the various institutional sectors and, when needed, for the drilling down to more granular data, thus allowing for the identification of specific economic behaviours.

### 3.2. Using the flow of funds

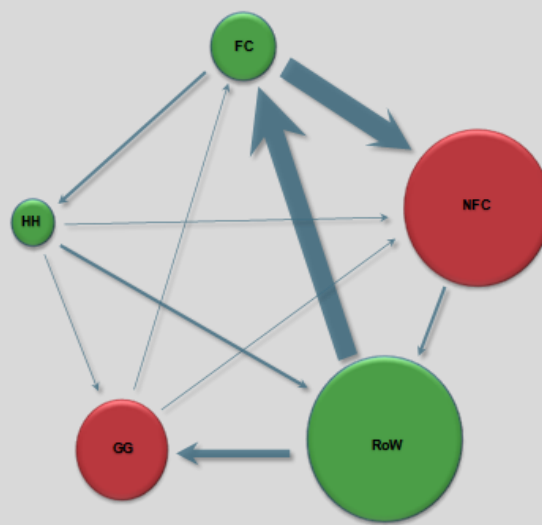
The information in a from-whom-to-whom matrix may be analysed by resorting to the flow of funds charts shown below. These charts display the net flows between the resident institutional sectors – financial sector, general government, non-financial corporations and households – and also the rest of the world. In these charts, the diameter of the circle is proportional to the financial saving (net lending / net borrowing) of each sector, filled in green when positive and in red if negative. Moreover, the arrows' width is proportional to the inter-sector relations.

In what follows, we highlight four main periods characterised by distinct inter-sectoral patterns of the Portuguese economy. The first one roughly comprises the period between Portugal joining the euro area up to the initial tensions in global financial markets on the wake of the subprime crisis (2000-2007). The second period covers the ensuing international financial turmoil ending in 2010, when the Greek sovereign debt crisis broke out (2008-2010). The third period encompasses 2011 and 2012 and is mainly marked by the start of the Assistance Programme. Finally, the fourth period, 2013 and 2014, shows the results of the adjustment policies followed in Portugal in the aftermath of the Assistance Programme.

## a) 2000 – 2007

During this period, the financial sector was carrying out its typical intermediary role, raising funds mainly from the rest of the world, and channelling these funds to the resident non-financial corporation sector (see Figure 2, for the 2007 figures). There was however a significant asymmetry between domestic and foreign financing sources, as domestic savings were clearly insufficient. Hence, the vast majority of the funding was coming from abroad. Another important trademark was the relatively contained funding needs of the general government at this point in time.

**Figure 2 • Flow of funds in 2007**



Legend: NFC – Non-financial corporations; FC – Financial corporations; GG – General government; HH – Households; RoW – Rest of the world

Source: Banco de Portugal

## b) 2008 – 2010

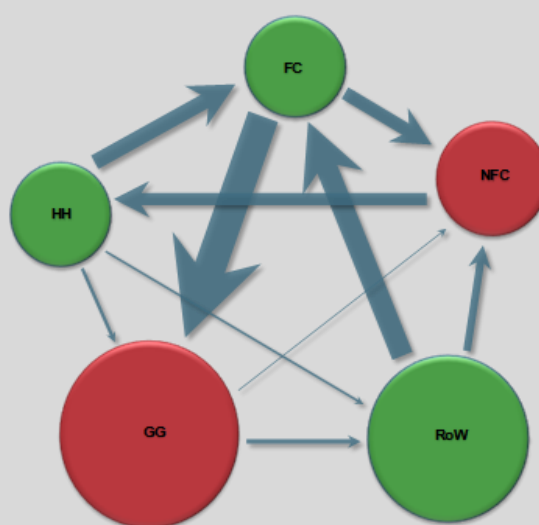
In 2010, an important change in sectoral relationships took place with three main interrelated effects, as can be seen in Figure 3. First, as mentioned, the overall financing needs were larger than before, with those of the general government reaching around 10% of GDP; these were only partly offset by a decrease in the net borrowing of non-financial corporations (NFCs).

Second, at the same time that the needs were higher, the general government ceased to be able to access international financial markets funding. In fact, there were net flows from the general government to the rest of the world in 2010, contrary to previous years, indicating the inability to issue debt securities in foreign markets together with the regular amortisation scheduling.

Third, the financial sector stepped in and most of the funding provided by financial corporations – chiefly by the banks but also, albeit to a lesser extent, by non-deposit taking corporations – was channelled to the general government instead of to NFCs as before. The considerable change in the recipients of the domestic financial corporations' intermediation is particularly interesting to notice. In other words, domestic credit was diverted to the public sector and became less available to the private sector, which resembled a sort of crowding out effect.

Furthermore, rather surprisingly, NFCs became net lenders of the financial sector in 2010, mainly because amortizations of previous loans were larger than new loans granted. At the same time, NFCs were also able to raise a substantial share of their funding directly from non-residents, thus effectively bypassing the intermediation of the resident bank system, which was able to raise less funds from abroad than before the crisis. However, this was mostly the case for large corporations, which already had access to international markets – the funding of small and medium enterprises remained severely constrained.

**Figure 3 • Flow of funds in 2010**



Legend: NFC – Non-financial corporations; FC – Financial corporations; GG – General government; HH – Households; RoW – Rest of the world

Source: Banco de Portugal

#### c) 2011 and 2012

The third period started in 2011 and was mostly influenced by the beginning of the Assistance Programme. There were three main developments that took place and which once more led to significant changes in funding patterns (see Figure 4).

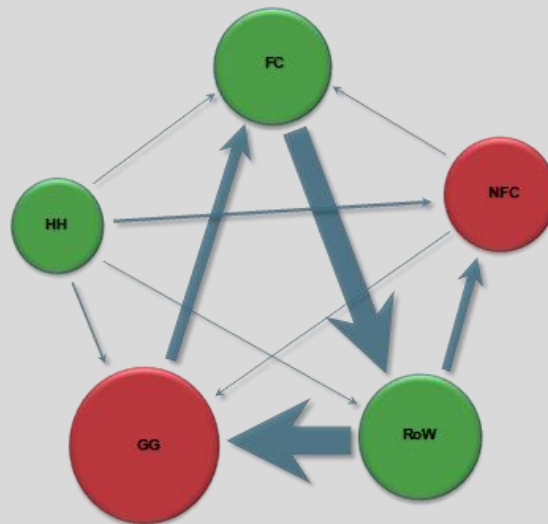
First, the start of the Assistance Programme is mirrored in the net funds being channelled from the rest of the world directly to the general government sector. In this sense, the disbursements under the Assistance Programme replaced the previous inflows coming from private sources, impaired with the disruption of international financial markets.

Second, the general government became a net lender of the financial sector. This was mainly due to the State granting financial support to banks, as well as to the placement of non-used funds from the Assistance Programme in the banking system. The general government sector then turned into a de facto financial intermediary of the Portuguese economy, channelling Assistance Programme funds to resident sectors, mostly to the financial sector.

Third, the deleveraging process in the financial sector took place by which banks and non-deposit taking financial corporations carried out significant sales of foreign assets in a context of both funding constraints and regulatory guidelines for balance sheet restructuring, which largely in-

volved stepping out of non-core markets and activities and programmes to reduce credit exposures. Notwithstanding, an important movement that partially made up for the outflows associated to the aforementioned banks' deleveraging process, was the funding provided by the Eurosystem.

**Figure 4 • Flow of funds in 2011**



Legend: NFC – Non-financial corporations; FC – Financial corporations; GG – General government; HH – Households; RoW – Rest of the world

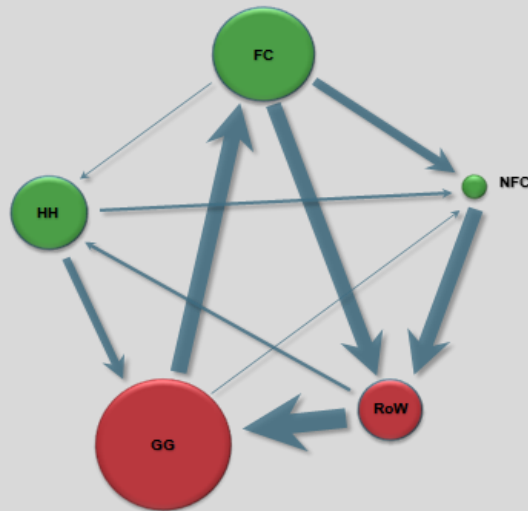
Source: Banco de Portugal

d) 2013 and 2014

The Assistance Programme to Portugal ended in 2014. The flow of funds of the Portuguese economy in this year was very different from the one in the beginning of the 2010s.

The most important development was the shift, from 2012 onwards, of the rest of the world from net lender to net borrower of the Portuguese economy (see Figure 5). On the non-financial side, this was mirrored in the sharp narrowing of the external current account deficit – and therein, in the trade balance – which eventually turned into a surplus.

The general government deficit decreased and the non-financial corporations became net lenders, in result of the sharp decline in investment. Households presented a higher savings rate as a result of a contraction in private consumption.

**Figure 5 • Flow of funds in 2014**

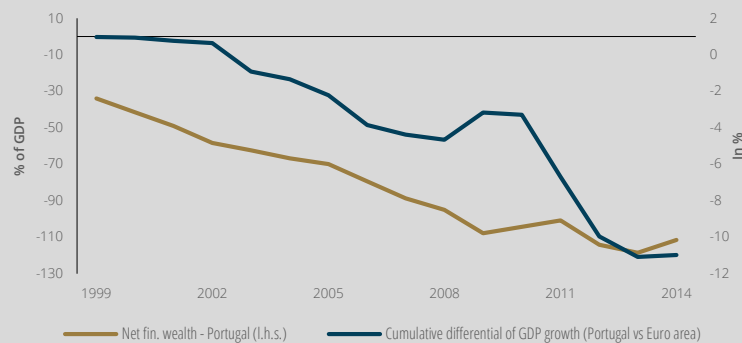
Legend: NFC – Non-financial corporations; FC – Financial corporations; GG – General government; HH – Households; RoW – Rest of the world

Source: Banco de Portugal

## 4. Changes in financial intermediation in a context of financial and sovereign debt crisis

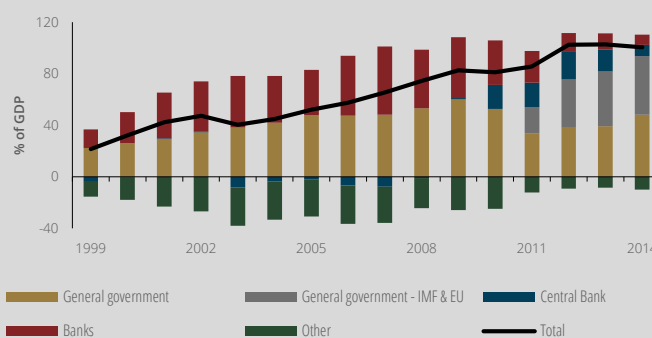
### 4.1. The financial sector in the Portuguese economy

The Portuguese economy has lagged behind the euro area average in most of the last 15 years, accumulating a differential of above 10 percentage points in terms of gross domestic product (GDP) growth. During the same period, the Portuguese economy experienced insufficient domestic savings, which led to significant external deficits, reversed only from 2012 onwards. The link between excessive debt and low growth is noticeable when looking at Portuguese data for the period 1999-2014 (see Figure 6) – Portugal's net financial wealth shows a marked decreasing trend since 1999, and the accumulation of the GDP growth differential between Portugal and the euro area has also been declining since that year (except for 2009 and 2014).

**Figure 6 • Financial wealth and growth**

Source: Banco de Portugal; Instituto Nacional de Estatística

The accumulation of negative financial savings had an impact in the financial wealth of the economy and of the most indebted sectors, *i.e.*, general government and non-financial corporations. Consequently, external debt (Figure 7) has also increased, mostly on account of the general government. From 2008 onwards, as a consequence of the global financial crisis and the sovereign debt crisis, regular access by domestic banks and the general government to the international financial markets became more difficult. The shortage of market financing has been overcome in two ways: through central bank financing in the context of the Eurosystem (addressed to banks) and through the Assistance Programme for Portugal agreed in May 2011 with the European Union (EU) and the International Monetary Fund (IMF).

**Figure 7 • Net external debt, by sector (% GDP)**

Source: Banco de Portugal; Instituto Nacional de Estatística

It is therefore in this context that the Portuguese economy can be regarded as an interesting case. Financial accounts are useful to illustrate what has been the role of the financial intermediaries

and how their balance sheets have changed. In particular, the interlinkages within the banking sector – including the central bank – are worth analysing. This is of special interest given that one of the main objectives of the Assistance Programme for the banking sector was to “maintain liquidity and support a balanced and orderly deleveraging in the banking sector”. This objective was part of a more ambitious goal of achieving a sounder macroeconomic framework for the Portuguese economy. In particular, besides deleveraging of the banking sector, the main goal was to reduce the fiscal and the external deficits.

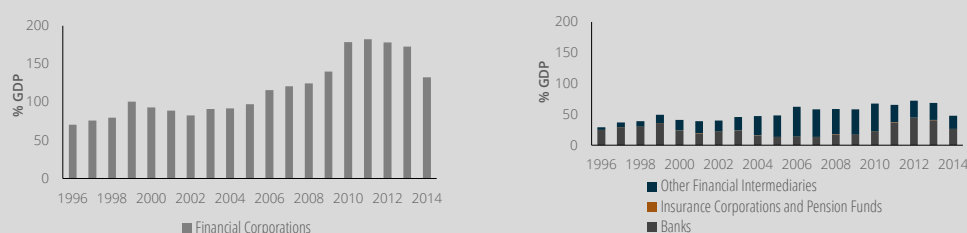
Financial corporations in Portugal have increased their weight in the economy over the last 20 years, reaching a peak of 570% of GDP in 2010. For the period 2010-2014, the relative weight of the financial sector in Portugal is slightly below the one in the euro area. In terms of composition by subsector banks are, by and large, the main players in the Portuguese financial sector, representing more than 50% of the total. Nonetheless, this share has been diminishing overtime due to the increase of the relative importance of other financial intermediaries (OFIs)<sup>38</sup> especially until 2010, and, since then, to the increase of the central bank weight, due to monetary policy operations in the context of the Eurosystem.

#### 4.2. Unveiling financial sector interlinkages: consolidated vs. unconsolidated data

Comparing consolidated to unconsolidated figures, we are able to derive the interlinkages between the different subsectors that compose an aggregate sector. Those interlinkages can be divided into two categories: (i) intra-sector operations corresponding to the activity between entities classified within the same subsector (e.g., between bank A and bank B); (ii) inter-sector operations, which refer to operations between entities belonging to different subsectors of the aggregate sector under analysis (e.g., between bank A and insurance company C).

In Portugal significant intra-sector flows are observed for the financial corporations' sector (see Figure 8). Those flows are significantly larger than the sum of the intra-sector flows of the three main subsectors, denoting significant interlinkages between the different financial corporations' subsectors. This can be most likely explained by the existence of financial groups in Portugal typically composed by a diversity of entities operating in the different financial domains (banks, holding corporations, insurance companies, pension funds, etc.). The funding between the central bank and banks also plays a role in this respect. In the case of the insurance corporations and pension funds' sector in Portugal, intra-sector positions are rather small, which can be interpreted as evidence that reinsurance is mostly done with foreign insurance companies.

