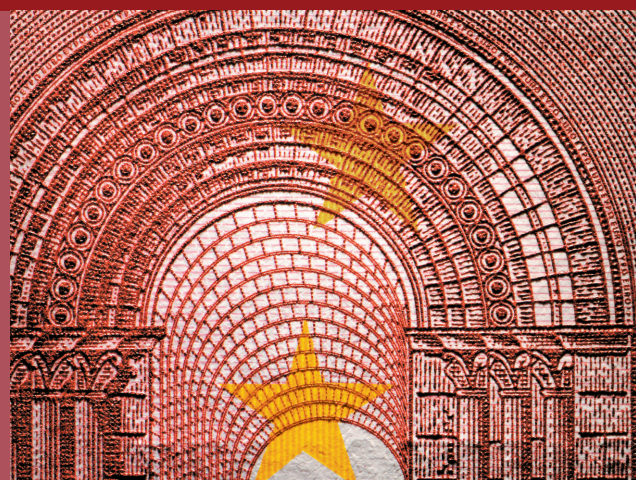


SUPPLEMENT TO THE  
STATISTICAL BULLETIN  
1|2011



Papers presented by the  
Statistics Department in national  
and international *fora*

*October 2011*



*Banco de Portugal*

EUROSYSTEM



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The analyses, opinions and findings of the following papers  
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## **FOREWORD**

The present issue of the Supplement to the Statistical Bulletin collects a number of technical papers prepared by the Statistics Department of *Banco de Portugal* and recently featured in various national and international *fora*.

The selected papers reflect the diversity of the statistics currently under the responsibility of the Statistics Department. We have opted to group them into six broad categories, in line with the main focus in each of them: institutional subject matters, statistical systems, methodological issues, micro-databases, compilation of balance of payment statistics and securitisation.

To guide the reader through the collection of papers included in this supplement, we provide next a brief summary for each paper.

### ***I. INSTITUTIONAL SUBJECT MATTERS – INTERAGENCY COOPERATION***

***João Cadete de Matos, “Collaborating with other statistical agencies”. Bela-Bela (South Africa), March 2011<sup>1</sup>.***

In his paper, the author supports the idea that, to deal with the increasing pressure on statistical systems, a statistical agency should enhance its level of preparedness, and should be more pro-active and outward-looking, which implies actively fostering interagency cooperation, both at national and international levels. Ensuring an effective cooperation between National Central Banks and National Statistical Offices is instrumental to the quality, relevancy and cost-effectiveness of macroeconomic statistics, since it supports a higher level of transparency within the process of producing and disseminating statistics, helps to improve data coherence and promotes steady efficiency gains in the statistical system.

### ***II. STATISTICAL SYSTEMS’ DESIGN***

***Maria do Carmo Aguiar and Carlos Martins, “Adding business intelligence to statistical systems – The experience of Banco de Portugal”. Brussels (Belgium), February 2011<sup>2</sup>.***

In this paper, the authors describe the strategy followed by *Banco de Portugal* as regards Business Intelligence (BI), which relies on the definition of an architecture framework to be used as reference in all Information Technology (IT) developments in the statistical area. This architecture is built upon three pillars: a data warehouse, centralised reference tables and a common IT platform. The Securities Statistics Integrated System is used as an example to describe the undergoing developments concerning the evolution towards a new BI architecture. The authors advocate following a stepwise approach in the implementation of such architecture framework that, in their opinion, will contribute to the construction of a coherent and truly integrated statistical system as opposed to having multiple systems that coexist but are not connected in an efficient way.

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<sup>1</sup> South African Reserve Bank Statistics Seminar: “Towards statistics that make sense – closing the loopholes”.

<sup>2</sup> NTTS 2011 Conference – New Techniques and Technologies for Statistics.

### **III. METHODOLOGICAL ISSUES IN THE 2008 SNA / REVISED ESA – PRACTICAL APPLICATIONS TO SPECIFIC CASES**

**Ana M. de Almeida, Sérgio Branco and João Falcão, “Country experiences in compiling pensions entitlements in the 2008 SNA”. Frankfurt am Main (Germany), April 2009<sup>3</sup>.**

The compilation of pension entitlements has been rousing significant interest as European countries face serious challenges due to Social Security deficits. The importance of this issue has become more visible in the context of the revision of the European System of National and Regional Accounts 1995 (ESA1995), with the inclusion of a new chapter dedicated entirely to the recording of pension schemes. The creation of a new Supplementary Table for Pensions designed to make pensions data more visible and to aid international comparison is one of the most prominent changes. This Table, to be compiled on a mandatory basis by all European Union Member-States, provides a basis for compiling comparable stock and flow data of all pension entitlements from a debtor/creditor point of view across countries. The future developments in recording pension entitlements in the Supplementary Table were discussed in the context of a joint *ECB/Eurostat workshop on pensions*, held in Frankfurt, on 29<sup>th</sup> – 30<sup>th</sup> April 2009. *Banco de Portugal* was discussant at the session on country experiences in compiling pension entitlements. This paper reflects the main issues addressed in the course of this session.

**Sílvia Fonte Santa, “Financial intermediation services indirectly measured – A new approach”. Frankfurt am Main (Germany), March 2011<sup>4</sup>.**

In her paper, the author points out that, in the wake of the recent financial crisis, the methodology currently followed in the measurement of the service charges implicit in financial intermediation activity may bring about the occurrence of negative FISIMs as well as high volatility of FISIM allocation. To cope with these issues, she advocates a different approach, based on the use of different reference rates according to the currency in which loans and deposits are denominated or, in the absence of income data by sector and maturity, of a weighted average of the interbank rates. She argues that the proposed method leads to theoretically sounder results, even in periods of financial markets turbulence.

### **IV. MICRO-DATABASES – POTENTIAL FOR STATISTICAL USE**

**António Agostinho and Maria José Valério, “Exploring micro-databases for statistical quality control: The experience of Banco de Portugal”. Helsinki (Finland), May 2010<sup>5</sup>.**

The rapid financial innovation and globalisation recently experienced has created new and more demanding challenges to the statistical function of central banks. The use of micro-databases and item-by-item reporting, covering different statistical areas, has been followed by central banks as a means of improving the availability of timely information and of circumventing some of the shortcomings associated with the conventional data collecting systems. The Statistics Department of *Banco de Portugal* has been following this approach for some time now with proven results in reducing the response burden, preventing data redundancy, enabling a more efficient data quality management, and

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<sup>3</sup> *ECB/Eurostat workshop on pensions.*

<sup>4</sup> *Task-Force on Financial Intermediation Services Indirectly Measured (FISIM).*

<sup>5</sup> *Q2010 – European Conference on Quality in Official Statistics.*



improving the responsiveness to ad hoc information requests. The authors particularly emphasise the use of micro-databases for enhancing quality control, especially by cross-checking elementary data and by taking advantage of the centralised management of these databases by the Statistics Department.

***Isabel Lavrador, “Exploring the statistical potential of micro-databases”. Basel (Switzerland), August 2010<sup>6</sup>.***

The use of micro-databases and item-by-item reporting, covering different areas of the economy and the financial markets, has been helping national central banks worldwide to circumvent a number of shortcomings related to the conventional data collecting systems. The use of such data for statistical purposes can deliver significant reductions in respondent burden, higher data quality and enhanced responsiveness to *ad hoc* information requests from the users. *Banco de Portugal* has been following this approach for some time, exploring the statistical potential of different administrative databases. In her paper, the author reviews the work carried out in reusing and sharing micro-data for statistical purposes, and addresses key operational issues related to the implementation of this approach, included the expanded usability of these databases in the context of the recent financial crisis.

***Homero Gonçalves, “How can administrative databases help us to understand the funding behaviour of non-financial corporations?”. Basel (Switzerland), August 2010<sup>7</sup>.***

In his paper, the author makes the case for the use of administrative micro-databases in supplementing traditional macro-statistics. The main focus of his study is on understanding Portuguese corporate finance and its impact on the banking sector exposure to non-financial corporations, which is particularly relevant for a country where this sector presents relatively high indebtedness levels when compared to its euro area counterparts. The analysis is based on data derived from two databases administered by *Banco de Portugal* under the responsibility of the Statistics Department: the Central Balance-Sheet Database and the Central Credit Register. The individual data from these two micro-databases offer the flexibility to perform a thorough analysis according to the firms’ characteristics. In the course of the study, a distinction between sector of activity and the size of companies was presented.