Figure 8 • Intra-sector stocks (% GDP)



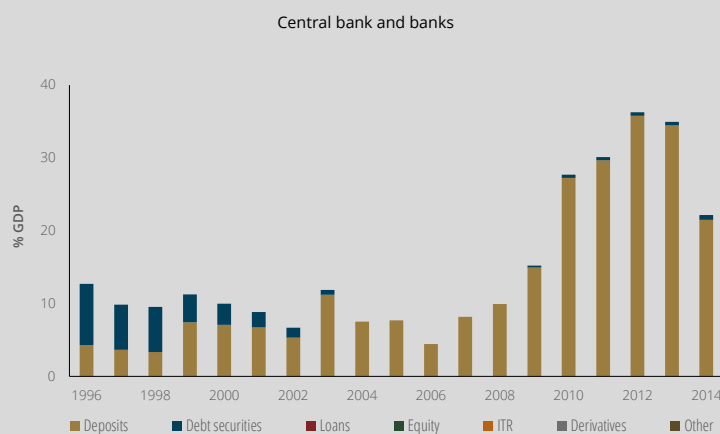
In terms of financial instruments related with these intra-sector stocks, we have: (i) deposits, mainly influenced by operations between banks and with banks and the central bank; (ii) debt securities,



especially in the recent past, for banks' issues that remained with the issuer or were acquired by other banks, particularly after the sovereign debt crisis, as they could be used as collateral for monetary operations with the European Central Bank; and, (iii) equity and loans, justified by intra-OFls operations (with a significant importance of holding corporations) and relationship between OFIs and banks (usually belonging to the same financial group).

Concerning inter-sector stocks, the relationship between banks and the central bank is worth analysing (see Figure 9). Deposits are, by far, the most prominent financial transactions within the banking sector. As already referred, in the aftermath of the international financial crisis, Portuguese banks became highly dependent upon the central bank and the Eurosystem intermediation. In addition to the traditional deposit facilities, debt securities operations were also relevant, and, in particular, we can divide the time span under analysis into 3 sub-periods: (i) 1994-2004, where we observed liabilities of the central bank could be found in the banks' portfolio, related to the absorption of liquidity (these securities refer to the liquidity absorption operated at the moment the new regime ruling minimum cash reserves came into force in late 1994); (ii) 2004-2008, where no debt securities operations were recorded between the two subsectors; and (iii) 2009-to date, even though in very limited amounts, the central bank purchased some banks' bonds.

**Figure 9 • Inter-sector stocks<sup>39</sup> (% GDP)**



Source: *Banco de Portugal*; Instituto Nacional de Estatística

To wrap up, in the most recent years the main changes experienced by the Portuguese financial intermediaries can be summarized as follows: (i) the more relevant role of the central bank in terms of monetary policy operations, carried out within the framework of the Eurosystem, in response to high primary liquidity demand by Portuguese credit institutions, in a context of financial market instability; (ii) in the banking sector, previous sources of funding (international financial markets) were replaced by funds provided by the central bank and by an enlarged deposit base; (iii) there has been an increase of operations between units of the financial sector, in particular, between units of different subsectors.

## 5. Final remarks

Financial accounts are a powerful tool to understanding the dynamics of the financial situation of the various institutional sectors. The availability of detailed data on the counterparts of financial operations allows for a more in-depth analysis of the relationships between agents in an economy.

In the Portuguese financial accounts, data is available, for all financial instruments and institutional sectors, on a from-whom-to-whom basis. Two key aspects for the high quality and detailed Portuguese flow of funds figures are, on one hand, the in-house availability of micro-databases and, on the other hand, the organizational model for the financial accounts compilation.

The flow of funds and financial accounts for Portugal have proved to be particularly useful to the analysis of the current economic situation and are an input for supporting policy decision making.

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## Notes

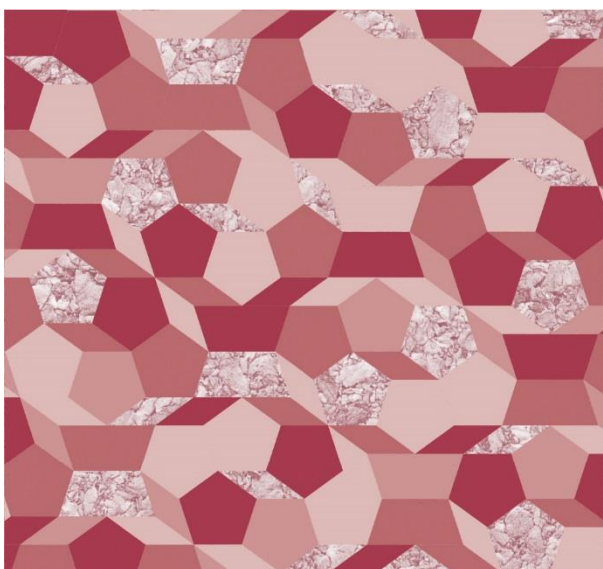
\* 1<sup>st</sup> Conference on “Statistics for Economic and Financial Analysis”, Santiago, Chile, 29-30 September 2015

37. I would like to thank José Sérgio Branco, Olga Monteiro and Luís D’Aguar for their valuable contributions to this paper. The analyses, opinions and findings of this paper represent the views of the author, which are not necessarily those of the *Banco de Portugal* or the Eurosystem. Any errors and omissions are the sole responsibility of the author. The data used in this paper refers to the data available at the time it was prepared and/or presented and, therefore, may not necessarily correspond to the most recent available data.

38. Refers to non-deposit taking corporations excluding insurance corporations and pension funds.

39. ITR stands for insurance technical reserves.





## IV

# Compiling statistics: specific case studies

High-growth enterprises in Portugal

Quarterly time-series from Central Balance Sheet Database

Stock and Flow Integration – Practice and Data Requirements in Europe

Financing of NFC – A comparison with other economic indicators

Casting a light on shadow banking activity in Portugal

Conceptual issues related to the definition of government debt

The Portuguese Central Credit Register: a powerful multi-purpose tool, relevant for many central bank's functions



# High-growth enterprises in Portugal<sup>★40</sup>

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## Abstract

In an economic crisis, such as the most recent one, examples of success and growth, counter-cyclical to the general recessive environment, are often used as beacons for other companies towards a path of recovery. Information available at *Banco de Portugal* allows the identification of a set of companies with high growth rates and of its distinctive features, as well as of the economic activities within which its presence is most noteworthy.

**Keywords:** Enterprises, Growth, Dynamics, Micro-data

## 1. Motivation and conceptual framework

The Portuguese economy faced a significant contraction over the last few years during which unemployment grew to record levels. It is then crucial to restore growth and for that a key issue relates to the promotion of entrepreneurial dynamics. High-growth enterprises (HGE) play an important role in this matter as they are usually linked with innovation and job creation. A better knowledge about these firms would allow policy makers to develop appropriate approaches in order to maximize the chances of developing HGE [OECD (2010)].

In order to identify such companies, it is common to consider the Eurostat-OECD (2007) approach according to which HGE are those achieving an average annual growth rate above 20% for a period of three consecutive years, having such growth evaluated either considering the number of employees or, as is the case of the present analysis, the turnover.

## 2. Methodological approach and data description

The need for in depth knowledge of the non-financial corporations (NFC) sector in Portugal led *Banco de Portugal* to the development of a business register combining data from the several databases it manages while also using other administrative sources. This business register, which is being constantly automatically updated with the most recent relevant information, gathers information on each enterprise's characteristics through a time-span of over 20 years [Gonçalves *et. al.* (2013)].

Identifying HGE as a subset of this population is not straightforward. Potential HGE's turnover variations must be derived organically from their current activity, *i.e.*, unrelated to other effects that

could bias the analysis. Hence, in this exercise, enterprises involved in mergers and acquisitions, or having registered recent operating activity shifts or other similar events, which may have led to an artificial growth, were excluded from the reference population of NFC.

Companies registered in Madeira's Free Trade Zone and firms with no employees were also excluded, as well as companies with a turnover below 50 thousand euros, for which the high turnover growth rates would only result from a relatively low initial level. Finally, since the criteria for a company to be defined as HGE derives from its turnover's average annual growth rate, enterprises active for less than four years were excluded, given that the turnover of its start-up years does not refer to a full year [*Banco de Portugal* (2013)].

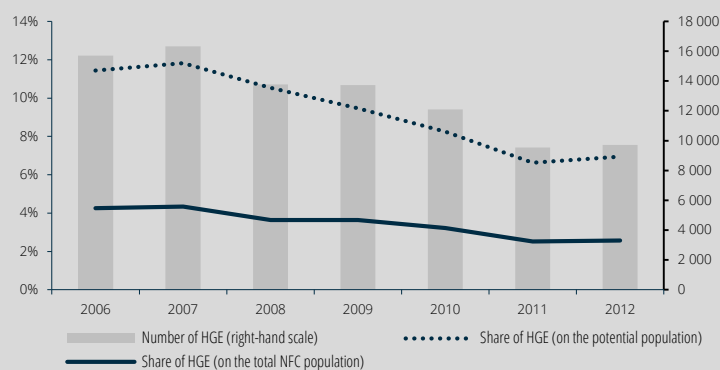
The set of companies which resulted from the implementation of these cut-offs is considered to be the population of potential HGE, *i.e.*, the relevant population of NFC regarding the present analysis.

### 3. Some relevant findings

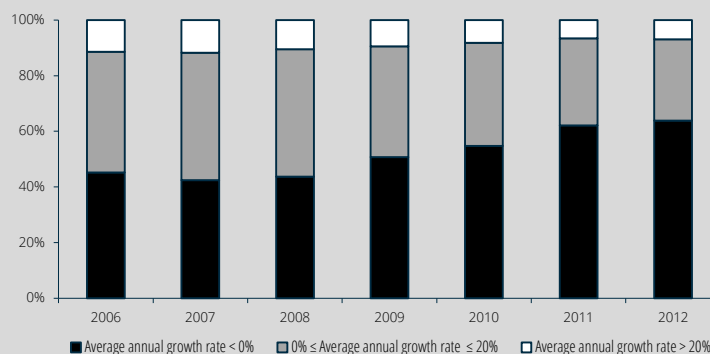
#### 3.1. Population of potential HGE and HGE

The population of potential HGE in 2012 gathered 37% of the NFC operating in Portugal, a relative share considerably higher when taking in consideration the turnover and number of employees (about three quarters of the total, in both cases). Only 7% of such companies were considered to be HGE (3% of the reference population of NFC), a share 4 p.p. lower than the one registered in 2006, a decrease that could be explained by the recessive context of the last years (Figure 1). The impact of the economic crisis is also noticeable in the growing number of companies with negative annual turnover growth rates in this period (45% of the population of potential HGE in 2006 and 64% in 2012) (Figure 2).

**Figure 1 • HGE and the population of potential HGE**





**Figure 2 • Average growth rate in the population of potential HGE**

### 3.2. Some characteristics of Portuguese HGE

The data reveal that companies are only HGE as a transitory phase in their life cycle. From over 50 thousand HGE identified between 2006 and 2012, more than 1/2 were considered to be HGE only once (56%), while companies considered HGE for more than four times represented only 1.5% of the referred total.

By company size, microenterprises are the class where HGE were most relevant (64% of total HGE in 2012), nevertheless below its weight in the population of potential HGE (74%), a situation opposing that of SMEs (35% of total HGE and a weight of 25% in the population of potential HGE) and large enterprises (0.9% e 0.6%, respectively). Analysed from another perspective, HGE stood for 6% of the microenterprises in the population of potential HGE in 2012, 10% of the SMEs and close to 11% of the large enterprises.

According to the geographic location, in 2012, around 42% of the HGE were headquartered in the northern region of Portugal, which compares to 28% in Lisbon region and 20% in Centre Portugal. When compared to 2006, the relevance of the northern region increased 7 p.p., while Lisbon and the Algarve went down by 7 p.p. and 1 p.p., respectively.

HGE are usually young companies. In 2012, 56% of Portuguese's HGE had been operating for less than 10 years, a maturity class that weighted 34% in the population of potential HGE in the same year. Only 15% of the HGE had been active for more than 20 years (29% of the total population of potential HGE in 2012).

### 3.3. Economic activities where HGE are most relevant

Among the economic activities with a significant share of HGE in 2012, it is worth noticing the presence of some of the Portuguese traditional activities, such as the manufacture of leather (dominated by the manufacture of footwear), fishing and forestry. On the other hand, it is also interesting to identify in this group activities like air transport, scientific research and development and pharmaceutical products.

As distinctive characteristics these economic activities have:

- A growing number of active companies: an average increase of 15%, while the population of potential HGE registered an average decrease of 4% between 2009 and 2012;

- A relatively lower median age: around 11 years, which compares with 14 years in the population of potential HGE;
- A larger share of large enterprises: standing for 8%, on average, while in the population of potential HGE this class stood for only 0.6%, in 2012; and
- Diminishing turnover's concentration on large companies: on average, large companies' share of turnover within these activities decreased 2 p.p. between 2009 and 2012, while it increased 3 p.p. within the population of potential HGE.

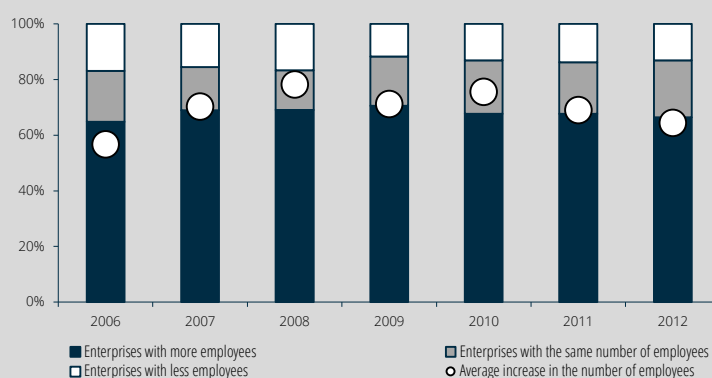
### 3.4. HGE's role on employment and on loans from resident credit institutions

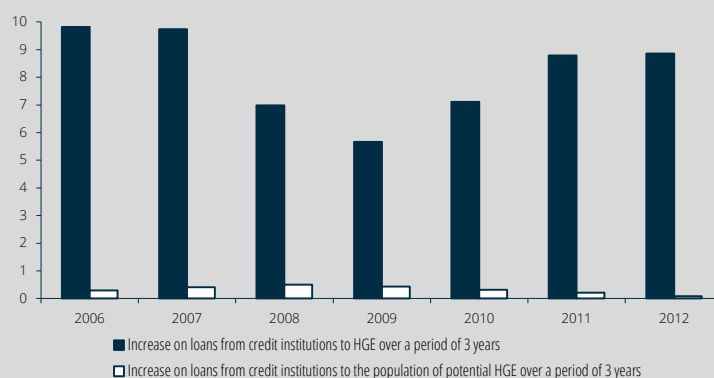
Although HGE's share of total employment in the NFC's sector is small (6% in 2012), these companies stand out by their ability to create jobs during the high-growth period (on average, by almost 60%). Along the high growth period, approximately 2/3 of these companies increased the number of employees, 21% maintained the employment level and only in 13% the number of employees diminished (Figure 3). The level of employment growth differs across firms, depending on the labour intensity of each company's production system, which is often related to its economic activity.

Information on loans granted by resident credit institutions suggests that the Portuguese financial system may be able to differentiate HGE from the remaining companies. Indeed, on average, throughout the high growth period of HGE, loans granted by resident credit institutions increased by about 7 times (Figure 4). This compares with an average null growth in the NFC sector as a whole in the 2006-2012 period.