## **V. COMPILATION OF BALANCE OF PAYMENTS STATISTICS**

***João M. Coelho, Carla Ferreira and João Veiga, “Measuring international spread of knowledge: The Portuguese technology balance of payments”. Lisbon (Portugal), March 2010<sup>8</sup>.***

Interest in research and development (R&D) or in science and technology (S&T) depends more on the new knowledge and innovations and on the resulting economic and social effects, than on the activity itself. However, indicators of R&D or S&T are not easy to define and compile. The Technology Balance of Payments (TBP) is one of the indicators available to measure international trade of intangible assets and technology-related services. The objective of this paper is to present the methodology followed by the Portuguese central bank for the data collection and compilation of the

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<sup>6</sup> Irving Fisher Committee Conference: “Initiatives to address data gaps revealed by the financial crisis”.

<sup>7</sup> Irving Fisher Committee Conference: “Initiatives to address data gaps revealed by the financial crisis”.

<sup>8</sup> 2<sup>nd</sup> European Conference on Intellectual Capital.

TBP. The intention of the authors is not only to disseminate and promote the use of this statistics in the domain of intellectual capital, but also to contribute to the characterisation of part of the recent economic history in Portugal regarding the international trade of intangible assets used in the production process. Emphasis is put on the recent change of pattern in the TBP; an interpretation of the main results broken down by type of technical knowledge is also presented.

***João M. Coelho, André Ferreira and João Veiga, “From the border to the chart: Freight services in the Portuguese balance of payments statistics”. Lisbon (Portugal), July 2010<sup>9</sup>.***

The easing of restrictions on trade across borders contributed to the increase of movements of resources and goods between countries and international trade has grown considerably in the last two decades, not only on consumption but also on intermediate goods. This paper describes the way in which the economic transactions on merchandise freight services undertaken between residents and non-residents companies are recorded in the Portuguese balance of payments (b.o.p.). In addition, the paper aims at disseminating and promoting the use of the b.o.p. statistics for transport research, specially imports and exports of freights, as well as contributing a short description of the transport activity in Portugal. The paper also analyses b.o.p. figures for the Portuguese freight services broken down by mode of transport (sea, air, road and others), and emphasis is given to the method used in converting the invoice value of the imported goods from a CIF to a FOB basis, obtaining the underlying services (transport and insurance) from import values. Finally, future plans to improve this method according to novel international recommendations are also presented.

***João M. Coelho, Carla Ferreira and João Veiga, “The use of payment cards data for travel statistics”. Lisbon (Portugal), November 2010<sup>10</sup>.***

This paper explores the virtues and caveats of using payment cards data as a source for estimating the “Travel services” item of the Portuguese balance of payments. According to the authors, the aim is to contribute with some new insights to the discussion of the best collection strategies for the compilation of travel services. The payment cards data are described in all their dimensions, focusing not only on those presently used, but also exploring other variables that have not been used so far in the regular production of the “Travel services” item.

## **VI. SECURITISATION IN PORTUGAL – STATISTICAL COMPILATION ISSUES**

***Ana M. de Almeida and Maria Teresa Crespo. “Assessing securitisation activity in Portugal – Compilation and measurement issues”. Madrid (Spain), May 2010<sup>11</sup>.***

This note addresses a number of issues affecting the measurement of securitisation statistics in Portugal, and provides an overview of the late developments in Portuguese securitisations. Starting with a brief reference to the applicable legal framework, the note subsequently depicts some of the main features of Portuguese securitisation structures, describes the sources and methods used in the compilation of related statistics and offers a quantitative assessment of the securitisation market in Portugal. To conclude, a few short remarks on data dissemination and institutional reporting are put forward.

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<sup>9</sup> 12<sup>th</sup> World Conference on Transport Research Society.

<sup>10</sup> 10<sup>th</sup> International Forum on Tourism Statistics.

<sup>11</sup> OECD Workshop on Securitisation.

# Collaborating with other statistical agencies<sup>1</sup>

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## *1. Reasons for institutional cooperation*

There is ample motivation for actively fostering interagency cooperation, both at national and international levels. To begin with, such an approach allows for a higher level of *transparency* within the process of producing and disseminating statistics, by effectively clarifying the responsibilities committed to each of the statistical agencies involved. It also helps to improve *data coherence* with regard to terminology, classifications, definitions and other metadata, thus facilitating the integration of data produced from different sources. In addition, it promotes steady *efficiency gains* in the statistical system, by reducing possible duplication of effort in reporting, hence contributing to a better allocation of resources, minimising the reporting burden of respondents and avoiding data redundancy.

Typically, an efficient institutional cooperation promotes the exchange of data and experience among statistical agencies, with mutual benefits: that is the case, for instance, when national statistical offices (NSOs) provide specialised data to national central banks (NCBs) for policy purposes or when NCBs help NSOs to develop particular statistical capacities.

Ensuring an effective cooperation between NCBs, as producers of statistics, and other statistical authorities – first and foremost NSOs – is instrumental to the quality, relevancy and cost-effectiveness of macroeconomic statistics. Clearly, this goal can be pursued through different institutional settings. However, regardless of the particular form of interagency cooperation chosen, it is vital that such organisational arrangement remains focused upon optimising the efficiency of the statistical production process.

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<sup>1</sup> Presented at the *South African Reserve Bank Statistics Seminar: "Towards statistics that make sense – closing the loopholes"*, Bela-Bela (South Africa), March 2011.

<sup>2</sup> The author would like to thank Luís D'Aguiar, senior adviser at The Statistics Department of the *Banco de Portugal*, for his valuable comments and excellent research.

## **2. Forms of interagency cooperation**

Cooperation between NSOs and NCBs in the field of macroeconomic statistics can take many possible forms, so as to be able to better accommodate the different possible purposes that statistical data may serve.

**Shared responsibilities for the national statistical programme**, particularly when the NCB is formally represented in the steering committee (or similar superstructure) responsible for the statistical programme, create the conditions for an appropriately coordinated and competent national statistical working plan, including a more efficient allocation of tasks on the execution of statistical operations, thus enhancing the operational effectiveness of the statistical system and making it more capable of responding to the existing and foreseeable future needs for official statistical data.

**Cooperation agreements** typically set out the division of responsibilities between two or more statistical agencies. They are particularly useful when both the NCB and the NSO are involved in the compilation of the same type of statistics, which is often the case (*exempli gratia*, national accounts or balance of payments statistics). The signing of a Protocol of Cooperation or a *Memorandum of Understanding* (MoU) contributes to a higher degree of integration and coordination in the statistical system and—+ creates the conditions for increasing the quality of official statistics, while alleviating the respondents' reporting burden, preventing data redundancy and using more efficiently the available resources.

**Service contracts**, whereby one statistical agency provides services (*exempli gratia*, a particular survey or the compilation of specialised data) to another against payment, may be a mutually beneficial arrangement, on condition that minimum standards of quality will be ensured. Such an approach may be especially useful in those cases where the activities of the statistical agency that provides the service are to some extent restricted by budget constraints and, at the same time, the price that the acquiring party is willing to pay for that service is inferior to the costs of developing that same product internally.

**Joint data collection efforts**, involving the adoption of common methodologies, concepts and nomenclatures, contribute to an effective coordination of the statistical agencies' initiatives and may help statistical agencies to identify ways to improve their individual data systems so that they are more useful for a wide range of purposes, thus enhancing data relevancy and contributing to strengthen the statistical system as a whole.

**Data sharing** among statistical agencies (possibly including also microdata, if the law allows it and on the condition that data confidentiality is accounted for) can be helpful to improve statistical estimates, reduce costs, eliminate data redundancy and avoid respondents' overburdening, thus contributing for the continuous betterment of the intrinsic quality of official statistics and for the efficiency of their production.