Moreover, there is also some evidence that these companies pose less risk to the credit institutions, given that their non-performing loans ratio is very small (2% in 2012), a distinctive feature particularly relevant in recent years considering that the NFC's non-performing loans ratio has been steadily increasing, reaching 10% in 2012.

**Figure 3 • HGE's employment**



**Figure 4 • HGE's loans from resident credit institutions**

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## Notes

\* JOCLAD XXI, Lisbon, Portugal, 11 April 2014

40. The analyses, opinions and findings of this paper represent the views of the authors, which are not necessarily those of the *Banco de Portugal* or the Eurosystem. Any errors and omissions are the sole responsibility of the authors. The data used in this paper refers to the data available at the time it was prepared and/or presented and, therefore, may not necessarily correspond to the most recent available data.



# Quarterly time-series from Central Balance Sheet Database<sup>★41</sup>

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## Abstract

The Central Balance Sheet Database of *Banco de Portugal* (CBSD) is a repository of annual and quarterly individual information of accounting and statistical nature, covering a wide range of non-financial corporations (NFC) for the period 1990-2013 (annual data until 2012). The methodology for the compilation of quarterly time-series has recently been improved, to obtain quarterly financial indicators representative of the population of NFC operating in Portugal [*BANCO DE PORTUGAL* (2013)].

**Keywords:** Ancillary information, Benchmarking, Imputation, Ratio estimator, Sampling

## 1. Sources of information

The process for obtaining quarterly time-series on NFC is based on a broad set of information. In addition to the databases that feed the CBSD – the reference population of NFC, the Simplified Corporate Information (IES) and Quarterly Survey on Non-Financial Corporations (ITENF) the process also uses information from the Central Credit Register (CCR) and the Securities Statistics Integrated System (SSIS) in the annual procedure.

### 1.1. Central Balance Sheet Databases

The CBSD incorporates three sources of information for the compilation of statistics on NFC. The annual data is collected through IES, which is, since 2007, a mandatory report from all entities operating in Portugal to four public entities – Tax Authority, Ministry of Justice, Statistics Portugal (INE) and *Banco de Portugal*. This database contains over 370.000 corporations a year, corresponding to a coverage rate above 95% of all NFC. Information collected through IES is chiefly of an accounting nature, based on the financial statements and the respective annexes set out in the accounting standards. It also comprises a range of data with additional detail on the activity and situation of the corporations, as necessary for statistical purposes [*BANCO DE PORTUGAL* (2008)].

As for the quarterly data, the ITENF is a statistical operation under the joint responsibility of *Banco de Portugal* and Statistics Portugal to collect quarterly information from a sample of around 4.000 NFC. Information collected is a subset of the variables collected through IES, and covers mainly a

range of accounting variables relating to the activity and financial situation of corporations [INE (2012)].

Finally, the information on the population of NFC comes from the reference population of NFC, which is a business register that combines information from several sources from *Banco de Portugal* and other public entities, such as the Ministry of Justice and Statistics Portugal [GONÇALVES *et al.* (2013)]. This database comprises, for each non-financial corporation operating in Portugal, a set of structural information (legal person identification number, location of the head office and sector of economic activity) as well as economic variables (number of employees, turnover, total assets and equity, for each year).

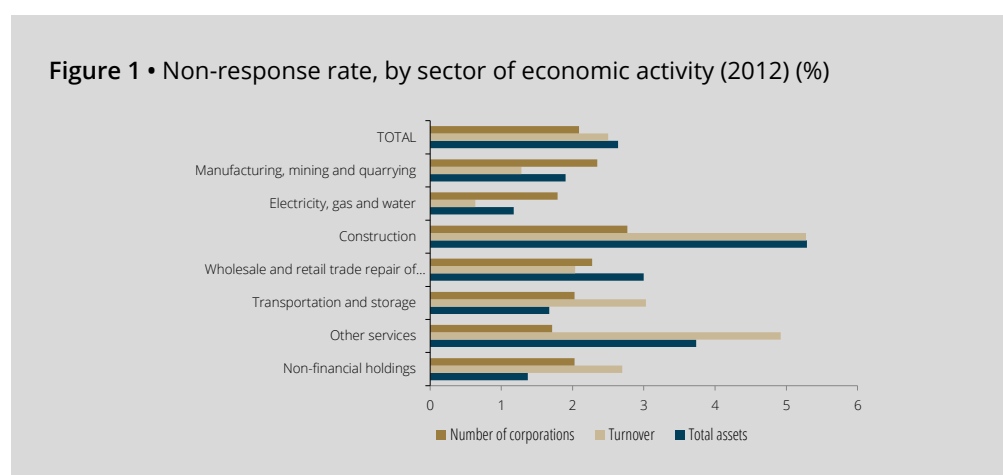
## 1.2. Other databases

The CBSD also uses information from other databases managed by the Statistics Department. The SSIS is a database with data on securities issues and portfolios, on a “security-by-security” and “investor-by-investor” basis. As for the CCR, this is a database with information on actual and potential credit liabilities towards financial credit institutions granting credit in Portugal.

## 2. The annual procedure

The information of the reference population of NFC concerning the sector of economic activity and the annual turnover for each corporation is considered the foundation stone of this procedure. In order to fill information gaps existing in the annual database, a two-stage procedure has been defined: (i) the imputation of total assets, combining cold-deck and mean imputation methods in three sequential steps, in order to improve the information from the reference population of NFC to be used in subsequent procedures; (ii) with the outcome of the first stage, a treatment of non-response is applied over annual data in order to produce information relating to all NFC. In this stage, we have implemented a mean imputation process in three sequential steps.

As Figure 1 shows, this procedure allows the estimation of data for about 2% of the NFC with no response to IES in 2012.



## 3. The quarterly procedure

The quarterly procedure estimates the quarterly population totals for a set of variables, combining quarterly data from ITENF database with the ancillary information that results from the annual procedure. The latter set of information is incorporated in two different steps: first, by the post stratification of the sample, and then by the ratio estimator.

### 3.1. Post stratification of the sample

The extrapolation methodology includes the post stratification of the sample, by sector of economic activity and one out of two quantitative ancillary variables, each one directed to the estimation of a specific set of variables: (i) Turnover, for the activity variables, trade credits and inventories, or (ii) Total assets, for the remaining balance-sheet and interest expenses indicators. The post strata are defined with ancillary information from the reference population of NFC.

### 3.2. Ratio estimator

The ancillary information available in the annual database is useful to calibrate the quarterly estimates, through a ratio estimator, defined as follows:

$$\hat{y}_h = \sum_{i=1}^{n_h} \left( \frac{y_i}{\pi_i} \right) \times \frac{\sum_{j=1}^{N_h} A Q V_j}{\sum_{i=1}^{n_h} \frac{A Q V_i}{\pi_i}}$$

Where  $\hat{y}_h$  is the ratio estimate for the population total of variable Y in post stratum h,  $n_h$  is the number of responses in post stratum h,  $N_h$  is the number of corporations in post stratum h in the population,  $y_i$  is the variable Y for corporation i,  $\pi_i$  is the probability of selection for corporation i, and  $A Q V_i$  is the ancillary quantitative variable for corporation i.

There are two possible ancillary quantitative variables: (i) Total income, for activity, trade credits and inventory indicators, and (ii) Total assets, for the remaining balance-sheet and interest expenses indicators.

Figure 2a uses, as an example, the Obtained funding for the Manufacturing, mining and quarrying sector to compare the Horvitz-Thompson estimator with the ratio estimator, as defined before, and we conclude that the latter has a smaller deviation from the annual.

## 4. The reconciliation procedure

To reconcile the annual and quarterly series, it is applied an adjustment procedure referred as benchmarking that follows the movement preservation principle developed by DENTON (1971), which consists in obtaining adjusted series that keep the dynamics of the original quarterly series, through the minimisation of a quadratic loss function subject to a set of constraints that ensure (i) the temporal consistency between the adjusted quarterly time-series and the annual figures relating the population of NFC, that result from the annual procedure, and (ii) for each period, that the accounting equilibrium is met. Figure 2b continues the example mentioned in the previous section to illustrate the results from this procedure.

**Figure 2 • Obtained funding – Manufacturing, mining and quarrying**

Figure 2a • Quarterly procedure

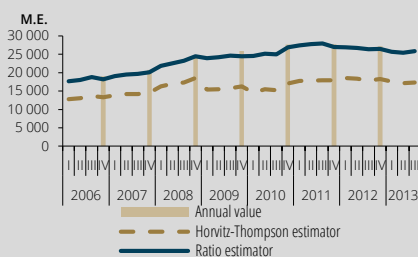
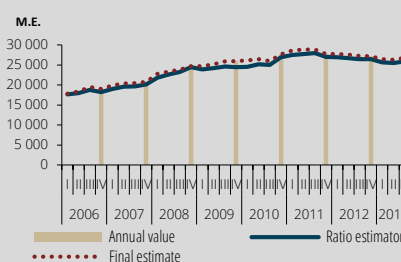


Figure 2b • Reconciliation procedure



## 5. Final remarks

The outcome of the process described in this paper is a set of quarterly time-series, divided into Balance sheet and Profit and loss account indicators for all NFC, as well as a set of economic and financial ratios broken down by economic activity, size and capital holding sector.

Given the amount of detail of these statistics, the use of ancillary information through the different techniques here described plays an important role in each of the procedures, as it improves the quality of the estimates, as well as it provides a link between the annual and quarterly databases.

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## Notes

\* JOCLAD XXI, Lisbon, Portugal, 11 April 2014

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# Stock and Flow Integration – Practice and Data Requirements in Europe<sup>★42</sup>

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## 1. Introduction

The accounts of General Government are part of a larger framework which ensures consistency, namely between stocks and flows. In particular, the consistency between deficit and debt should be guaranteed when presenting the results of government accounts.

Usually, government deficit over a certain period is not equal to the change in government debt in the same period, although the same trend is expected. In principle, debt increases when a deficit is observed, and decreases when a surplus occurs. However, there are differences between the government deficit and the change in government debt, known as deficit-debt adjustments, which can in some cases be rather significant. For instance, from the end of 2009 to the end of 2013, the total increase in European Union<sup>43</sup> government debt (also known as “Maastricht debt”) amounted to 14 percentage points of GDP, whereas the accumulated euro area government deficit amounted to around -12% of GDP. The difference between the change in debt and the cumulated deficit was thus -2 percentage points of GDP over the period or -0.5 percentage points of GDP on average per year for the European Union as a whole.

This comment examines the differences between the government deficit and the change in government debt in more detail, giving a special emphasis on the practice and data requirements in Europe.

## 2. Stocks and flows in national accounts

“Who does what, with whom, in exchange for what, by what means, for what purpose, with what changes in stocks?” - SNA 2008, §2.8

National accounts measure what happens in the economy, among which agents and for what purposes. The core of national accounts is the production of goods and services, which can be consumed in the period they relate or accumulate for subsequent periods. In simple terms, the value added generated by the production is GDP. The corresponding income is distributed by economic agents. This process of production and distribution enables agents to consume goods and services produced by other agents or acquire assets to ensure consumption in the future.

To capture this pattern of economic flows, the corresponding activities are recorded by identifying the institutional units of the economy and the specification of the account structure that reflect the corresponding transactions in the different phases of the production process and, finally, the consumption of goods and services.

National accounts provide a comprehensive and detailed set of data of the complex economic activities taking place within an economy and the interactions between the different agents or groups.

## 2.1. From production to borrowing and lending – the sequence of accounts

National accounts record, in principle, all transactions between economic subjects during a certain period and also show the opening and closing stocks of assets and liabilities in the balance sheets. The transactions are grouped into several categories that have a distinct economic significance. In turn, these categories of transactions are shown in a sequence of accounts, each of which covers a specific economic process. This ranges from the production accounts, to the income generation and income (re)distribution, through the use of income, for consumption and saving, and investment, as shown in the capital account, to financial transactions such as borrowing and lending (financial account).

The balance of capital and financial accounts are conceptually equal to the net lending or borrowing and the financial account shows how the net lending was used or how the net borrowing was funded. These accounts show the money flows within the economy during a specified period of time. Flows cover the creation, transformation, exchange, transfer or extinction of an economic value over a period of time. Flows can be derived from transactions or from other changes in assets. They are recorded in transaction accounts and in other changes in volume and revaluation accounts, respectively.

On the other hand, the stocks of assets and liabilities in the economy at the beginning or the end of specific time periods are presented by the balance sheet. This includes the value of non-financial assets, and the value of financial assets and liabilities, and results in the net worth. Since the national accounts system is exhaustive, all changes in stocks should be explained by flows recorded in the system.

## 2.2. Financial and non-financial accounts

One of the main purposes of financial accounts is to determine the financial saving in different sectors of the economy; in other words, to calculate the difference between investments in financial assets in a given period and liabilities taken on in the same period. Simultaneously, non-financial accounts determine the lending capacity or the borrowing requirement for each institutional sector. This is reached by finding the difference between resources (revenues) and uses (expenditures). The acquisition of financial assets and the issuing of liabilities in any given sector for any given period are the counterpart to the lending capacity or the borrowing requirement that stems from the economic activity in the same sector during the same period. Thus, net lending results from situations where the resources exceed the uses in non-financial accounts and in which transactions in financial assets are greater than transactions in liabilities in the financial accounts. Net lending corresponds to a positive value of the balance of the sector, and can also be called surplus. Conversely, net borrowing occurs when resources are lower than uses and when transactions in financial assets are lower than transactions in liabilities, which originates a negative balance also called deficit.

## 2.3. General government accounts

In national accounts, economic agents are classified into institutional sectors (non-financial corporations, financial corporations, general government, households and non-profit institutions serving households). The counterpart of operations between resident and non resident units is recorded in the rest of the world accounts. Since the general government sector is one of the sectors identified in national accounts, the main public finance indicators are based on the national accounts methodology, and therefore, result from a consistent and integrated framework. In addition, the information of public finance indicators is, itself, integrated: the public deficit is the balance of non-

financial accounts (revenues less expenditures) and of financial accounts (transactions in assets less transactions in liabilities). Stocks of assets and liabilities are also available from national accounts and their change may be explained with flows calculated also in the same framework.

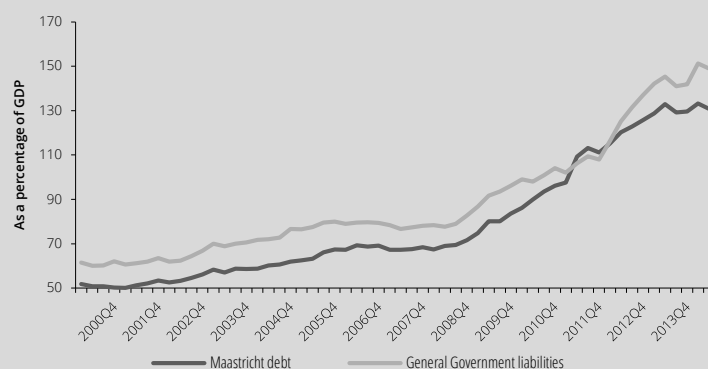
The analysis of the accounts of general government is of particular importance, since its decisive impact on the economy (through taxes, the debt of the general government, employment, etc). Moreover, the financial equilibrium of general government is regularly monitored at national and international levels. For instance, a negative balance shows the existence of net borrowing, or a public deficit. In general, net borrowing leads to an increase in public debt and therefore in interest charges that have to be incurred by future generations. The positive balance means the existence of net lending, or a surplus, allowing the government to reduce its debt or to accumulate assets.