**Technical assistance and common training initiatives**. Statistical agencies often provide technical assistance to other agencies (and receive assistance in turn), thus learning from and contributing to the work of other statistical agencies within the country or in other countries, in such areas as, *exempli gratia*, definitions, concepts, measurement methods, analytical tools and dissemination modes. Technical assistance typically comprises sharing of best practices, seconding of

staff and bilateral working visits, as well as organising and participating in specialised seminars and workshops.

***International comparability of statistics.*** NSOs and NCBs should be concerned with the international comparability of their statistics. For this purpose, they should monitor and/or contribute to the joint development or updating of methodological manuals and international standard classifications and guidelines, as well as to the activity of the various international organisations that have a vested interest in statistics, such as the International Monetary Fund, the United Nations Statistical Commission, the Organisation for Economic Cooperation and Development, just to name a few.

### ***3. Banco de Portugal's experience in collaborating with other statistical agencies***

The recognition of the importance for the efficiency of the statistical system of having robust working agreements among the main national statistical agencies, led the competent authorities in many countries, including Portugal, to evolve to more formal institutional arrangements as regards interagency statistical collaboration.

In accordance with the new legal framework of the National Statistical System (NSS) that entered into force in 2008, the Portuguese central bank is recognised as a statistical authority and formally incorporated in the NSS structure as well as in the High Statistical Council, a state entity that is responsible for guiding and coordinating the NSS. The new law fully endorses the Fundamental Principles of Official Statistics adopted by the United Nations Statistical Commission, namely by regulating aspects such as technical independence, quality, access to official statistics and individual data protection. The guidelines in the European Statistics Code of Practice were also adopted and are reflected in the fundamental principles of the NSS. With regard to statistical secrecy, the NSS law regulates the circumstances in which access to individual statistical data can be granted for scientific purposes.

Another important feature of the NSS law concerns the increased emphasis given to promoting coordination between statistical authorities, in particular between Statistics Portugal (the Portuguese national statistical office; INE) and the central bank.

***At national level,*** *Banco de Portugal* has been actively involved in interagency collaboration in the field of statistics for more than ten years, not only with Statistics Portugal but also with other entities with a vested interest in statistics, as the following examples attest:

- In 1998 *Banco de Portugal*, the Ministry of Finance and Statistics Portugal signed a protocol setting up forms of cooperation among these three entities to meet Portugal's commitments concerning IMF's Special Data Dissemination Standard (SDDS). This protocol was very important to define individual obligations and implement the SDDS timetable, and has contributed decisively to the positive assessment of the Portuguese participation in the SDDS over the past ten years.
- Also in 1998, another protocol was signed between *Banco de Portugal* and Statistics Portugal regarding the implementation of the European system of national and regional accounts in the

Community (ESA 95) – the European Union equivalent of the System of National Accounts (SNA 1993) adopted by the United Nations Statistical Commission. The arrangement, which was updated in 2001, defined the two institutions’ joint responsibility in the compilation of the Portuguese national accounts: Statistics Portugal in charge of compiling non-financial accounts and *Banco de Portugal* taking over the compilation of financial accounts. This cooperative effort proved to be an essential factor in enhancing the quality of Portuguese (quarterly and annual) national accounts.

- In 1999, Statistics Portugal and *Banco de Portugal* signed a formal agreement with the intention of carrying out, from 2000 onwards, a single quarterly survey addressed to non-financial corporations. The main purpose of this initiative was to avoid undertaking two similar surveys, thereby reducing the reporting burden for the corporations involved.
- In the field of balance of payments statistics, two protocols were signed in 2004, respectively with the General Directorate of Tourism and Statistics Portugal, focusing on two statistical operations: one being a survey on cross-border movement of travellers and the other a survey on international tourism expenditure. These surveys provide additional information for the compilation of the item “Tourism” in the balance of payments.
- In the beginning of 2006, an institutional cooperation agreement in the field of general government statistics was signed between *Banco de Portugal*, Statistics Portugal and the Ministry of Finance, covering the following areas: (a) delimitation of the general government sector and updating of the list of entities it comprises; (b) compilation of the general government accounts (financial and non-financial) on a quarterly and annual basis; (c) compilation of public debt statistics; and, (d) a close analysis of the Excessive Deficit Procedure report and the corresponding methodological background. For this purpose, a framework of common data sources and procedures was drawn up by a working group of representatives of those institutions.
- With the purpose of defining a harmonised solution for the collection of annual data from the financial statements of non-financial corporations four institutions (Statistics Portugal, the Ministry of Finance, Ministry of Justice and *Banco de Portugal*) joined efforts to set up the so-called IES - *Informação Empresarial Simplificada*, which literally means “Corporate Simplified Information”. IES went live in January 2007, following the enactment of the legal act that officially endorsed it. On the basis of IES, companies can meet their accounting, fiscal and statistical reporting requirements towards the four above-mentioned authorities through one single, all-purpose, electronic submission, at one moment in time. The set of measures included in IES has gradually streamlined the administrative and legal procedures that companies had to abide by, thus helping to reduce their reporting burden.
- Lastly, and still at a national level, cooperation with the supervisory bodies must be highlighted. By end-January 2008 *Banco de Portugal* signed a Protocol of Cooperation with the Portuguese Securities Market Commission – an independent public institution in charge of supervising and regulating securities and other financial instruments markets, as well as the activity of all the entities that operate within these markets. In accordance with the said arrangement, both institutions agree in interchanging detailed information on securities issues (including, exempli gratia, data on securitisations) and on financial intermediaries. Banco de

Portugal has also an informal agreement with the Portuguese Insurance and Pension Funds Supervisory Authority for the regular remittance of data.

*At international level*, cooperation within the European Union assumes a major role. *Banco de Portugal* is part of the European System of Central Banks and, as such, has been permanently and deeply involved in building up a harmonised European statistical framework, not only directly with the European Central Bank (ECB) and the other NCBs but also with the Statistical Office of the European Communities (Eurostat) and the NSOs of the European Union Member-States, under the umbrella of the *Memorandum of Understanding on economic and financial statistics* agreed between the ECB's Directorate General for Statistics and Eurostat. This *memorandum* makes it possible for the ECB and the Eurostat to apply the same statistical framework to the whole European Union while taking the national contributions into account.

The joint coordination work through the *Committee on Monetary, Financial and Balance of Payments Statistics* (CMFB) has also been a determinant factor to the good cooperation among statisticians in NCBs, NSOs, the ECB and the Eurostat, fostering the interchange of statistical knowledge among these entities, and contributing to bringing about efficient data collection and compilation as well as access to high quality European Union and Euro area economic and financial statistics. Significantly, two out of three strategic priorities identified in the Work Programme for 2011-12 of the CMFB – *id est*, deepening the cooperation within the CMFB and sharing best practices, integration of financial and non-financial Euro area sector accounts and advisory role in issues related to the Excessive Deficit Procedure – clearly point out to the enhancement of interagency collaboration in the field of statistics as a means to foster high quality data and efficient statistical systems.

*Banco de Portugal* also works in close cooperation with other international institutions, in particular the International Monetary Fund, the Bank for International Settlements and the Organisation for Economic Cooperation and Development. This articulation includes both data reporting and discussion of concepts and methodologies.

Finally, a third area of institutional cooperation in which *Banco de Portugal* has been especially active refers to *technical assistance*, particularly (but not exclusively) with the NCBs and NSOs of the Portuguese-speaking countries. This comprises, *exempli gratia*, bilateral working visits, the organisation and/or participation in seminars and workshops and the sharing of good practices – as in the cases of the *Biennial Meetings on Statistics* of the Portuguese-speaking NCBs and the Cooperation and Technical Assistance Agreement in the Field of Statistics that was signed by *Banco de Portugal* and the NCB and the NSO of Brazil not so long ago.

#### **4. Meeting the challenges ahead**

The increased importance of economic globalisation, the rapid financial innovation and the related ever-growing complexity and diversification of statistical data needs, together with the consolidation of the Information Society, are some of the driving forces behind the *increasing pressure on statistical systems* worldwide.

The financial crisis of 2007-09 drew attention to the increased vulnerability of economies to risks,

particularly credit risk, caused by the deepening of financial globalisation. This is a case where the lack of sufficient data on credit risk concentrations hindered a proper assessment of the policy implications of the turmoil and prevented a timely response by policy-makers. Indeed, the extent and nature of the financial interdependencies that amplified the crisis have not yet been fully captured by the set of financial statistics currently available.

In the context of European statistics, the problems posed by the enlargement of the European Union and the new requirements for statistics as a result of the European integration process add extra complication to an already complex situation.

One method of effectively dealing with those issues consists in further deepening the extent of institutional cooperation, both at national and international levels, by exploring all possibilities left opened and thus creating the objective conditions to meet the challenges of the future.

*Anticipating users' data needs* seems to be both a natural and an unavoidable process. Nonetheless, to cope with the mounting intricacies of current economic life, such an approach needs to be complemented with a much needed reorientation of official statistics, both in terms of focus and of role.

Not so long ago, official statistics were essentially centred on quantifying relatively well-known and stable key economic phenomena. However, the urgent needs of an ever-changing economic life tell us that this stance may no longer be enough. In fact, the financial developments above-referred are just a sign of other – possibly even more serious – predicaments looming ahead.

More and more, data users – and, *a fortiori*, statisticians – have but a partial knowledge of the reality they attempt to describe. Developments in the economic and financial realms grew in complexity and became more dynamic and less predictable. Against this background, statistical agencies cannot afford remaining forever static; they have to assume a more proactive stance.

To provide information of continued relevance for the users, statistical agencies should continually try to anticipate data needs for future policy considerations and look for ways to develop data systems that can serve broader purposes. Therefore, in addition to quantification, they will have to identify, as early as possible, the likely changes and the true underlying economics of the events and transactions which have to be measured. For that purpose, it is critical, on the one hand, to promote mutually rewarding interrelationships, both at national and international levels, between statistical agencies and the relevant (*id est*, institutional) users, particularly policy-makers; and, on the other hand, to widen the communication channels with the business and the research communities and to explore further the possibilities offered by commercial data providers.

*Getting prepared* in an effective way implies that the statistical agency should resolutely increase the technical skills and the conceptual and analytical capabilities of its staff. In-house analysis has the potential to lead to instant improvements in the quality of the statistical output, to facilitate the identification of emerging data needs and to provide better understanding of the data users' perspectives. For this purpose the statistical agency must be in a position to attract and maintain highly qualified human resources.

In addition, statistical agencies should keep pace with the developments in information and communication technologies – which, in turn, implies that statisticians may have to undergo training



and education in this specific area to become digitally literate – and be prepared to implement new procedures in a suitable manner, to continually improve the quality and timeliness of their information, promoting a swift disclosure of statistics – reducing the ‘time-to-market’ of statistical outputs (by means of, *exempli gratia*, flash estimates) – and thus increasing the efficiency of their operations and the relevancy of the disclosed data.

*Defining a communications strategy* along the lines of the Fundamental Principles, according to which official statistics should be relevant for the society as a whole (thus not just governance-driven), compiled in an impartial way (hence objective and free from political interference) and accessible for everyone under equal conditions. However, in many instances, official statistics fail to comply in full with this design, due to, among other factors, its poor communications strategy. Therefore, to be able to convey official statistics in a form that can be easily understood and readily used, statistical agencies should consider adopting a more outward-looking culture, by defining a communications strategy capable of matching the new exigencies brought about by the Information Society, in particular the heightened expectations of the users of statistics as to the way official statistics should be divulged, in the wake of a generalised use of broadband internet by the public at large. Users now expect to be able to access information on websites that are all-together friendly, attractive and easy to understand and utilise. In the last few years, there has been a growth in web sites that take freely-available information – both from official and non-official sources –, integrate these data, and analyse and present them in a manner that seems to be pleasing to the general public. Rather than competing with these data providers, statistical agencies should consider learning from their experience and eventually doing business with them.

Indeed, with the consolidation of the Information Society, and the concomitant advancements in electronics and communications, people are demanding and using more and more statistical information. In line with these developments, statistical agencies seem to be increasingly aware of the multiple purposes that official statistics should serve, with consequences on the way these data are processed and disseminated. Statistical press releases (joint, where applicable) and on-line statistical databases (tailor-made, interactive and up-to-date) are examples of dissemination methods and procedures that statistical agencies have been implementing with a view to facilitating the general public’s use and understanding of official statistics. This trend has to be continued and possibly reinforced. The ability to communicate is essential for the consecution of the statistical agency’s mission.

In this context, consideration needs also to be given to enhancing the statistical literacy of the public at large, to prevent the risk of misinterpretation of the data being released. Rather than just contributing to the already considerable overflow of information, statistical agencies should consider *converting information into knowledge*, by adding an extra dimension to data disclosure – *id est*, data analysis, to lead the users into the right direction. Since communication is not a one-way process, statistical agencies should be prepared to make adjustments based on the data users’ feedback.

Communicating statistics, particularly central bank statistics, in a manner that is fit for use by the general public and that helps the public to understand and to accept the policy decisions based on those statistics, is certainly a key issue. The recent creation of the *Task Force on Accessibility of Statistics* by the Statistics Committee (STC) of the European System of Central Banks (ESCB), which is expected to deliver a significant contribution “to make Eurosystem statistics more accessible, to enhance financial literacy and to provide customised feed-back to reporting agents”, constitutes a good

example of institutional cooperation, at European level, between national central banks and the European Central Bank.

In a nutshell, interagency cooperation is essential to cope with the challenges ahead. In particular, to deal with the increasing pressure on statistical systems, a statistical agency should enhance its level of preparedness, and should be more pro-active and outward-looking, which implies, *inter alia*:

- Deepening further the degree of institutional cooperation – both at national and international levels.
- Attempting to identify, as early as possible, the likely changes and the true underlying economics of the events and transactions that have to be measured.
- Promoting mutually beneficial interrelationships with the relevant users and data providers.
- Increasing the technical skills and analytical capabilities of its staff.
- Defining a communications strategy capable of matching the users' expectations as to the way data are delivered, and of converting data into knowledge.

# Adding business intelligence to statistical systems

## The experience of Banco de Portugal<sup>1</sup>

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### ***1. Motivation and starting point***

There are several challenges regarding statistics compilation: from data collection to data processing, from data quality management to output production and dissemination. However, timely, efficient and reliable data analysis is a main challenge that has become of crucial importance in the recent years. In an environment in permanent change and in a context of financial and economic crisis like the one we have been experiencing, most of the traditionally available predefined analyses are not appropriate to give the adequate answers to the multiple ad hoc requests that arise every day. Furthermore, having micro data available is not enough; there is the need for tools that enable rapid data exploration, permitting multidimensional analysis and cross-reference of multiple sources of information with different granularity.

Information technology developments led to a new trend in the way statistics are produced: traditional aggregated reporting is being replaced by item-by-item reporting. The advantages of this approach are enormous, ranging from lower reporting costs to higher compilation flexibility. Although item-by-item reporting requires dealing with larger volumes of data, this has become easier due to the evolution in network and communication protocols, database systems and multidimensional analytical systems. Consequently, old multiple heterogeneous collection and compilation systems are being replaced by integrated systems. Nevertheless, migration of existing systems to a new integrated and coordinated information system cannot be done in one step; consequently there is the need to gradually integrate multiple sources of information in such a way that the best of each can be explored.

*Banco de Portugal* statistics rely on a large set of macro and micro data information systems that are interdependent. From Balance of Payments and International Investment Position (b.o.p./i.i.p.) to

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<sup>1</sup> Presented at the *NTTS 2011 Conference – New Techniques and Technologies for Statistics*, Brussels (Belgium), February 2011.

Monetary and Financial Institutions (MFI) and Other Financial Institutions (OFI) statistics, all of which contribute to the elaboration of National Financial Accounts.