### 3. Excessive deficit procedure – European definition of general government debt

The Treaty on the European Union (signed in Maastricht in 1992) established the process of economic and monetary union and defined the 'convergence criteria' that specified the conditions required for a country to participate in the common currency. With the Stability and Growth Pact then adopted, countries agreed to pursue the joint aims of price stability, sustainable economic growth and employment. It is intended to ensure that Member States maintain budget discipline with medium term balanced budgets. This discipline involves avoiding excessive budgetary deficits. To this end a regular surveillance should provide early warning if budget deficits diverge from the agreed medium term targets. The Instruments of multilateral surveillance for achieving medium term balanced budgets are defined in the Protocol on the Excessive Deficit Procedure (EDP)<sup>44</sup> that is annexed to the Maastricht Treaty, which specified that the deficit to GDP ratio must not exceed three percent and the debt to GDP must not exceed sixty percent of GDP.

The Protocol defines government deficit and gross debt with reference to European System of Accounts (ESA), which is broadly consistent with the System of National Accounts<sup>45</sup> (SNA) but has been written specifically by and for the European Union. In the Protocol, deficit means net borrowing of general government (as surplus means net lending) and gross debt is constituted by the liabilities of general government at face value in currency and deposits, debt securities and loans according to ESA definitions.

It should be noted that, although the calculation of the debt indicator uses ESA as a reference, it differs in some ways from the stocks accounts of ESA. Therefore, the indicator is not fully integrated in the framework of national accounts. The main differences are: i. Maastricht debt excludes some financial instruments, such as financial derivatives and other accounts payable (which include trade credits); ii. Maastricht debt is an end-of-a-period position at face value, which corresponds to the amount contractually agreed by general government to repay to creditors at maturity, different from the valuation at market prices used in national accounts; iii. Maastricht debt is a gross definition, i.e., it is not netted by the corresponding government assets. Figure 1 illustrates the difference between general government liabilities compiled through the stocks accounts of ESA and public debt for Portugal. Due to these differences reconciliation between Maastricht debt and deficit may be a demanding task.

**Figure 1 • Difference between general government liabilities and public debt for Portugal**

## 4. Data requirements

Council Regulation (EC) No 479/2009, as amended by Council Regulation (EU) No 679/2010 and Commission Regulation (EU) No 220/2014, requires that EU Member States report EDP-related data to Eurostat twice per year at end-March and end-September. The data are reported in harmonised tables – EDP Notification Tables.<sup>46</sup> These tables are designed to provide a consistent framework, with a link to national budgetary aggregates and between the government net lending/net borrowing (B.9) and changes in government debt.

In particular, EDP Table 3A, “Provision of the data which explain the contributions of the deficit/surplus and the other relevant factors to the variation in the debt level (general government)”, is the basis to ensure a coherent and consistent report across European countries of the reconciliation between Maastricht debt and deficit.

Additionally, EDP data should be fully consistent with Government Finance Statistics data supplied through the ESA 2010 Transmission Programme.

The European Commission is responsible for providing the data used for the EDP, and within the European Commission this task is undertaken by Eurostat. This is done on the basis of the Government Finance Statistics and EDP statistics provided by the Member States. In addition, Eurostat has sole competence for the statistical methodological basis on which the data for the EDP are compiled.

## 5. Reconciliation between Maastricht debt and deficit

Usually, general government’s deficit over a certain period is not equal to the change in debt in the same period, although the same trend is expected. In principle, debt increases when a deficit is observed, and decreases when a surplus occurs. However, changes may occur in public debt due to other factors.

The difference between the deficit and change in debt is usually called deficit-debt adjustment or stock-flow adjustment. A positive deficit-debt adjustment means that public debt grows more than would be expected from the accumulation of deficits (or decreases less than the accumulation of surpluses). On the contrary, a negative deficit-debt adjustment shows that public debt grows less than the deficit (or decreases more than the surplus).

The deficit-debt adjustment is caused, mainly, by three factors:

- Transactions in financial assets. Public debt is a gross concept, i.e. it concerns general government liabilities and does not take into account the assets of this sector. Thus, changes in financial assets held by general government are a factor of difference because, sometimes, it is necessary to issue debt to purchase financial assets or, on the contrary, existing financial assets are used to finance the deficit or debt repayment. These transactions in financial assets can occur in any of the instruments defined in ESA2010: currency and deposits, debt securities, loans granted to entities not included in the general government sector, shares and other equity or other financial assets. For example, if government obtains a loan and keeps the proceeds as a deposit then a deficit-debt adjustment will arise. An example occurred with the increase in cash holdings for Portugal in 2011 related to the funds received in the framework of the Economic and Financial Assistance Programme to Portugal and not yet used at the end of that year. The use of privatisation proceeds to make repayments of debt is, also, an example of an operation that affects the debt, without any impact on the deficit, also originating a stock-flow adjustment.
- Transactions in liabilities not included in debt. The definition of public debt used in Europe excludes the financial instruments of financial derivatives and other accounts payable (namely trade credits). Thus, public debt may increase due to payments related to expenditure recorded in the deficit in previous periods according to accrual basis accounting. Changes in liabilities not included in public debt are thus a second main source of difference. An example of these transactions is trade credits obtained to finance the purchase of goods and services. Given that trade credits are not included in the concept of public debt, this operation has only an impact on the deficit, originating a stock-flow adjustment for the amount unpaid. Another example occurs when the State issues debt to pay trade credits recorded in previous periods. This operation will entail an increase in debt, with no impact on the deficit, leading to a deficit-debt adjustment for an equal amount. For instance, the significant positive value for Greece reflects a sharp decrease in payables in 2013 (mostly due to settlements of hospitals' arrears). Spain also reported a large reduction of other accounts payable for 2012 due to the state and local government sub-sectors' settlements of unpaid bills to suppliers.
- Valuation differences. Public debt is a stock measured at nominal value, according to the methodology defined at European level. On the one hand, this means that transactions in interest accrued and not paid are not added up to the stock of debt but are included in the deficit. On the other hand, changes in value or reclassifications with an impact on debt are not reflected in the deficit, since they are not transactions. For example, the accumulation of interest accrued and not paid is reflected in a higher general government deficit, without any impact on the nominal amount of public debt, originating a deficit-debt adjustment. Greece, due to the extensive restructuring of government debt (including private investors exchanging bonds), reported under the items difference between interest accrued and paid and the redemptions of debt below nominal values particularly high in 2012. Another example occurs with the appreciation / depreciation of debt issued in foreign currency, which is a change in value, with an impact only on government debt. Some Member States have substantial amounts of debt denominated in foreign currency, mostly in euro or in U.S. dollars. Significant depreciation/appreciation of foreign currency debt is observed for Hungary and Poland, but also for Croatia, Romania and Sweden.

In fact, the differences between the deficit and the change in general government debt are inevitable. The ability to reconcile these two concepts provides an important quality tool of both aggregates, which can be supplemented by a correct measure and explanation of the reconciliation items.

The results of the stock-flow adjustment are monitored by each country and also by Eurostat. This is considered one of the most important criteria for evaluating the quality of information reported by national institutions under the excessive deficit procedure. The main factors contributing to the deficit-debt adjustment in each country are published by Eurostat.<sup>47</sup>

In the European context, the stock-flow adjustment assumes a particular importance, since in many countries the compilation of deficit and debt are separate by national statistics authorities.

In that countries the collection, compilation and analysis of financial accounts data take place at the central banks and the non-financial accounts by the national statistics institutes. For example, in Portugal and for general government accounts, a specific institutional framework has existed since 2006, when the Institutional Cooperation Agreement in the Field of General Government Statistics was signed between *Banco de Portugal*, National Statistics Institute and the Ministry of Finance's Directorate-General for the Budget. In this framework *Banco de Portugal* assumed the responsibility of compiling the financial accounts of general government and Maastricht debt.

The next table presents the responsible institutions for the compilation of non-financial accounts, financial accounts and debt statistics by Member State.

**Table 1 • Institutional responsibilities for the compilation of general government national accounts and debt**

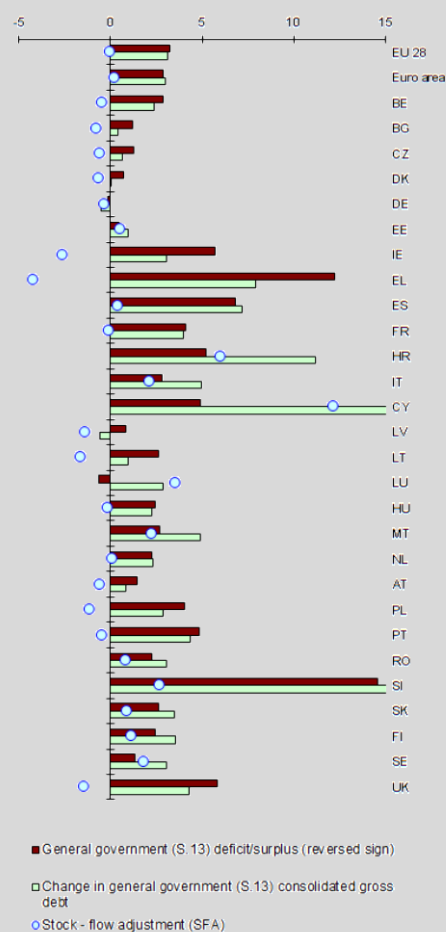
	Non-financial accounts	Financial accounts	Debt
Belgium	NCB	NCB	NCB
Bulgaria	NSI	NSI/NCB	MoF
Czech Republic	NSI	NSI	NSI
Denmark	NSI	NSI	NSI
Germany	NSI	NCB	NCB
Estonia	NSI	NSI	NSI
Ireland	NSI	NSI	NSI
Greece	NSI	NCB	NSI/MoF/NCB
Spain	NSI	NCB	NCB
France	NSI/MoF	NSI/MoF/NCB	NSI/MoF/NCB
Croatia	NSI	NSI	NSI
Italy	NSI	NCB	NCB
Cyprus	NSI	NSI	NSI
Latvia	NSI	NSI	NSI
Lithuania	NSI	NSI	NSI
Luxembourg	NSI	NSI	NSI
Hungary	NSI	NCB	NCB
Malta	NSI	NSI	NSI
Netherlands	NSI	NSI	NSI
Austria	NSI	NSI	NSI
Poland	NSI	NSI	MoF
Portugal	NSI	NCB	NCB
Romania	NSI	NCB	MoF
Slovenia	NSI	NCB	NSI/MoF
Slovakia	NSI	NSI	MoF
Finland	NSI	NSI	NSI
Sweden	NSI	NSI	NSI
United Kingdom	NSI/MoF	NSI/MoF	NSI/MoF

NCB - National Central Bank; NSI - National Statistical Institutes; MoF - Ministry of Finance

The coordination between both institutions is crucial to ensure the consistency between financial and non-financial accounts. This coordination should take into account that the reporting population of financial and non-financial transactions should be exhaustive and also that the basic statistical sources on financial and non-financial transactions are interrelated in the sense they refer to the same population and they are synchronized (i.e. the classification of operations are the same in both). In this context, it should be emphasized the work of Committee on Monetary, Financial and Balance of Payments Statistics (CMFB). This Committee has developed the conditions for an effective cooperation between the national statistical institutes and the Eurostat and, on the other hand, the national central banks and the European Central Bank, contributing for an interchange of statistical knowledge among these entities and to an efficient data collection and compilation, ensuring high-quality European Union economic and financial statistics.

The next figure, published by Eurostat in the last Stock-flow adjustment review, displays the 2013 deficit-debt adjustment for each Member State, together with the government deficit/surplus (reversed sign) and the change in the government debt, expressed as a percentage of GDP. Numerical data is presented in the Table 1 of the Annex 1.

**Figure 2 • Government deficit/surplus (reversed sign), change in government debt, and stock-flow adjustment as percent of GDP: 2013 figures**



Source: Eurostat

## 6. Looking forward: net debt and alternative measures.

Other results for the stock-flow adjustment can be achieved if other measures of public debt are used. Therefore, an aggregated measure of debt may result of the total liabilities derived from the financial accounts (stocks). This measure corresponds to the sum of all liability instruments, in accordance with ESA2010 definition, i.e. liabilities in gold and special drawing rights, currency and deposits, debt securities, loans, equity and investment fund shares or units, insurance, pension and standardised guarantee schemes, financial derivatives and employee stock options and other accounts payable. This measure has the advantage of having the same valuation of the deficit/surplus. However, it is also a gross measure by not considering the financial assets. This could be overcome if a net financial worth concept is considered, which corresponds to the total value of its financial assets minus the total value of its outstanding liabilities.

Another definition of gross debt is established by the International Monetary Fund. According to the Guide for Compilers and Users of the Public Sector Debt Statistics,<sup>48</sup> «total gross debt, often referred to as “total debt” or “total debt liabilities”— consists of all liabilities that are debt instruments. A debt instrument is defined as a financial claim that requires payment(s) of interest and/or principal by the debtor to the creditor at a date, or dates, in the future.» Thus, all liabilities of the total liabilities derived from the financial accounts are considered debt, except for liabilities in the form of equity and investment fund shares and financial derivatives and employee stock options. For risk management, it could be useful to focus on a net debt concept. For example, debt may have been incurred to fund assets that will generate income to meet liabilities. A concept of net debt, according to the International Monetary Fund is then calculated as the previous gross debt minus financial assets corresponding to debt instruments.

A more restricted concept of net debt is developed by the Eurostat, considering the Maastricht debt minus the financial assets corresponding to debt instruments also included in Maastricht debt (currency and deposits, debt securities and loans).

## 7. Conclusion

The differences between the deficit and the change in general government debt are inevitable. However, it is important to understand how these two concepts are related. The difference between the deficit and the change in debt can be grouped into three major categories: transactions in financial assets, transactions in liabilities not included in debt and valuation differences.

Stock-flow adjustment may not in itself raise concerns about the consistency of deficit and debt statistics. The ability to reconcile these two concepts provides an important quality tool of both aggregates, which can be supplemented by a correct measure and explanation of the reconciliation items.

Other results for the stock-flow adjustment can be achieved if other measures of public debt are used, namely net debt as defined by the Eurostat, which may avoid some of the difficulties that arise from the definition of government debt as a gross concept.



## Annex 1

**Table 1 • Stock-flow adjustment, in percent of GDP, 2010-2013**

	2010	2011	2012	2013	average
<b>EU 28</b>	1.7	0.6	0.5	-0.1	0.7
<b>Euro area</b>	1.5	0.7	1.3	0.2	0.9
<b>BE</b>	0.7	2.4	-0.1	-0.5	0.6
<b>BG</b>	-1.2	-1.0	2.1	-0.8	-0.2
<b>CZ</b>	0.0	0.6	0.8	-0.6	0.2
<b>DK</b>	1.7	2.2	-3.9	-0.7	-0.2
<b>DE</b>	7.1	0.2	2.9	-0.4	2.5
<b>EE</b>	0.0	1.2	3.8	0.5	1.4
<b>IE</b>	-8.4	14.2	3.6	-2.7	1.7
<b>EL</b>	1.9	2.2	-35.0	-4.3	-8.8
<b>ES</b>	-1.9	-0.7	3.7	0.4	0.4
<b>FR</b>	-1.8	0.8	0.7	-0.2	-0.1
<b>HR</b>	1.9	0.2	-1.5	6.0	1.6
<b>IT</b>	0.8	0.0	2.1	2.1	1.2
<b>CY</b>	0.0	5.0	7.4	12.1	6.1
<b>LV</b>	0.7	-2.6	0.8	-1.4	-0.7
<b>LT</b>	1.5	-4.2	1.8	-1.7	-0.6
<b>LU</b>	4.8	0.6	3.5	3.5	3.1
<b>HU</b>	0.4	-2.2	-3.4	-0.2	-1.3
<b>MT</b>	1.2	2.4	-2.8	2.2	0.8
<b>NL</b>	-1.3	-1.0	1.1	0.0	-0.3
<b>AT</b>	0.4	0.9	-0.4	-0.6	0.1
<b>PL</b>	-1.2	0.3	-2.1	-1.2	-1.0
<b>PT</b>	3.5	5.5	4.0	-0.5	3.1
<b>RO</b>	1.1	0.5	2.0	0.8	1.1
<b>SI</b>	-2.2	2.6	2.4	2.6	1.4
<b>SK</b>	-0.5	0.0	5.7	0.9	1.5
<b>FI</b>	4.2	2.7	2.9	1.1	2.7
<b>SE</b>	-1.0	0.6	-0.4	1.7	0.3
<b>UK</b>	4.2	0.7	-2.4	-1.5	0.2

Source: Eurostat

## Notes

\* Meeting of the IMF Government Finance Statistics Advisory Committee, Washington, D.C., USA, 9-10 March 2015

42. The analyses, opinions and findings of this paper represent the views of the authors, which are not necessarily those of the *Banco de Portugal* or the Eurosystem. Any errors and omissions are the sole responsibility of the authors. The data used in this paper refers to the data available at the time it was prepared and/or presented and, therefore, may not necessarily correspond to the most recent available data.

43. Composition of 28 countries.

44. Council Regulation (EC) No 479/2009 of 25 May 2009 on the application of the Protocol on the excessive deficit procedure annexed to the Treaty establishing the European Community, and Commission Regulation (EU) No 220/2014 of 7 March 2014 amending Council Regulation (EC) No 479/2009 as regards references to the European system of national and regional accounts in the European Union.

45. Regulation (EU) No 549/2013 of the European Parliament and of the Council of 21 May 2013 on the European system of national and regional accounts in the European Union.

46. More details on the EDP Notification Tables can be found at <http://ec.europa.eu/eurostat/web/government-finance-statistics/excessive-deficit-procedure/edp-notification-tables>.

47. The last release can be found at:

[http://ec.europa.eu/eurostat/documents/4187653/5798141/STOCK\\_FLOW\\_2014\\_OCT-EN.PDF/f4a1b352-1f08-48d6-8303-f94f792caeab](http://ec.europa.eu/eurostat/documents/4187653/5798141/STOCK_FLOW_2014_OCT-EN.PDF/f4a1b352-1f08-48d6-8303-f94f792caeab)

48. Available at *Available at* <http://www.tjfs.org/pdf/method/2013/psds2013.pdf>.

# Financing of NFC – A comparison with other economic indicators★49

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## Abstract

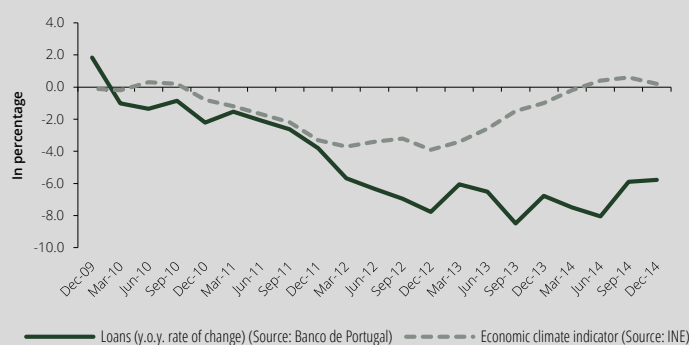
From December 2009 until the end of 2014, loans granted by the resident financial system to Portuguese non-financial corporations (NFC) have shrunk by almost 24%. In this paper we present an analysis of the NFC loans' evolution and compare it with related economic indicators. We further break it down by economic activity and geographical region, and observe notorious heterogeneity in the behaviour of credit and other variables across the different regions and activities.

**Keywords:** Central bank statistics, Credit, Economic Indicators, Gross Value Added

## 1. Introduction

According to Leão *et al.* (2014), the financing of non-financial corporations (NFC) is a key factor for their performance and the restrictions imposed since the beginning of the Portuguese Economic and Financial Assistance Programme have been one of the main barriers to the competitiveness of the Portuguese NFC. Since the end of 2009 loans granted by the resident financial system to Portuguese NFC have decreased by almost 24% while the economic climate indicator has been negative since November 2010, exhibiting a positive relation with the loans' year on year rate of change (Chart 1).

**Chart 1 • Loans granted to NFC and economic climate indicator**

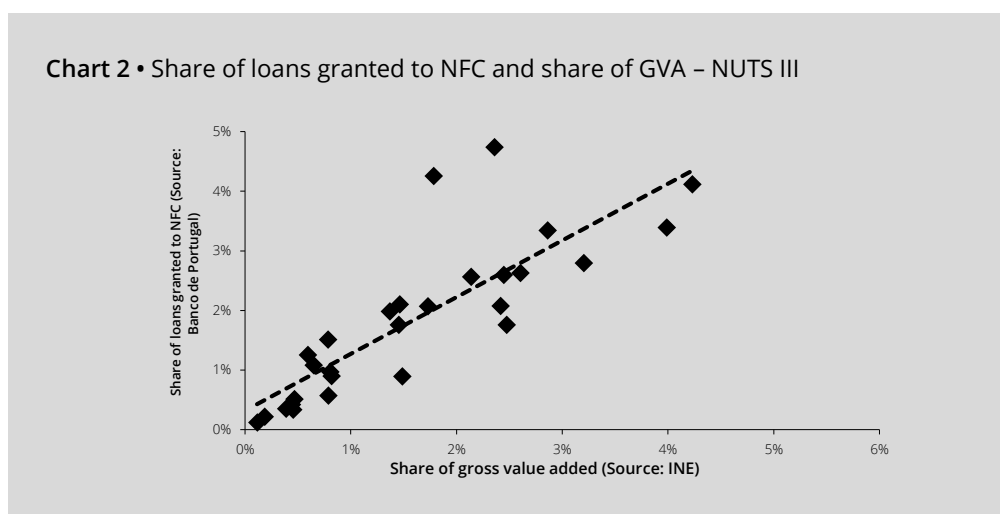


In this paper, by jointly analysing the information publicly available at *Banco de Portugal* and other public databases, we present a comparison between the evolution of loans granted to NFC and

other economic indicators, breaking down by economic activity (according to NACE) and geographical region, revealing different relations across regions and sectors of economic activity.

## 2. Statistical analysis

The joint analysis of *Banco de Portugal* statistics, based on the Central Credit Register's data, and data available at INE's website, allows a comparison between the gross value added (GVA) by NFC and the loans granted to NFC at a NUTS III region level. Comparing both variables at their 2012 levels, it is observable a close relation between the share of GVA each region adds and its respective share of loans granted to NFC. Excluding the NUTS III regions of *Grande Lisboa* and *Grande Porto* from the analysis, due to their relative size difference to other regions, the close relation is still observable as seen in Chart 2.



The same sources of data also allow a comparison of the same variables at a sector of economic activity level. Analysing the rate of change between 2009 and 2013, one can observe that sectors of activity with higher rates of change in loans granted also experienced higher rates of change in their GVA.

The analysis of statistics published by *Banco de Portugal*, within different scopes, also allows for interesting analysis. Comparing the total debt of private NFC vis-à-vis the financial sector and the returns on total assets (ROA) of private NFC by sector of activity, between December 2009 and September 2014, it is possible to see that the loans' year on year rate of change and changes in ROA follow distinct patterns across sectors, not allowing for a clear relation to be established. This result provides evidence that, despite the loans' reduction, there were some sectors able to increase their ROA.

## References

LEÃO, J., MARTINS, A. & GONÇALVES, J. (2014) Crescimento Económico e Financiamento da Economia Portuguesa. Boletim Mensal da Economia Portuguesa, 11 | 2014, 55-69.

## Notes

\* JOCLAD XXII, Setúbal, Portugal, 10-11 April 2015

49. The analyses, opinions and findings of this paper represent the views of the authors, which are not necessarily those of the *Banco de Portugal* or the Eurosystem. Any errors and omissions are the sole responsibility of the authors. The data used in this paper refers to the data available at the time it was prepared and/or presented and, therefore, may not necessarily correspond to the most recent available data.

# Casting a light on shadow banking activity in Portugal<sup>\*50</sup>

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## Abstract

In line with most recent debates on financial stability, the present study analyses the shadow banking activity in Portugal using the available statistical information. Empirical data shows a significant growth of activity from 2001 until 2010, with an increase of 30% to 63% as a percentage of GDP mainly driven by securitisation operations; at the end of the 3rd quarter of 2014 it amounted to 46% of GDP. Nonetheless, these values are smaller than the ones registered in other economic and financial jurisdictions.

**Keywords:** Credit intermediation, Securitisation, Shadow banking

## 1. Introduction

Over recent years, in the aftermath of the financial crisis the shadow banking activity became a focus of international analysis as a source of financial stability concerns, leading the G20 leaders, in November 2010, to request the Financial Stability Board (FSB) to develop an assessment on shadow banking, in order to prompt policy initiatives to enhance its monitoring and regulation. According to the FSB, in broader terms, shadow banking system can be described as credit intermediation involving entities and activities outside the regular banking system. The entities engaged in shadow banking are financial intermediaries that ultimately conduct maturity transformation (long term assets financed by short term liabilities) within the process of credit intermediation (and/or transformation). From a financial stability perspective, their high interconnectedness with the banking system heightens the leverage and the procyclicality of the financial system underlying potential risks.

The European Central Bank published, in 2012, a paper with the first analysis on the size and the structure of shadow banking within the euro area, having observed that the total amount of shadow banking activity in the 2<sup>nd</sup> quarter of 2011 was of about 11 trillion euro (112% of euro area GDP). In the present study, the universe of entities that were considered as relevant were those identified in *Banco de Portugal's* Financial Stability Report - May 2014, namely: investment funds (including money market funds), financial vehicles corporations (FVC) engaged in securitisation and other financial intermediaries (OFI).

## 2. Analysis and results

The aim of this study is to analyse the shadow banking activity in Portugal, using the published statistical data, comparing its evolution against the euro area as a whole. The inexistence of a single statistical database for this analysis, led to the combination of different statistical outputs, namely Monetary and Financial Statistics and National Financial Accounts, which made the quest for results more challenging.

Since 2000, when analysing the total assets of the relevant shadow banking subsectors (excluding MMF which only amounted about 2.5 billion euro in the end of 2014), it is possible to observe a positive growth rate until the end of 2007, reaching a peak of 30% in 2003, mostly due to the development of FVC activity. In fact, having begun their activity in Portugal in 2001, FVC recorded an impressive growth until the end of 2011, with total assets reaching a maximum of 62 billion euro, more than quadrupling its size since 2003.

As a whole, total assets of shadow banking system, now also including MMF, amount to nearly 80 billion euro (46% of GDP) in the 3<sup>rd</sup> quarter of 2014 comparing with 444 billion euro (255% of GDP) of banks. More than 90% of the securitised assets, as at the 3<sup>rd</sup> quarter of 2014, were loans originally granted by the banking system, demonstrating the very strong interconnectedness between the banking sector and the shadow banking system. Also for investment funds, excluding MMF, it is possible to observe that banks hold 33% of the total issued investment fund units, at the end of 2014. In the case of OFI, credit intermediation has a relevant roll, since about 75% (in the 3<sup>rd</sup> quarter of 2014) of total assets correspond to loans and advances. As consequence of this interconnectedness, since 2003 the other intermediaries have contributed to the grossing-up of bank's liabilities, reflecting mainly securitisation operations.

## 3. Conclusions

Although the credit intermediation activity in Portugal is largely undertaken by the banks, the shadow banking system increased its relevance until 2010, mainly driven by securitisation. Even so, data seem to indicate that the shadow banking activity in Portugal is not as relevant as in the euro area.

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### Notes

\* JOCLAD XXII, Setubal, Portugal, 10-11 April 2015

50. The analyses, opinions and findings of this paper represent the views of the authors, which are not necessarily those of the *Banco de Portugal* or the Eurosystem. Any errors and omissions are the sole responsibility of the authors. The data used in this paper refers to the data available at the time it was prepared and/or presented and, therefore, may not necessarily correspond to the most recent available data.

# Conceptual issues related to the definition of government debt<sup>\*51</sup>

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## **Abstract**

This paper discusses several concepts with regard to the definition of public debt, in particular possible changes related to the delimitation of the public sector and to the range of financial instruments included and its valuation.

Firstly, it describes the different definitions of government debt that can be found in macroeconomic statistics. It considers the advantages and disadvantages of the various concepts, namely by taking into account the different coverage of entities and instruments and the different ways to value them.

This analysis is supplemented by looking at net debt measures, which are especially relevant in times of financial crisis, when governments tend to hold more financial assets. From here, the paper examines the arguments that support possible changes in the government debt definition, in particular on some conceptual issues raised recently regarding the definition of the so-called Maastricht debt, which is the concept commonly used in Europe to measure the indebtedness level of a country's general government. In this respect, recent discussion focused on the possible inclusion of trade credits in the definition of the Maastricht debt and the possible valuation of debt at nominal value rather than face value.

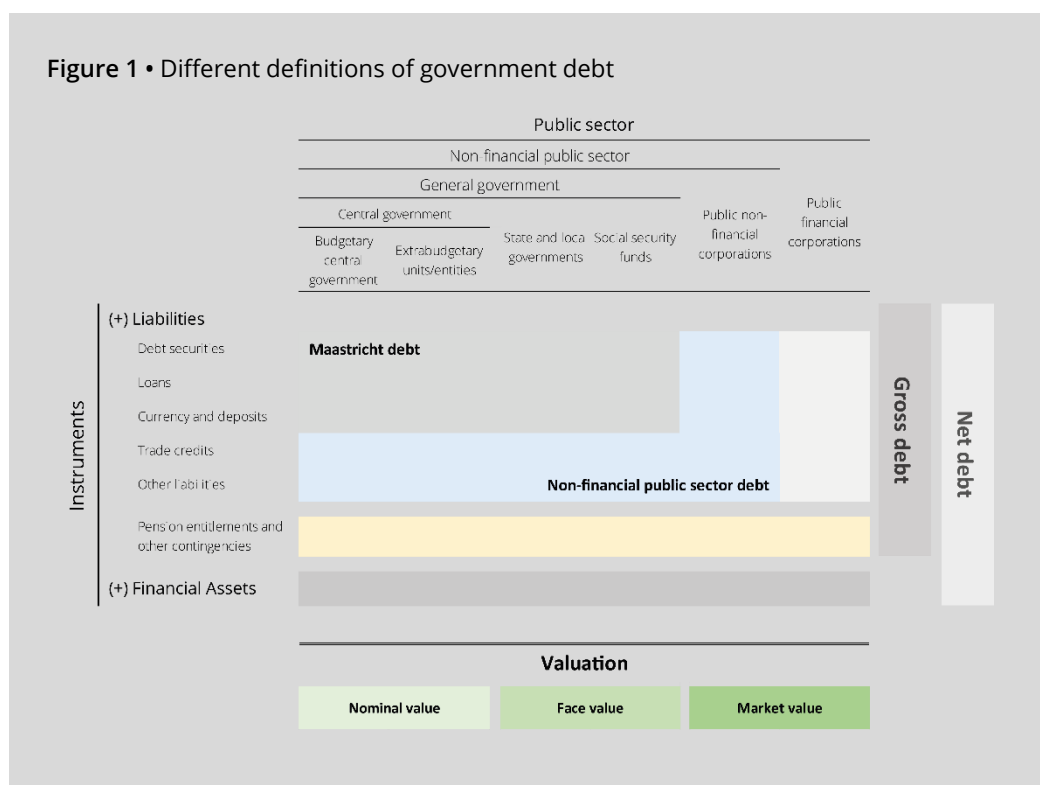
Possible advantages of taking into account, for fiscal policy purposes, the debt of the whole public sector rather than just the debt of the general government sector are also analysed. In a nutshell, we can say that the latter indicator may be seen as showing a more comprehensive and accurate portrait of the financial position of governments. Finally, the challenge that contingent liabilities may pose to the definition of public debt is addressed.