Producing high-quality and timely monetary and financial statistics is a key responsibility of national central banks. Ensuring that these statistics remain fit-for-purpose implies keeping pace with financial innovation, assessing the statistical impact of innovations at the earliest possible stage and making the necessary amendments in a well-timed manner, if possible without overburdening the reporting agents and by making a more efficient use of the data already available.

The financial turmoil of 2007-2009 revealed important gaps in information for the purposes of financial stability analysis, namely concerning counterpart data. The development of micro-databases can have a major contribution in overcoming some of these shortcomings. They permit to develop knowledge about the activities of economic and financial agents at a more detailed level and allow for the drawing of conclusions that would not be possible should one rely solely on aggregated data.

In the last 10 years, *Banco de Portugal* has been developing and maintaining several databases based on item-by-item reporting, with proven results on reducing or eliminating previous information gaps. In particular, it has been exploring the statistical potential of various sources of information, including the Securities Statistics Integrated System (SSIS), the Central Credit Register (CCR) and the Central Balance Sheet Database (CBSD).

The SSIS was developed by the Statistics Department of *Banco de Portugal* with the purpose of gathering in a single repository all the information deemed necessary to comply with reporting requirements on securities. The SSIS is an information system that stores data on securities issues and portfolios (holdings) on a “security-by-security” and “investor-by-investor” basis. In addition to compiling statistics on securities, SSIS data are also used in the assessment of exposures on the balance sheet of resident financial institutions, quality control (cross-checking with other statistics) and identification of components of structured financial instruments that are not separately reported to the system. Quite ambitious in its aims, the system has been source of opportunities for data “explorers”.

The CCR database is an administrative database created to provide credit-related information to the participants for their assessment of the risks attached to extending credit. The use of CCR data for other purposes is authorised since 1996; it has been used in statistics (e.g., business register, data quality control, complementary data, separate statistical outputs); in banking supervision and regulation (e.g., assessment of credit risk and concentration of risk exposures both at micro and macro level, improvement of on-site inspection practices) and in economic research and policy (e.g., structural analysis, monetary policy).

The CBSD was, up to 2007, a database with economic and financial indicators on a significant set of Portuguese non-financial corporations, based on accounting. The reported data related to a quarterly survey, in cooperation with Statistics Portugal (mandatory); an annual survey (voluntary); and financial statements. Since 2007, data reported under the Simplified Corporate Information (SCI) replaces the CBSD annual survey. SCI is a joint electronic submission of accounting, fiscal and statistical information by companies to the Ministry of Justice, the Ministry of Finance, the Statistics Portugal (the Portuguese national statistical office; INE), and *Banco de Portugal*. It allows companies to fulfil four reporting obligations through a single submission, entirely paper-free, at one moment in

each year. CBSD data is used in statistics, economic analysis, financial stability analysis, prudential supervision, research and credit risk management.

Statistical data produced at *Banco de Portugal* is available to the public on its website. The BPstat-Statistics online, developed by *Banco de Portugal*, is an Internet online access to relevant statistical information on the Portuguese economy (data and metadata).

Business intelligence (BI) can be described as “a broad category of applications and technologies for gathering, storing, analysing, and providing access to data to help enterprise users make better business decisions. BI applications include the activities of decision support systems, query and reporting, online analytical processing (OLAP), statistical analysis, forecasting, and data mining”.

In the last two decades, many organisations developed data warehousing projects. The scope of these developments ranged from combining multiple legacy systems to developing user interface tools for analysis and reporting. In the past, business intelligence amounted to a set of weekly or monthly reports that tended to be unconnected and were available mainly to executives, the reason why these systems were often called executive information systems. Usually targeted to large enterprises aiming to support organisation-wide analysis and integrated decision making, the new generation of BI systems comprise features that are fundamental to statistical systems, namely integration and visualisation.

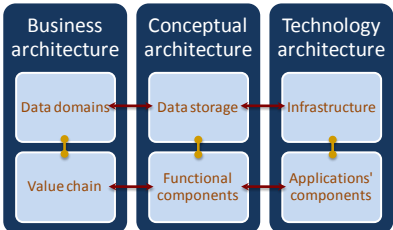
A possible strategy to deal with the issues arising from the need to fill the information gaps should not necessarily rely only on gathering new information on financial innovation-related activities and/or on restraining these activities through heavier regulation, but rather on improving the overall efficiency of the statistical framework by further exploring the largely unused statistical potential of already existing data sources, in particular linking micro-data to macro-risks. Developing a BI architecture that enables efficient data analysis can be the answer to fulfill this objective.

The remaining sections of this paper describe the strategy followed by *Banco de Portugal* which relies on the definition of an architecture benchmark to be used by new statistical systems, built upon three pillars: a data warehouse, centralised reference tables and a common IT platform. The SSIS is used as an example to describe the undergoing developments concerning the evolution towards new BI architecture. The main objectives and challenges are stated and a stepwise approach is advocated.

**2. Business Intelligence Architecture**

Evolution of methodologies, frameworks and statistical demands are the main reasons for the need to reformulate most of the information systems that are used in statistical production. Furthermore, the need to interconnect different statistical domains and cross check data has become a fundamental requisite.

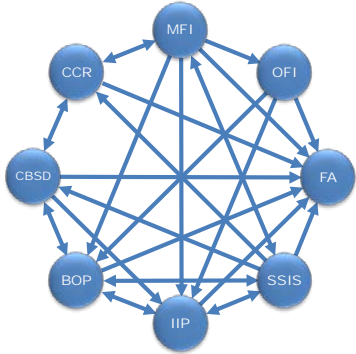
In the beginning 2008, the IT Department and the Statistics Department initiated a study with the purpose of defining a BI framework, to be used as a reference in all future IT developments in the statistical area. A layered approach was taken (largely inspired in Zachman Framework for enterprise architecture), which looked at the problem by three different perspectives, namely the business view, the



information systems view and the information technology view. For each of these views there was a focus on structural and functional aspects of the problem, that were to be combined in a comprehensive and coherent vision of what we call the BI Architecture for the *Banco de Portugal* statistical systems.

This 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.

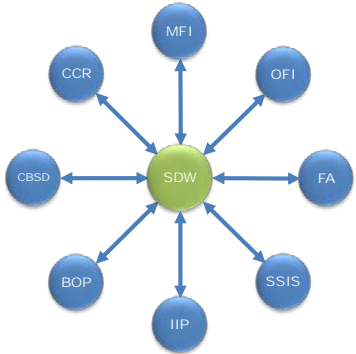
The stocktaking exercise on the relationships between existing statistical systems showed a high level of interdependency, with multiple fluxes of data being exchanged over the network, each of which poses a need of data extraction, cleaning, transformation and integration.



As for the statistical production chain, it was noted that all systems were executing fairly comparable processes, which were however implemented in very different ways.

These observations lead to the conclusion that there was a need for a much deeper revamping of statistical systems beyond the IT tooling.

A data warehousing program was proposed to deal with the overhead of multiple data exchanges. Moreover, it addressed the need for a unique repository of certified statistical micro data, which was already being claimed for some time. From now on, each new or renewed system would contribute to and use data from a single centrally managed database. This will be a continuous process as there are always new developments ongoing in the statistical area, but the goal is to get to a situation where there is a single version of trusted data, and little or no data is directly exchanged between statistical systems.