**Keywords:** public debt; national accounts; financial accounts; government finance statistics

## 1. Introduction

Government debt is one of the most relevant macroeconomic indicators. It is used to evaluate the financial health of governments and, often, of the country as a whole. However, despite some efforts to harmonize the definition, it is still not possible to find a consensual framework. Several “layers” of debt can be identified (see Figure 1). The most restrictive ones are easier to compile but show an incomplete picture of the government’s situation, whilst broader definitions may show a more accurate situation but are more demanding in terms of the compilation system. Another issue to take into account is the fact that data users (e.g., academics, investors, voters) tend to compare government debt across countries. Therefore, consistent frameworks are highly desirable.

In section 2, we present the most commonly used concept of debt in Europe – i.e., the so-called Maastricht debt – and identify other definitions of government debt, discussing their advantages and disadvantages. Several definitions of net debt measures are also covered in this section. In section 3, we depart from the concept of Maastricht debt by changing coverage and valuation. A more comprehensive measure is introduced in section 4, followed by a section about contingent liabilities of the general government sector. We conclude the paper in section 6 by identifying some challenges for the near future.



## 2. Different definitions of government debt and net debt measures

The Treaty on the European Union (originally signed in Maastricht in 1992) established the process of Economic and Monetary Union (EMU) and defined the convergence criteria that specified the conditions required for a country to participate in the common currency. It also established the



way in which multilateral fiscal surveillance is organized. The instruments of multilateral surveillance for achieving medium-term balanced budgets are defined in the Protocol on the Excessive Deficit Procedure (EDP) that is annexed to the Maastricht Treaty, which specifies that the deficit to GDP ratio must not exceed 3 percent and the debt to GDP must not exceed 60 percent of GDP.

European Union (EU) legislation defines government deficit and gross debt with reference to the European System of National and Regional Accounts (ESA), which is broadly consistent with the System of National Accounts (SNA) but has been written specifically by and for the EU. Gross debt, also called Maastricht debt, is constituted by the liabilities of general government at face value in currency and deposits, debt securities and loans according to ESA definitions.

It should be noted that, although the calculation of the debt indicator uses ESA as a reference, it differs in some ways from the stocks in ESA financial accounts. Therefore, the indicator is not fully integrated in the framework of national accounts, the main differences being: (i) Maastricht debt excludes some financial instruments, such as financial derivatives and other accounts payable (which include trade credits); (ii) Maastricht debt is an end-of-period position at face value, which corresponds to the amount contractually agreed by general government to repay creditors at maturity, different from the valuation at market prices used in national accounts; and (iii) Maastricht debt is defined on a gross basis, i.e., it is not netted by the corresponding government assets. Figure 2 illustrates the difference between general government liabilities compiled in the context of ESA stocks accounts and the Maastricht debt for Portugal.

**Figure 2 • Difference between general government liabilities and public debt, for Portugal**

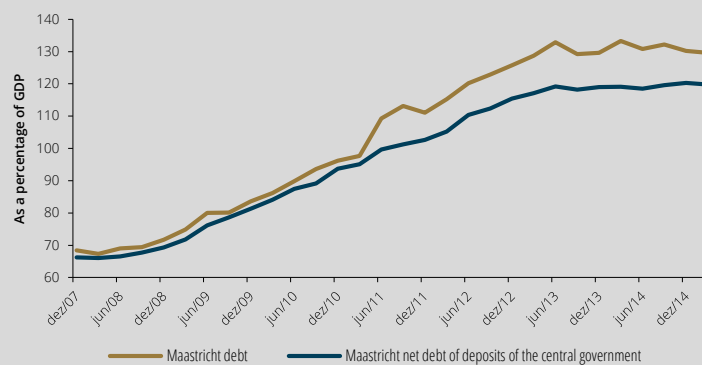


In this context, an aggregated measure of debt may result of the total liabilities derived from the financial accounts (stocks). This measure corresponds to the sum of all liability instruments, in accordance with ESA 2010 definition – i.e., liabilities in gold and special drawing rights, currency and deposits, debt securities, loans, equity and investment fund shares or units, insurance, pension and standardised guarantee schemes, financial derivatives and employee stock options, and other accounts payable. This measure has the advantage of having the same valuation of the deficit/surplus of general government. However, it is also a gross measure by not considering the financial assets. This could be overcome if a net financial worth concept is considered, which corresponds to the total value of its financial assets minus the total value of its outstanding liabilities.

Another definition of gross debt is established by the International Monetary Fund (IMF). According to the Guide for Compilers and Users of the Public Sector Debt Statistics, “total gross debt, often referred to as ‘total debt’ or ‘total debt liabilities’, consists of all liabilities that are debt instruments. A debt instrument is defined as a financial claim that requires payment(s) of interest and/or principal by the debtor to the creditor at a date, or dates, in the future.” Thus, all liabilities of the total

liabilities derived from the financial accounts are considered debt, except for liabilities in the form of equity, investment fund shares, financial derivatives and employee stock options. According to the IMF, for risk management purposes it could be useful to focus on a net debt concept. For instance, debt may have been incurred to fund assets that will generate income to meet liabilities. A concept of net debt, according to the IMF is then calculated as the previous gross debt minus financial assets corresponding to debt instruments.

**Figure 3 • Maastricht debt and Maastricht net debt of deposits of central government, for Portugal**



A more restricted concept of net debt is developed by the Eurostat, considering the Maastricht debt minus the financial assets corresponding to debt instruments also included in Maastricht debt (currency and deposits, debt securities and loans). It should be noted that the definitions of net debt type measures are especially relevant in times of financial crisis, when governments tend to hold more financial assets.

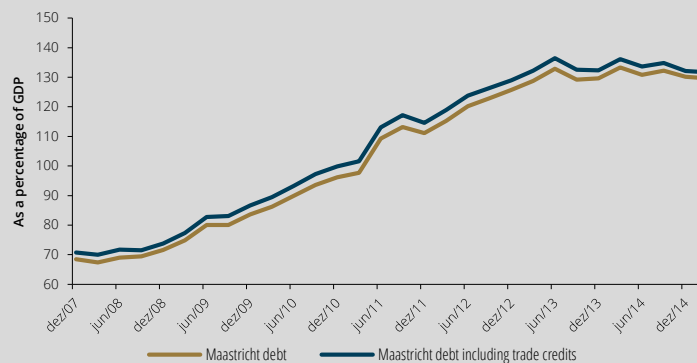
Some countries, like Portugal, publish their own net debt measures, *i.e.* Maastricht debt net of central government deposits (see Figure 3). The rationale for choosing this definition is the fact that recently the Portuguese government has issued significant amounts of debt in order to create cash reserves. However, at international level, there is currently no agreed common definition for net government debt.

### 3. The inclusion of trade credits and changes in valuation of debt

Departing from the most commonly used concept of debt in Europe, the Maastricht debt presented above, this section discusses the possible inclusion of trade credits in the definition of the Maastricht debt and the possible valuation of debt at nominal value rather than face value<sup>52</sup>.

Trade credits are compiled for financial accounts and the expenditure financed by trade credits is included in the calculation of government deficit. However, they are not part of the definition of the Maastricht debt. Since significant accumulation of trade credits has been identified in many European Union Member States in recent years, the exclusion of trade credits in the current definition of the Maastricht debt appears to be something to be discussed in the future. In fact, trade credits are, in some cases, an alternative to financing through classic debt securities or bank loans. In the case of Portugal, trade credits granted to general government units are compiled in a monthly basis and shown as a component of government debt (see Figure 4).

**Figure 4 • Maastricht debt and Maastricht debt including trade credits, for Portugal**



In order to approximate the definition of debt to the national accounts definition, the replacement of “face value” by “nominal value” could also be considered, given that the first can be a misleading indicator of the value of the debt to investors. As referred in Dias et al (2014) the comparison of debt stocks can generate misleading conclusions due to different ways to compensate debt holders for the capital invested. For example, different results may arise when the debt is issued at discount or if the interest is paid through coupons.

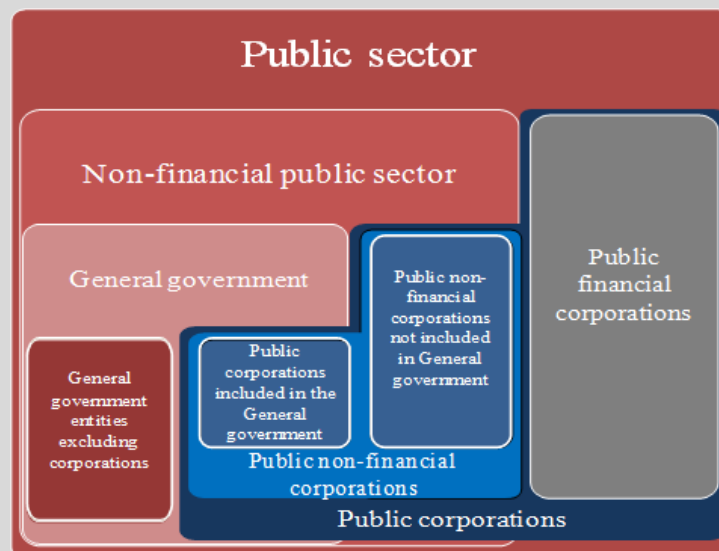
Face value does not reflect the amount of the debt that will be redeemed by the debtor, in particular because it does not include interest accrued but not paid. This has also particular implications for the recording of zero-coupon bonds and similar instruments in the sovereign debt market for which the face value is different from the nominal value.

## 4. A more comprehensive measure

Concerning fiscal policy purposes, the debt of the whole public sector rather than just the debt of the general government sector could be an indicator showing a more comprehensive and accurate portrait of the financial position of governments.

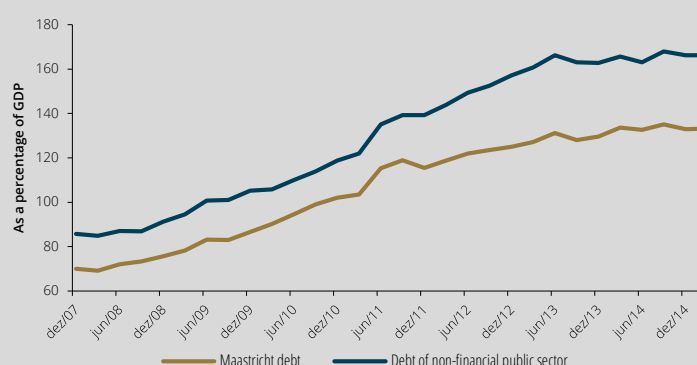
The public sector includes the public institutional units classified in the institutional sectors of general government, non-financial corporations and financial corporations (see Figure 5). Public institutional units are entities which are controlled by general government, *i.e.* whose general policy is determined by government. Public institutional units can be market or non-market producers. Non-market units are the ones for which less than half of their production costs are covered by sales. In this context sales are deliveries of goods or services at economically significant prices, *i.e.* prices which influence the amounts produced and consumed.

**Figure 5 • Delimitation of the public sector**



In turn, general government sector only includes non market public institutional units. It can be broken down into three subsectors: central government; regional and local government; and social security funds.

The public sector debt includes, in addition to the debt of general government entities, the debt of other public institutional units. In this respect, *Banco de Portugal* regularly publishes on the indebtedness of the non-financial public sector which includes general government and non-financial public corporations not included in general government (see Figure 6). Apart from the enlarged institutional sector coverage, it also includes monthly data on general government debt, as well as a breakdown of debt by financing institutional sector.

**Figure 6 • Maastricht debt and debt of non-financial public sector, for Portugal**

## 5. Future liabilities of the general government sector

Another aspect that may be analyzed in the future is the fact that governments often incur in contingent liabilities. In particular, during financial crisis governments tend to increase the amount of guarantees granted, which are used to ease the access of certain entities (namely banks) to credit. Guarantees are not a liability of government but they constitute a risk of having additional debt in the future, if those guarantees are called.

Pension entitlements of public social insurance schemes may also be seen as future responsibilities of governments. The SNA provides for the calculation of these entitlements of households *vis-à-vis* the general government. Although the general government may change the amount of pensions that are going to be paid in each moment, the age of retirement, and other conditions, it may be useful to consider that there is an amount of pensions to be paid in the future. If this is the case, however, it should also be considered that contributions are paid by workers and employers to finance social security and, therefore, this liability of the general government.

Other off-balance-sheet liabilities that represent significant risks for the sustainability of government finances may also be taken on board, such as liabilities due to long-term contracts (e.g. public-private partnerships) and non-performing loans granted by government agencies (student loans, import / export loans, etc.).

These items will potentially become future liabilities of the general government sector and, as such, are a challenge to take into account in the definition of public debt in the near future.

## 6. Conclusions

The definition of public debt is not a closed concept. Different possibilities for alternative measures of government debt may be discussed. The definition of debt used in the European Union is one of the most restrictive concepts that can be used in terms of sector delimitation, valuation, instrument coverage and netting.

The concept might be enlarged by including all of the public sector and not only the general government (showed by the horizontal enlargement in the diagram in Figure 1). Other financial instruments may also be included, such as trade credits (vertical expansion in the diagram). Debt could also be considered net by taking into account the investment of government in financial assets.

The valuation of debt could follow the concepts defined in ESA 2010, e.g. nominal value or market value.

An important challenge also to take into account in the definition of public debt is the treatment of future liabilities of governments, namely pension entitlements of public social insurance schemes, guarantees granted, and other off-balance-sheet liabilities.

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\* ISI2015 – 60<sup>th</sup> World Statistics Congress, Rio de Janeiro, Brazil, 26-31 July 2015

51. We thank Luís D'Aguiar, António Silva and Pedro Pólvora for their comments to this paper. The analyses, opinions and findings of this paper represent the views of the authors, which are not necessarily those of the Banco de Portugal or the Eurosystem. Any errors and omissions are the sole responsibility of the authors. The data used in this paper refers to the data available at the time it was prepared and/or presented and, therefore, may not necessarily correspond to the most recent available data.

52. According to the SNA, nominal value refers to the amount the debtor owes to the creditor, which comprises the outstanding principal amount including any accrued interest. Face value is the undiscounted amount of principal to be repaid.

# The Portuguese Central Credit Register: a powerful multi-purpose tool, relevant for many central bank's functions\*<sup>53</sup>

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## Abstract

The Portuguese Central Credit Register (CCR) – managed by the Statistics Department of the *Banco de Portugal* – contains monthly granular information on credit on a borrower-by-borrower basis and includes, in some cases, details that provide loan-by-loan information with a virtually complete coverage.