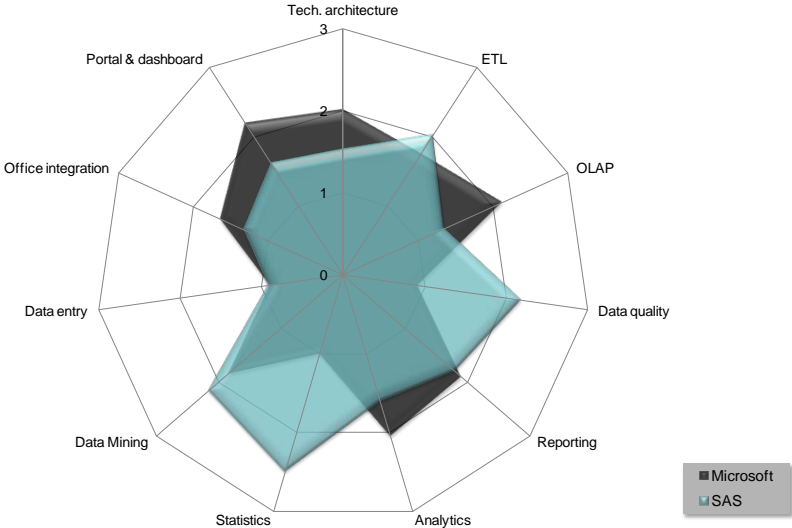
The second pillar of the BI architecture is Master Data Management (MDM), which is running in parallel with systems development. This is an initiative that is being held by a specific team, for several years now, and that maintains the processes of collecting, consolidating, storing and delivering of reference data (e.g. countries, currencies, financial sectors, ...) that are used across the systems. A register of Financial Institutions has been kept for long, and recently there was an effort, still taking place, to streamline the process of gathering data from several sources and consolidating it in an historical register of all resident Companies. The master data database assigns each register an internal surrogate key that never changes; the mapping between the internal key and the corresponding external business or natural keys (different data sources often report different keys for the same data entity) are kept in the MDM system; it also keeps track of changes on business keys and other relevant

attributes of the registers. This is in fact an extremely important component of the architecture, as it gives consistent meaning to the facts stored in the data warehouse, and makes much easier the crossing of fact data from different systems.

In the last quarter of 2007, the IT Department and the Statistics Department jointly carried out a Proof of Concept for the selection of the BI Platform to be used in the forthcoming IT projects of the statistics business area. After a preliminary market analysis, and given the history of BI tools usage at *Banco de Portugal* in the recent years, the short list was reduced to two solution providers: Microsoft and SAS.

The results of this PoC showed that none of the two platforms could deliver a high level of functionality across the whole spectrum of business needs, but they were in fact complementary in the sense that the shortages of one platform were well covered by the other one. In figure 1 we see the summary of the scoring attained by the two platforms, evaluated independently on several groups of functionalities.

**Figure 1 – BI platforms evaluation**



The final choice regarding the technological platform was a combination of two solutions: Microsoft (SQL Server 2008) for the structural components and SAS which contributes with advanced functionalities in the domain of statistical analysis and analytical workflow. Microsoft has also been chosen for the development of multidimensional models (Analysis Services), ad hoc analysis & reporting (via Excel 2007), standard reporting (Reporting Services) and dashboards (Sharepoint Server).

### 3. SSIS features and main components

With developments in financial markets worldwide, securities statistics have increasingly gained importance. Therefore, subjects related to coverage, quality and harmonisation of securities statistics produced in the various countries are a growing concern at the international level and, in particular,

within the scope of the European System of Central Banks (ESCB). In this context, integrated statistical systems enable a more efficient and harmonised production of statistical data.

The SSIS is an information system created in 1999 and managed by the Statistics Department that stores data on securities issues and portfolios (holdings) on a “security-by-security” (“s-b-s”) and “investor-by-investor” basis.<sup>2</sup> It gathers in a single database detailed data on stocks and transactions of debt securities and shares and other equity (financial derivatives are not included). Both stocks and transactions are collected on a monthly basis. Information is acquired by ISIN (International Securities Identification Number) code and afterwards is classified according to the European System of National and Regional Accounts (ESA1995) classification of financial instrument.

The classification of securities relies on the existence of a reference database which, in the case of domestic securities, is maintained by *Banco de Portugal*; data are collected from several sources such as the Euronext, the Securities Market Commission (SMC), the General Government, Interbolsa, commercial databases, etc. Foreign securities are classified according to the Centralised Securities Database (CSDB) managed by the European System of Central Banks (ESCB).

As regards securities holdings, detailed information is collected on investments by residents in domestic and foreign securities, as well as on the holdings of non-resident investors in domestic securities. This information is reported by financial institutions, the SMC, and other resident entities.

The existence of a reference database with individual information on securities and issuers allows for the collection of statistical information from reporting entities on a “s-b-s” basis. This approach implies lower reporting costs, given that there is no need for reporters to aggregate background information according to multiple criteria. Furthermore it enables a better information monitoring and a greater flexibility when exploring data and building statistical analysis.

Figure 2 illustrates the current SSIS architecture. The system relies on two relational databases and one analytical database. Collected data are stored and validated (first level of quality control) in the “transactional database”. Data estimation of missing information is also done in this database. Validated and “enriched” data are daily copied to the so called “exploration database”. A second level of quality control is made on aggregate data, by carrying out consistency tests and comparisons with other information sources. Statistical outputs are produced from the “exploration database” as well as from the “multidimensional database”. This analytical database is a quite powerful tool since it enables user friendly multidimensional analysis of the information.

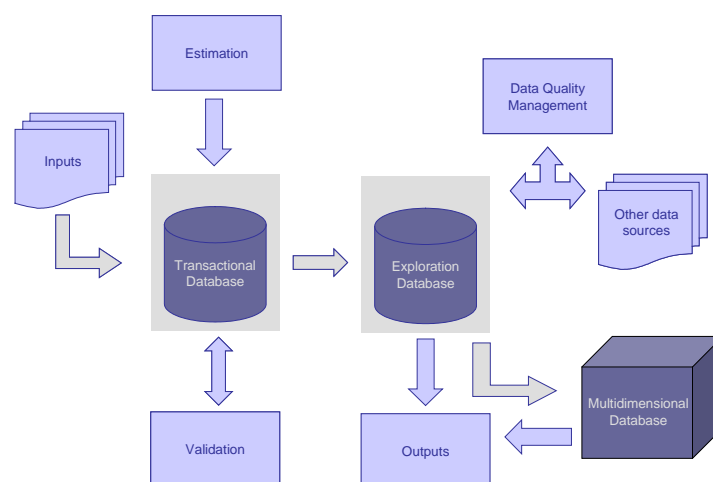
SSIS stores information on the type of instrument, the institutional sector and the residency of the issuer/investor, prices (market value), transactions and positions associated with securities issues (issues, redemptions and outstanding amounts) and transactions and positions associated with securities portfolios (purchases, sales, stocks).

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<sup>2</sup> In the case of investors belonging to the households\* institutional sector, data are aggregated by the investor’s country.



**Figure 2 – SSIS architecture**



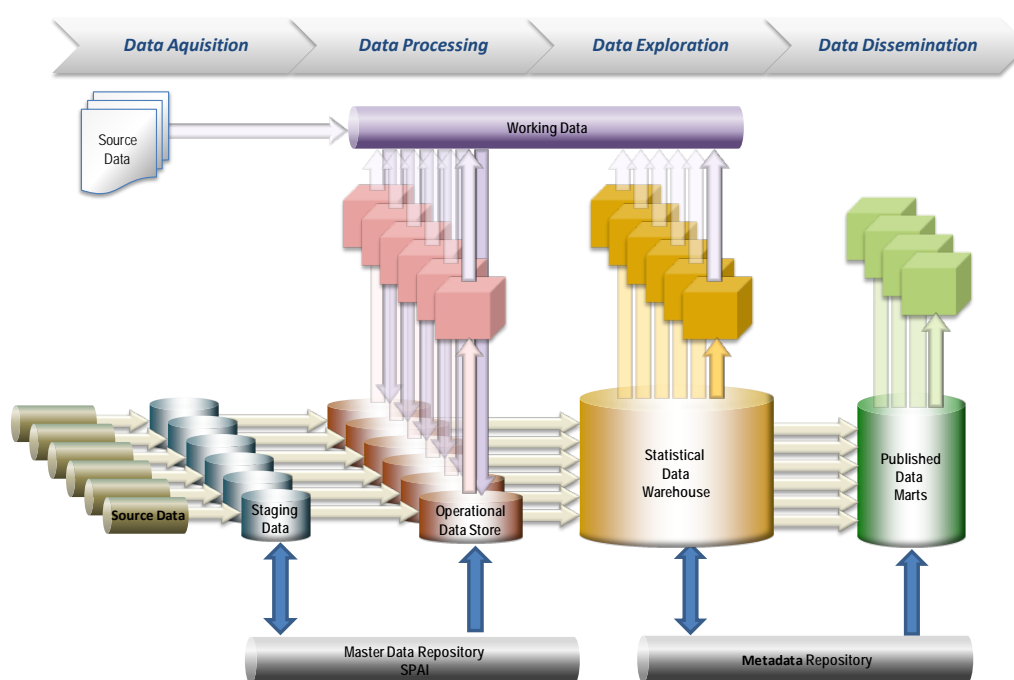
SSIS promotes consistency across statistics produced by *Banco de Portugal*. In fact, SSIS information is used as an input for the compilation of a wide set of statistics produced at *Banco de Portugal*: from monetary and financial statistics to balance of payments and international investment position and financial accounts. On the other hand, information from other statistical sources is used as an input for estimation of missing data and for data quality management purposes. Many of these procedures have been developed over time and are accomplished via Excel and Access tools. Integration is not always straightforward. Multidimensional analysis of securities data has been in place for the last five years and it has been a powerful tool for rapid analysis and reporting, but we can foresee many advantages in adding dimensions of analysis from other statistical systems. More than ten years after its inception it is time to redefine SSIS within the BI architecture and take even more profit from it.

#### **4. Towards BI: work in progress**

The statistical value chain comprises four phases: Acquisition, Processing, Exploration and Disclosure (Figure 3). Each phase in the value chain has a comprehensive set of core tasks. The statistical value chain guiding principles are: centralisation; harmonisation; flexibility; consistency and efficiency.

The **Acquisition** processes deal with collecting data from external or internal sources, validating file formats or schemas, checking and substituting business keys. When the input data is stored in the SDW, this process is very straightforward, as data is already validated and stored with the correct codes. The Acquisition database is highly volatile and keeps only transient data that is to be passed to the next phase. Where the data sources are internal systems or external entities with a specified remittance protocol, the processes will be implemented by IT specialists using MS SQL Server Integration Services. In cases when the input format is less structured and subject to change, a more agile solution must be chosen, meaning that some users will have the ability to adapt existing SAS processes to changes in external data formats.

Figure 3 – Statistical information value chain and data repositories



The **Production** phase is where statistics are made, and is heavily dependent on human intervention. Quality control is done using adequate statistical techniques, followed by estimates of missing or incorrect data. Classification and aggregates calculation are also examples of processes running at this stage. The Production database stores all data relating to the current processing cycle, that is data of last period plus data from previous periods subject to revision. This database needs to be updated by users in charge of the production process and is not available to users outside its statistical domain. While core data structures shall be implemented in MS SQL Server, most processes will be built in SAS, making use of its specialisation towards statistical operations, and also allowing for these processes to be adjusted by power users, whenever a different methodology must be chosen.

The **Exploration** processes are all about using data that has previously been checked or calculated by specialists in the statistical domain. Multidimensional analysis, statistical analysis, data mining, reporting and data extraction are examples of such processes. The Exploration database of each statistical system is part of the common SDW, and must comply with the same rules of organisation and naming conventions. The SDW is, by nature, intended to be accessed by a large community of users of the *Banco de Portugal*, with different levels of read access to the stored data. As all data warehouses, this database is subject oriented, integrated, non-volatile and time variant. On top of the database, there will be SQL Server Analysis Services cubes, designed to provide an easy ad hoc access to data (via Excel), giving the user endless possibilities of data explorations, without having to know anything about data structures or query languages. SAS tools are also playing here an important role in data analysis and reporting, while we rely on SQL Server Reporting Services for the more standardised and corporate reports.

The **Disclosure** processes are focused on the statistical data dissemination obligations to external entities and also for the general public. Databases supporting these processes are always a subset (data mart) of the SDW, usually anonymised data, with a lower level of granularity and filtered by rules of confidentiality. There is, currently embedded in *Banco de Portugal's* corporate portal, an application built to provide external access to time series and multidimensional data (BPStat). A new Statistics Portal is being envisaged by *Banco de Portugal*, and will be designed on top of MS Sharepoint.

Reformulation of SSIS according to the BI architecture will imply redefining the above mentioned processes, along with adopting the common IT infrastructure. The data model that supports SSIS needs to be redesigned in order to separate data acquisition and data processing repositories, which currently are the same. Internal reference data will be replaced with master data references, ensuring harmonisation with other statistical systems. When available, input from other systems will be provided via SDW; this will be an incremental process. Multidimensional analysis, already in place, will benefit from other systems data available via SDW. Efficiency gains are expected, along with improved data analysis.

## ***5. Conclusions and way forward***

The use of micro-databases and item-by-item reporting, covering different areas of the economy and the financial markets, has been helping National Central Banks worldwide to circumvent a number of shortcomings related to the conventional data collecting systems. The use of such data for statistical purposes can deliver significant reductions in respondent burden, higher data quality and enhanced responsiveness to *ad hoc* information requests from the users.

A possible strategy to deal with the issues arising from the need to fill the information gaps should not necessarily rely only on gathering new information on financial innovation-related activities and/or on restraining these activities through heavier regulation, but rather on improving the overall efficiency of the statistical framework by further exploring the largely unused statistical potential of already existing data sources.

The strategy followed by *Banco de Portugal* relies on the definition of an architecture framework to be used as a reference in all IT developments in the statistical area. This architecture is built upon three pillars: a data warehouse, centralised reference tables and a common IT platform.

Following a stepwise approach, the implementation of this architecture framework will contribute to the construction of a coherent and truly integrated statistical system as opposed to having multiple systems that coexist but are not connected in an efficient way. At the moment, three statistical information systems are being reformulated according to this model: the b.o.p./i.i.p., the CBSD and SSIS. The outcome of this effort will soon be evaluated.

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# Country experiences in compiling pension entitlements in the 2008 SNA<sup>1</sup>

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## **1. Introduction**

In the context of the revision of the European System of National and Regional Accounts 1995 (ESA1995), the compilation of pension entitlements entails a specific and growing interest as European countries face serious challenges due to Social Security deficits. The importance of these issues becomes visible in the revised ESA with the inclusion of a new chapter - chapter XVII - dedicated entirely to the recording of pension schemes. The creation of a new Supplementary Table, to be compiled on a mandatory basis, is one of the most relevant changes within the framework of the ESA1995 revision. This table, which aims to record all the transactions and other economic flows, pretends to have a full coverage of pension schemes data included as social insurance.

In order to accommodate Supplementary Table proceedings and modelling pension entitlements, European and also some non-European countries were invited to give their contributions in a conference organised jointly by the ECB and Eurostat: *ECB/Eurostat workshop on pensions*, which took place on 29<sup>th</sup> – 30<sup>th</sup> April 2009.

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<sup>1</sup> Presented at the *ECB/Eurostat workshop on pensions*, Frankfurt am Main (Germany), April 2009.

*Banco de Portugal*<sup>2</sup> was invited as a discussant in the 4<sup>th</sup> Session of the conference: “Country experiences in compiling pension entitlements”. The session aimed to discuss and point out the main concerns, difficulties and improvements that can be made in order to harmonise and make more effective the compilation of pension entitlements. Four countries, with very different experiences, gave their contributions during this session: Spain, Luxembourg, Finland and Canada.

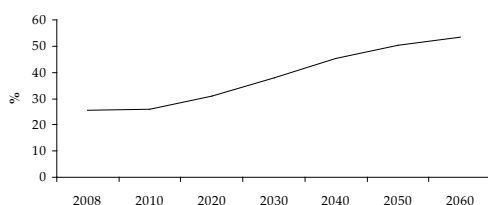
This paper designs the main features and discussion issues prepared by *Banco de Portugal* in the referred workshop on pensions, reflecting the experiences of the participant countries mentioned above. It is organised as follows: section two provides an overview of the Social Security’s current issues. In section three, some aspects of country experiences in the compilation of pension entitlements data are summarised and discussed. Further general issues / final remarks and future developments of recording pension entitlements are presented in section four.