These features have enabled the *Banco de Portugal* to use its CCR data for a variety of purposes, namely:

- a. To compile very comprehensive statistics on credit, with breakdowns by institutional sector of the borrower, branch of activity, purpose, size of the firms, location/region and amount of credit
- b. To assess credit concentration and distribution
- c. To measure overdue loans and overdue loans' ratio
- d. To understand the risks underlying banks' balance sheets
- e. To create an in-house credit risk assessment system in the *Banco de Portugal*.

Given these multi-purpose uses, the Portuguese CCR has proved to be a powerful tool, relevant for many central bank's functions, namely for banking supervision, financial stability, monetary policy, economic research and compilation of statistics..

**Keywords:** Micro-data; Central Credit Register; Financial Stability; Data Collection; Central Bank statistics

**JEL Code:** C80; E50

## 1. Introduction

The Central Credit Register (CCR) is an information system managed by the Statistics Department of the *Banco de Portugal* (hereafter referred to as "the Bank"), which contains granular information on credit granted by the institutions participating in the system (all resident credit-granting institutions) on a borrower-by-borrower basis and, in some cases, including details which provide loan-by-loan information, with a virtually complete coverage.

The CCR was established in 1978, at the time covering only the credit liabilities of non-financial corporations (NFCs) – households were included later, in 1993. The main goal of the CCR is to

provide the credit institutions with data relevant for their assessment of the risks attached to granting credit – aggregate information on the credit liabilities of each client (borrower) vis-à-vis the financial system as a whole.

The use of CCR data for the compilation of statistics was authorized in 1996. However, the responsibility for the management of the database and all its related services was assigned to the Statistics Department only in 1999. Since then, a number of developments were introduced aiming at improving the CCR's coverage and usability, namely the establishment of a bilateral exchange of individual credit data among the 7 European countries that signed a Memorandum of Understanding (in 2005),<sup>54</sup> the inclusion of the potential credit liabilities of personal guarantors (in 2007) and the implementation of a new information system that introduced additional breakdowns at the level of credit data and a greater efficiency in identifying private individuals (2009).

More recently, (i) the CCR coverage was extended to include new reporting institutions (essentially NFCs that buy credit portfolios from the resident financial sector); (ii) a new analytical data system for data analysis and exploration was developed; (iii) additional details were included to allow for the individual identification of loans used as collateral in Eurosystem financing operations; and (iv) additional breakdowns were introduced (e.g., new collateral types, original and residual maturity brackets, non-performing loans and restructured loans).

According to CCR's legal framework,<sup>55</sup> apart from the compilation and publication of statistics, CCR data is also used by the Bank for several other purposes, namely, the prudential supervision of credit institutions, the analysis of the financial system's stability, the implementation of monetary policy and for research.

This paper is organised as follows: the next section presents a short overview of the Portuguese CCR; section three illustrates how CCR data are being used in the context of the compilation of credit statistics; section four discusses briefly the Bank's involvement in the AnaCredit project; section five addresses the recent creation of an In-house Credit Assessment System in the Statistics Department; section six considers the use of CCR data for banking supervision, financial stability, monetary policy and economic research; lastly, section seven concludes.

## 2. Description of the Portuguese Central Credit Register (CCR)

The CCR's main goal is to assist the participating entities in their risk assessment when granting loans. Hence, these entities have access to aggregate information on the credit liabilities of each borrower<sup>56</sup> vis-à-vis the whole CCR reporting institutions.

Borrowers also have the legal right to access their respective information stored in the CCR. In case of missing or wrong information, borrowers must address the reporting institution to change or update its information, since the Bank is not legally authorized to correct the information itself.

Currently, 188 institutions (of which 146 are banks) report data to the CCR and around 6.2 million borrowers are registered with effective or potential (e.g., credit lines) credit data.

As mentioned above, the CCR database contains information on actual and potential credit granted by participants to borrowers. Actual credit includes all the loans granted by the participants (mainly resident financial institutions) and actually taken up – *inter alia*, loans for house purchase, loans to purchase cars, furniture and other consumer goods or services, loans for the acquisition of shares or bonds, payment of bills of exchange or other commercial bills, overdrafts, leasing or factoring operations, and balances on credit card transactions. Potential credit consists chiefly of irrevocable commitments by participants, such as available credit on credit cards, credit lines, pledges given by participants and other credit facilities which may become actual debt.

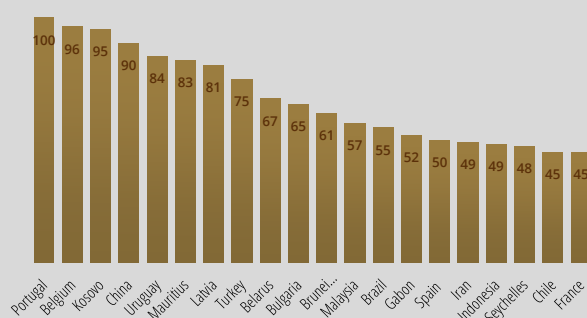


Participants are all resident financial institutions granting credit – *i.e.*, banks (including savings banks and mutual agricultural credit banks) and other credit institutions (*e.g.*, credit financial companies, financial leasing companies, factoring companies and credit-purchase financing companies). Additionally, other non-financial entities with credit-related activity may also be designated by the Bank to participate in the CCR. This is, for example, the case of some non-financial companies that buy credit portfolios from the financial sector.

Borrowers are resident or non-resident entities, both private individuals and legal persons, receiving credit from the participant institutions. The identification of resident borrowers is made using the tax payer number; for the identification of non-residents, reporting institutions must provide a code (unique for each borrower in each institution), the name, an identification document and the country of residence.

Data has to be reported to the CCR on a monthly basis, with reference to the end of each month, until the 6th working day following the end of the reference period. Participants are obliged to supply the CCR with information on the outstanding amount of the borrower's actual or potential liabilities whenever its value exceeds 50 (fifty) Euros. This very low threshold has allowed the Portuguese CCR to lead the world ranking of public credit registries in term of coverage (please see Figure 1. below).

**Figure 1 • Credit registry coverage (as a % of the adult population<sup>57</sup>)**



Source: World Bank, Doing Business 2016

Participants have to classify loans according to a list of attributes and dimensions, using the following variables to classify the loans:

- Type of liability of the borrower – identifies the commitment the borrower has *vis-à-vis* the credit institution (for example, individual credit, joint credit, personal guarantee).
- Status of the loan – shows the type of liability represented by the loan and if there is any degree of non-compliance with the repayment schedule (*e.g.*, drawn credit in a regular situation, undrawn credit, overdue loans, written-off loans).
- Type/purpose of the loan – identifies the credit instrument used, sometimes referring to the purpose of the loans (*e.g.*, current accounts, credit card, factoring with or without resource, housing loans, consumer credit and car credit).
- Original and residual maturity – identified according to a list of predefined brackets.
- Number of days the loan is past due – in case of default, the number of days since the loan has defaulted is identified according to a list of predefined brackets.

- f. Currency – identifies the currency of denomination of the loan.
- g. Type and value of collateral or guarantee securing the loan (when existing).
- h. Identification of special characteristics associated to loans – information to be used internally by the Bank, which allows the identification of, inter alia, securitised loans (derecognized and non-derecognized), syndicated loans, loans used as collateral for monetary policy operations, non-performing loans.
- i. Value of monthly repayments – only for some types of personal loans.

The Portuguese CCR also collects information on the insolvency status of the borrower, both for private individuals and companies or other legal entities. This information is provided by the Portuguese Courts of Law.

Figure 2. highlights the comprehensiveness of the Portuguese CCR: currently, none of the other credit registers of the countries that signed the Memorandum of Understanding on the exchange of information among CCRs (see footnote 1) is in a position to collect information on the full set of variables depicted in the table below.

Figure 2 • Comparison among European public credit registers

Variables collected	Austria	Belgium	Czech Republic	France	Germany	Italy	Portugal	Romania	Spain
Credit status	Y	Y	Y	Y	Y	Y	Y	Y	Y
Liability level	Y	Y	Y	Y	Y	Y	Y	Y	Y
Purpose of the loan	N	N	Y	N	N	N	Y	N	Y
Original maturity	N	Y	Y <sup>3</sup>	Y	N	Y	Y	Y	Y
Residual maturity	N	Y	Y <sup>4</sup>	N	N	N	Y	N	Y
Overdue loans	Y	Y	Y	Y	N	Y	Y	Y	Y
Type of collateral	Y	N	Y	N	Y	Y	Y	Y	Y
Value of collateral	N	Y	N	N	Y	N	Y	Y	N <sup>5</sup>
Bankruptcy status	Y	Y	N	Y	N	Y	Y	Y	Y
Currency	N	Y	Y	N	N	N	Y	Y	Y
Country where the loan was granted	Y	Y	Y	Y	Y	N	Y	N	Y
Data on personal guarantors	N <sup>1</sup>	Y <sup>2</sup>	N	N	Y	N	Y	N	Y

<sup>1</sup> Only for the types of credit derivatives indicated in Article 204 of Regulation (EU) No. 575/2013, used for hedging purposes, the protection seller has to be specified.

<sup>2</sup> For consumer and mortgage lending.

<sup>3</sup> Variables collected directly are "Date of origin" and "Maturity date". "Original maturity" is calculated using these variables.

<sup>4</sup> Variable collected directly is "Maturity date". "Residual maturity" is calculated using this variable.

<sup>5</sup> This data will be collected from 31 December 2016.

### 3. The use of CCR data for the compilation and dissemination of statistics

The compilation of comprehensive statistics on credit granted is one of the various goals of the Portuguese CCR. With this in mind, credit instruments and other variables related to the classification of loans are defined in such a manner that they are meaningful for economic analysis. Also, borrowers have to be classified according to proper statistical criteria (e.g., by institutional sector, sector of economic activity, firm size and region of residence). Since the participating institutions only report the borrowers' identifications (i.e., their taxpayer numbers), the statistical classification of the resident borrowers is made in the Bank, mostly by means of a business register managed by the Statistics Department.

Statistical information based on the Portuguese CCR data is made available to users on a monthly/quarterly basis. In both cases, the main focus is loans granted by the financial sector to the resident entities classified as NFCs, non-profit institutions serving households and households.

The set of statistical indicators disclosed monthly includes:

- a. Outstanding amounts of loans granted and the correspondent annual change of rate.
- b. Overdue loans ratios.
- c. The percentage of borrowers with overdue loans.

These indicators are compiled for borrowers belonging to the NFCs and households sectors. In the former sector, information is also broken down by firm size and also made available for exporting companies. In case of households, a breakdown according to the purpose of the loan is also included. Data using the above-referred metrics are provided for non-profit institutions serving households without any additional details.

More detailed information is disseminated on a quarterly basis, both for the outstanding amounts of regular loans and for loans in default. In the latter case, two indicators are published: overdue loans ratio and percentage of borrowers with overdue loans. In the case of NFCs, for the referred metrics, data is further broken down by:

- a. Region of residence of the company headquarters (according to NUTS<sup>58</sup> classification)
- b. Economic activity sector (according to NACE<sup>59</sup> sections)
- c. Brackets of total amount of loans per borrower.

As to households, data are further broken down by:

- a. Purpose of the loan
- b. Region of residence (according to NUTS classification and by municipality)
- c. Brackets of total amount of loans per borrower.

The Bank has the intention to enlarge the set of statistical indicators on loans that are compiled on the basis of CCR data, and has scheduled its dissemination to the 1<sup>st</sup> quarter of 2016. The type of additional indicators envisaged include: (i) loans broken down by size of the firm, maturity (original and residual) and type of collateral; and (ii) indicators on the average number of financial institutions granting loans to NFCs or to households.

The high-quality figures that can be obtained from specific breakdowns of CCR credit data are of great importance for economic analysis and for quality control. In addition, the use of the CCR has made it possible to reduce the reporting requirements in the context of the Bank's Monetary and

Financial Statistics (MFS), thus alleviating the participants' reporting burden and curtailing data redundancy.

The following example, concerning the breakdown by branch of economic activity of credit granted to NFCs, illustrates this point. The referred breakdown has been included in the MFS reporting requirements from 1990 to 2002. Yet, the data reported during this period showed a number of weaknesses in terms of quality due to the need for the reporting agents to aggregate the information according to various statistical criteria prior to its submission to the Bank. Given that the CCR provides an alternative source for such data, with higher quality, the MFS data collection system in force since January 2003 no longer requires the breakdown by branch of economic activity.

## 4. The CCR as a tool for banking supervision, financial stability, monetary policy and economic research

The prevailing CCR legal framework already foresees that, besides statistical compilation, data can be used in the context of other specific functions of the Bank, such as banking supervision, financial stability analysis, monetary policy and research.

### 4.1. Using CCR data for banking supervision and financial stability

In the domain of banking supervision, CCR data have been used in the assessment of credit risk and concentration of risk exposures, both at micro and macro level, and for the improvement of on-site inspection practices.

In this context, it is worth mentioning the Bank's Early Warning System (EWS), whose aim is to identify companies showing a high probability of default as a result of an excessive level of indebtedness to be assessed taking into consideration the ability to generate cash flow and/or the existing capital structure. Through this system, the Bank intends to encourage credit institutions to be proactive in identifying and defining appropriate procedures and solutions in the treatment of such companies.

The EWS relies heavily on the information available in the Portuguese CCR – and also on data from the Bank's Central Balance-Sheet Database (CBSDB) –, which are used to calculate a predefined set of five financial ratios, determined for each company regardless of the industry or sector in which it operates:

- a. Two financial ratios (Total Debt to EBITDA<sup>60</sup> and EBITDA Interest Coverage) are classified as core ratios in accordance with Standard & Poor's Corporate Ratings Framework.
- b. Three additional ratios are considered as supplementary ratios due to the fact they foster the understanding of a company's financial risk profile, capturing other critical risk dimensions, such as profitability and leverage (FFO to Total Debt,<sup>61</sup> Gearing, Return on Capital).

As regards the Bank's financial stability function, both the CCR statistics disclosed in the Bank's Statistical Bulletin and the granular data available from the CCR database are extensively used.

Granular data are crucial for (i) research purposes, allowing for the crossing/analysis of various dimensions and characteristics of loans/debtors/creditors; and (ii) analysis objectives.

These data are typically used, *inter alia*, in the:

- a. Analysis of distribution measures by loan/debtor classes according to the activity sector, exposure size, firm size, type of guarantee, performing status and other characteristics (assessment of risks stemming from the household and NFCs sectors).

- b. Distinction of financial situation of NFCs with positive, null or negative changes in borrowing (together with data from the Bank's CBSD).<sup>62</sup>
- c. Breakdown of above by activity branch and by size<sup>63</sup> (together with data from the Bank's CBSD).
- d. NFCs' credit performance following credit restructuring.
- e. Effects of the age in NFCs bank relations in credit spreads (with the interest rate statistics database).
- f. Credit trends of largest indebted NFCs.
- g. Credit history of high growth corporations.

Given its homogeneity and comparability with other datasets, CCR data allow for complementary analysis to aggregated data by providing distribution measures. Granular data enable better testing and monitoring of the banks' results in face of more comprehensive scenarios (e.g., stress testing).

Moreover, some macroprudential tools require the use of characteristics that are only available in granular datasets (such as real estate collateral amount and debt instalments).

## 4.2. Using CCR data for monetary policy

Within the monetary policy framework, CCR has been used as an auxiliary tool in the identification of loans used as collateral in Eurosystem financing operations. In particular, the CCR collects the data needed to evaluate the risks associated with the acceptance of bank loans as collateral of monetary policy credit operations.

The general documentation on Eurosystem monetary policy instruments and procedures requires:

- a. All Eurosystem credit operations to be based on adequate collateral (underlying assets provided by the counterparties).
- b. Underlying assets to fulfill certain criteria in order to be eligible for Eurosystem monetary policy operations.
- c. A single framework for eligible assets common to all Eurosystem credit operations.

The single framework comprises two distinct asset classes:

- a. Marketable assets.
- b. Non-marketable assets (namely, credit claims).

CCR is relevant for eligibility assessment (and ex post verification) of credit claims. CCR is also relevant for the elaboration of collateral generation capacity estimates of domestic counterparties on credit claims, asset back securities (ABS) and covered bonds.

Each National Central Bank (NCB) is responsible for the eligibility assessment of a subset of assets. The Bank is responsible for the eligibility assessment of:

Marketable assets traded in Portugal.

Non-marketable assets granted by domestic counterparties and presented as collateral to the Bank.

Since February 2012, NCBs are allowed, as a temporary measure, to accept as collateral for Eurosystem credit operations additional performing credit claims. These credit claims should satisfy specific eligibility criteria proposed by the NCBs and approved by the ECB Governing Council. In general, the use of CCR data allows for:

- a. Verifying the existence of the credit claims.
- b. Confirming the major characteristics of the credit claims.
- c. Simplifying the report for monetary policy purposes.

### 4.3. Using CCR data for economic research

The Bank's economic research function has been using CCR micro-data for several research papers and analysis, frequently combining this data with other micro-data sources, like the Bank's CBSD.

A good example of the usefulness of this information can be found in Augusto, F. & Félix, S. (2014), where the authors examine the impact of bank recapitalization on firms' access to credit. Starting from the several private and public capital injections experienced by the Portuguese banks during the recent global financial crisis, the paper investigates the impact of bank recapitalizations on the supply of credit in the period between the first quarter of 2010 and the fourth quarter of 2013. Their results suggest that bank bailouts contributed to an increase in the supply of credit. This effect is negatively related to the capital buffer of recapitalized banks and applies to the sectors of manufacturing and trade. There is no evidence that bank recapitalizations contributed to a selective behavior in the supply of credit towards distressed firms compared to other firms. The main dataset used in this analysis is the Bank's CCR. The granularity of these data allows considering sophisticated micro-econometric approaches to identify the effects of the bank recapitalization on the supply of credit. The information reported in the CCR allows for the construction of several credit performance indicators, related to firms' overdue credit. This study includes two firm distress indicators based on firms' overdue credit (as reported in the CCR). The sample includes 201,768 non-financial corporations and 327,777 loans (firm-bank pairs). The results suggest that firms have on average two banking relationships.

Another example can be found in Farinha, L. & Félix, S. (2014). This paper examines the importance of credit demand and credit supply-related factors in explaining the evolution of credit granted to Portuguese small and medium-sized enterprises (SMEs). The results suggest that the interest rate is a strong driver of SMEs' demand for bank loans, as well as their internal financing capacity. On the other hand, credit supply mostly depends on the firms' ability to generate cash-flows and reimburse their debt, and on the amount of assets available to be used as collateral. The model was estimated for the period between 2010 and 2012, and the estimated coefficients were used to compute the probability of credit rationing. The results suggest that a considerable fraction of Portuguese SMEs were affected by credit rationing in this period.

## 5. The creation of an ICAS in the Statistics Department

The bank has recently taken decisive steps towards further exploring the informational potential of the CCR and balance sheet databases in creating an In-house Credit Assessment System (ICAS).

This system will provide the Bank with its own in-house 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 (Austria, Belgium, France, Italy, Germany, Slovenia and Spain). In fact, at 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.

But the benefits of such a system are not exclusive to monetary policy. In fact, there is a broad range of advantages to different business areas, in particular regarding banking supervision and financial stability. First and foremost, starting with banking supervision, the credit notations derived from ICAS could be used as a benchmark to gauge those provided by institutions with their own internal notation system. Furthermore, the computation of sectoral default probabilities could also be envisaged, providing a useful input for stress-testing. As for financial stability, the monitoring of developments in the non-financial sector (and the potential building up of imbalances) would benefit from an indicator of NFCs credit risk, which could serve, at least, two purposes: on the one hand, to identify situations of potential financial fragility in a set of companies of a particular economic activity sector; on the other hand, to contribute in assessing other risks stemming from the NFCs sector. Other business areas such as economic analysis and statistical functions would also stand to gain from ICAS's outputs.

Against this background, CCR data is essential for the good performance of the ICAS. In line with the Basel III default definition and the guiding principles for the identification of defaults, default observations are determined using the CCR data, namely:

- a. Data on legal proceedings (legal defaults) are obtained automatically from the CCR (public information).
- b. Data on all remaining elements of the reference default definition are obtained automatically via Portuguese commercial banks reporting to the CCR.

This information is crucial to calibrate the econometric models and also for the assessment of the ICAS performance.

In addition, the remaining credit information (e.g., non-performing loans, loan volume, number of banks and write-offs) is used by analysts to supplement the information given by the econometric model. These indicators support the analyst's decision of revising the company's rating upwards or downwards.

## 6. The AnaCredit project and its impact in the Portuguese CCR

Central credit registers are a fundamental tool to monitor and manage credit risk, as well as to provide an overview of credit exposures and the level of indebtedness of both resident and non-resident borrowers *vis-à-vis* national financial intermediaries.

In order to get a better overview of the level of indebtedness of the borrowers across European Union Member-States the European System of Central Banks has been exploring, since 2007, the potential statistical use of CCRs.<sup>64</sup> In particular, it sought to understand to which extent their content may be enhanced and adapted to euro area and European Union statistical needs, to alleviate the statistical reporting burden and to increase transparency.

Against this background, the European Central Bank (ECB) launched the so-called AnaCredit<sup>65</sup> project in 2011, together with experts from both the statistical and credit registers' areas of a number of euro area and non-euro area national central banks.

Three main issues were especially under scrutiny:

- a. Identifying a core set of information to meet main users' needs and the necessary data attributes and level of harmonisation of definitions / methodologies.
- b. Considering the governance, legal and confidentiality issues.
- c. Exploring the identification of entities and loans and the CCRs' links to other data sources such as micro databases and business registers.

Following this avenue, a joint Statistics Committee (STC) / Financial Stability Committee (FSC) Task Force on Analytical Credit Datasets (co-chaired by the *Banco de Portugal*) was established in 2013. The overarching aim of this task force was the setting up of a long-term framework for the collection of harmonised granular dataset on bank loans in the euro area.

In order to fulfil the AnaCredit requirements, the Portuguese CCR will be redesigned and will adopt a new philosophy: a loan-by-loan basis. The preparatory work regarding the implementation of this new CCR information system has already started, in collaboration with the Bank's IT Department, and it has progressed in terms of the evaluation of data requirements, not only to comply with the AnaCredit requirements but also with the data needs of both financial institutions and internal users. Although the first stage of AnaCredit will comprise only loans granted by banks to legal entities, the Portuguese CCR will keep the current coverage both in terms of participating institutions and borrowers.

So far, it is clear that some functionalities of the current CCR should be kept: (i) different reporting rules for static and dynamic data; (ii) identification of borrowers using a unique code (the use of the taxpayer number will continue to be mandatory for residents in Portugal); (iii) statistical classification of borrowers will be made in the Bank through its business register; (iv) the monthly back-flow data to the financial system will be approximately the same; (v) corrections to reported data will be made only by the reporting institutions; and (vi) the system itself should be composed by two components (transactional and analytical).

Moreover, new options are being considered given the CCR data users requirements (both AnaCredit and internal users), *inter alia*:

Classification of participating institutions according to data needs (different types of institutions may report different sets of data).

Identification of different types of data (characterization of counterparties, contracts and related instruments and guarantees; financial data, on a monthly basis; accounting data, on a quarterly basis; credit risk data).

Definition of different deadlines for each type of data.

The new CCR system is expected to "go live" six months before the beginning of the reporting for AnaCredit (no overlap with current system will occur, given that a test phase shall be included in the project development).

## 7. Concluding remarks

The Portuguese CCR has been created with the objective of providing the participating institutions with relevant information to better understand the risk associated with a specific credit contract or borrower. That being said, the CCR holds also nowadays a significant potential for other purposes: the prevailing CCR legal framework already foresees that data can be used in the context of specific functions of the Bank, such as statistical compilation, supervision, economic research, financial stability analysis and monetary policy.

The use of CCR data for statistical purposes has allowed, *inter alia*, an improvement in the quality of monetary financial institutions (MFIs) and other financial institutions (OFIs) balance sheet statistics (e.g., greater accuracy in the MFIs' classification of the institutional sector of the counterparties receiving credit), a better assessment of credit developments, including the possibility of analysing different breakdowns, and the conception of new statistical products, without imposing additional reporting requirements and burdens on respondents.



In the context of monetary and financial statistics (MFS) the use of CCR data has been facilitated given the fact that: (i) both domains share the same data source (i.e. the same reporting institutions); (ii) the content of the reported information is coherent, since the CCR covers a complete range of credit liabilities; (iii) they both have identical reporting frequency and timeliness; and (iv) both the CCR and MFS are integrated in the same Division in the Bank's Statistics Department. On the whole, the high-quality figures that can be obtained from specific breakdowns of CCR credit data are of great importance for economic analysis and for quality control.

In the domain of banking supervision and regulation, CCR has been used in the assessment of credit risk and concentration of risk exposures, both at micro and macro level, and for improvement of on-site inspection practices. Economic research has been using CCR micro-data for several research papers and analysis, frequently combining this data with other micro-data sources, like the CBSD. Within the monetary policy framework, CCR has been used in the identification of loans used as collateral in Eurosystem financing operations.

The data reported to the CCR has gained relevance with the current indebtedness situation of the Portuguese economy combined with the pressing need of economic agents in all sectors to deleverage their activity, including the banking sector. CCR data combined with other micro-data databases (namely securities holdings and issues and corporate balance-sheet data) has been a key factor in meeting all the data demands in the context of the economic and financial assistance programme.

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## Notes

\* Irving Fisher Committee – Narodowy Bank Polski workshop, Warsaw, Poland, 14-15 December 2015

53. I would like to thank Luís D'Aguiar, from the Statistics Department, for his valuable contributions to this paper. The analyses, opinions and findings of this paper represent the views of the author, which are not necessarily those of the *Banco de Portugal* or the Eurosystem. Any errors and omissions are the sole responsibility of the author. The data used in this paper refers to the data available at the time it was prepared and/or presented and, therefore, may not necessarily correspond to the most recent available data.

54. The seven original Signatories of the 2005 Memorandum of Understanding on the exchange of information among CCRs were the NCBs of Austria, Belgium, France, Germany, Italy, Portugal and Spain. A few years later, the NCBs of the Czech Republic and Romania also joined this group.

55. The Portuguese CCR is regulated by Decree-Law no. 204/2008, of 14 October, Bank's Instruction no. 21/2008, of 15 January 2009 and National Commission for Data Protection's Authorization no. 4241/2011 of 27 April. It is also mentioned in a provision of the Bank's Organic Law (Art. 17º - 1). The use of and access to CCR data is in compliance with the provisions laid down in specific laws issued by Portuguese Parliament and by the National Commission for Data Protection..

56. Of each potential client, when the client asks for a loan or authorizes the entity to access information on it.

57. Credit registry coverage reports the number of individuals and firms listed in a credit registry's database as of 1 January 2015, with information on their borrowing history within the past five years, plus the number of individuals and firms that have had no borrowing history in the past five years but for which a lender requested a credit report from the registry in the period between 1 January 2014 and 1 January 2015. The number is expressed as a percentage of the adult population (the population age 15 and above in 2014 according to the World Bank's World Development Indicators). A credit registry is defined as a database managed by the public sector, usually by the central bank or the superintendent of banks, that collects information on the creditworthiness of borrowers (individuals or firms) in the financial system and facilitates the exchange of credit information among banks and other regulated financial institutions (while their primary objective is to assist banking supervision).

58. Nomenclature of Territorial Units for Statistics.

59. Statistical Classification of Economic Activities in the European Community.

60. EBITDA is an acronym for "Earnings Before Interest, Taxes, Depreciation and Amortization".

61. FFO ("Funds from Operations") is given by (EBITDA - Net Interest - Income Taxes).

62. Used together with data from the Bank's CBSD.

63. Id.

64. Data sharing with other countries' CCRs follows the rules of the 2005 Memorandum of Understanding on the exchange of information among CCRs and are based on reciprocity.

65. The name AnaCredit stands for "Analytical Credit Datasets".

# Supplements to the Statistical Bulletin

- 1/98 | Statistical information on non-monetary financial institutions, December 1998
- 2/98 | Foreign direct investment in Portugal: flows and stocks statistics for 1996 e stocks estimates for 1997, December 1998
- 1/99 | New presentation of the balance of payments statistics, February/March 1999
- 2/99 | Statistical information on Mutual Funds, December 1999
- 1/00 | Portuguese direct investment abroad, December 2000 (only in Portuguese)
- 1/01 | "Statistical balance sheet" and "Accounting balance sheet" of other monetary financial institutions, August 2001
- 1/05 | A New Source for Monetary and Financial Statistics: the Central Credit Register, April 2005
- 2/05 | National Financial Accounts for the Portuguese Economy. Methodological Notes and Statistical Results for 2000-2004, June 2005
- 3/05 | National Financial Accounts for the Portuguese Economy. Statistics on Financial Assets and Liabilities for 1999-2004, November 2005
- 4/05 | Seasonal Adjustment of Balance of Payments Statistics, November 2005
- 5/05 | Statistics on Non-Financial Corporations from the Central Balance-Sheet Database, December 2005
- 1/07 | Papers presented by *Banco de Portugal* representatives at the 56th session of the International Statistical Institute, held in Lisbon 22-29 August 2007, August 2007
- 1/08 | Simplified reporting: Inclusion of the Simplified Corporate Information in the Statistics on Non-Financial Corporations from the Central Balance-Sheet Database, May 2008
- 2/08 | Securities Statistics: Integrated System Features and Main Results, July 2008
- 1/09 | Papers presented by *Banco de Portugal* representatives at the 57th Session of the International Statistical Institute, held in Durban, South Africa, 16-22 August 2009
- 1/11 | Papers presented by the Statistics Department in national and international fora, October 2011
- 2/11 | Papers presented by *Banco de Portugal* representatives at the 58th World Statistics Congress of the International Statistical Institute, held in Dublin, Ireland, 21-26 August 2011, October 2011
- 1/12 | Quality management in the statistics of *Banco de Portugal*, January 2012 (only in Portuguese)
- 2/12 | General Government Statistics, October 2012
- 3/12 | Papers presented by the Statistics Department in national and international fora, December 2012
- 1/13 | Quality management in balance sheet statistics of monetary financial institutions, September 2013 (only in Portuguese)
- 2/13 | Statistics on Non-Financial Corporations of the Central Balance-Sheet Database - Methodological notes, October 2013 (only in Portuguese)
- 3/13 | Papers presented in the Workshop on Integrated Management of Micro-databases, June 2013
- 4/13 | Papers presented by the Statistics Department in national and international fora, December 2013
- 1/16 | Papers presented by the Statistics Department in national and international fora in 2014 and 2015