## 2. Social Security – An overview

Social Security has been an active area of economic and statistics research in the last years, due to the highly concern on the financial sustainability of the system. The ageing of population and the corresponding demographic changes are the main causes to this issue. In fact, the increase of life expectancy and the downward trend in fertility rates lead to changes of the population structure in such a way that older people outnumber younger ones. This situation creates intergenerational imbalances with increasing costs for caring for the older generations and consequently Social Security growing expenditures. The following chart plots age dependency ratio and clearly indicates the expected increase number of people aged beyond 65 years, from 25 per cent of the working age population (from 15 to 64 years old) in 2008 to 50 per cent in 2060.

The change in demographic trend jointly with the immigration phenomena turns out to be a problem to the European countries, as public expenditure on pension schemes increases. This situation pressures active workers, through the increase in contributions, especially when they belong to a pay-as-you-go system, the most common Social Security scheme in Europe.

**Figure 1 – Old age dependency ratio (EU -27)**



Source: Eurostat EUROPOP2008

$$\text{old age dependency ratio} = \frac{+65}{(15-64)}$$

Under this situation, policy makers have to be aware of the problems that may arise. It becomes urgent to ensure long term fiscal sustainability to avoid uncertainty and the risks associated under this scenario. In order to guarantee future benefits to active workers during their retirement period and to

<sup>2</sup> Ana M. de Almeida.

ensure reasonable living standards, many countries made some reforms in their Social Security regimes.

The main implemented reforms can be summarised by the following vectors: increase of pension benefits to workers that remain working beyond the retirement age (as in Spain); penalties to early retirements, with an actuarial reduction of pension benefits when the retirement is earlier than the standard legal age (as in Finland); and, finally, the increase of the second and third pillars (privately managed pensions and voluntary schemes) (as in Luxembourg and Canada).

Statistical data can provide several contributions by shedding some light on the specific areas of Social Security where policy makers may intervene. If at a micro level, accounting practice recognises pension liabilities of employers and pension funds, national accounts should also be important to raise, at a macro level, the main specific areas where Social Security problems exist and which can be improved. The possibility of making realistic economic projections will also become more effective with a good compilation procedure of the statistical data. Finally, statistical data have other important advantages like, for instance, allowing for cross section analysis. This is the case of the Supplementary Table, as it provides the basis for compiling comparable stock and flow data of all pension entitlements from a debtor / creditor point of view across countries.

### ***3. Country experiences***

#### ***3.1 Spain***

Statistics Spain<sup>3</sup> described the Spanish experience on the subject, in the paper “*Estimating Social Security Pension Entitlements in Spain*”.

As we can infer from this presentation, Spain is an example of a country that made some efforts to prepare the measurement of pension entitlements under the Supplementary Table. There are three interesting aspects in the presentation that we would like to focus on.

The organisational procedure, with the creation of a working group composed by the national institutions concerned and the definition of the responsibilities for the compilation, is clearly a good starting point to this exercise. Another main aspect of the Spanish Social Security system is the existence of two parallel pension schemes sponsored by General government: the Social Security and the Government employer pension schemes. A third important and interesting feature from this presentation is the development of a national model that accommodates specific assumptions of the Spanish Social Security scheme. In fact, this model can be used as a benchmark for future comparisons with the model from the University of Freiburg.

Some issues can, however, raise a deeper discussion on the presentation made by this country.

One question that can be brought up deals with the interpretation of the “total amount of contributions” estimated by the national model. As it was mentioned before there exists a breakdown

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<sup>3</sup> Lourdes Prado.

between Social Security and the General government employer pension schemes but, apparently, no distinction in the final estimates is done. How can we split pension entitlements between these two regimes?

The description of the national model would also gain with the identification of certain assumptions. It would be very useful to have a better clarification of the sources of data and on the methodology definition and sample criteria used in the estimation of future pensions of active population.

A final remark concerns the interpretation and comparison between the national model estimates and the University of Freiburg model. Pension entitlements under the Freiburg model represent 204 per cent and 207 per cent of GDP in 2006 and 2007, respectively (according to the Contact Group on Pensions Report, CMFB, 2009), whereas, in the national model, pensions entitlements are 240 per cent and 242 per cent of the GDP in the same years. Can we interpret these differences solely due to the different wage growth rate assumptions, or are there any other reasons that explain these differences?

### **3.2 Luxembourg**

Luxembourg's participation was made by *Inspection Générale de la Sécurité Sociale*<sup>4</sup> through the paper “*Experiences in compiling pension entitlements in Luxembourg: 'Ensuring consistency'*”, which focuses the main concerns that arise from the compilation of pension entitlements data in Luxembourg. The main aspect addressed by Luxembourg relates to the consistency that needs to be ensured in national data among different institutions and data sources. Other difficulties mentioned by this country rely on the heterogeneous definitions of benefit schemes and Social Security regimes across countries. An additional issue is also referred by Luxembourg: the problems that are raised by the existence of different data sources.

The presentation provides the estimates of a national model that was developed by Luxembourg. However, we are not able to compare them with the estimates provided by the Freiburg model, as this country did not compile data for the fulfilment of the Supplementary Table.

The first issue we would like to bring up into the discussion is the importance of having a more detailed methodology and assumptions used in the national model. This could facilitate the interpretation of the estimations, for example, the motion of pension entitlements in percentage of GDP and replacement rate, both decreasing until 2007.

The chart “Entitlements and expenditure” deserves also, in our opinion, a better clarification, namely the path of differences between “percentage of GDP all” and “percentage of GDP by years”.

Finally, difficulties stressed by Luxembourg concerning the statistical consistency and harmonisation to be ensured across countries that experience different and complex structures of pension schemes and retirement regimes, motivate also a discussion on this topic. It would be useful to have the participant's opinion on how this process could be improved.

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<sup>4</sup> Tom Dominique.



### 3.3 Finland

The paper “*The social security pension scheme in Finland*” presented by Statistics Finland<sup>5</sup> provides a very good overview of the Finnish pension system. One of the main features of this system is the fact that it is a three-pillar pension regime. It includes two statutory pension schemes (first pillar) and voluntary pension insurance (second and third pillars). An explanation for this classification should be given since, according to the multi-pillar approach (World Bank), the second pillar is mandatory and not voluntary as it is stated in the paper.

The paper presents the results of the compilation of the Supplementary Table for Finland. This output, calculated with the University of Freiburg methodology, is compared with the results of the national model estimated by the Finnish Centre for Pensions. The total amount of pension entitlements computed by this institution (268 per cent of GDP in 2007) is higher than the amount computed in the Supplementary Table via the accumulated benefit obligations (ABO) approach (235 per cent) but lower as compared with the projected benefit obligations (PBO) approach (295 per cent). The analysis of these differences should be investigated. Attention should be given to the possible factors behind the different results: different databases, different assumptions?

In the Supplementary Table, the method for computing the item «Household social contribution supplements» should be explained. In principle, according to the methodology defined by the CMFB task force on the Statistical Measurement of the Assets and Liabilities of Pension Schemes in General Government, it should be equal to the start of year pension entitlements times the discount rate. In this case, a discount rate of 5 per cent was apparently used, which is different from the hypothesis of 3 per cent discount rate of the Freiburg model.

Some doubts were raised about the significance of the item «Other (actuarial) increase of pension entitlements». In our view, this item can be seen in two different (non- mutually exclusive) ways:

- (i) This amount could mean that the social insurance scheme is under or over financed if the values are positive or negative, respectively. This conclusion may have important economic policy implications,
- (ii) The existence of important amounts in this item of the Supplementary Table may indicate there are shortfalls in the model due to, e.g., wrong estimation procedures and or assumptions.

In the paper, a doubt is also raised in relation to the inclusion of “Employer imputed social contributions” in the core and non-core accounts. In this respect, our interpretation is that this item should be included both in the core and non-core accounts but with different values:

- (i) «In cases where pension entitlements of schemes for government employees are not recorded in the core accounts, by convention the employers' imputed contributions are calculated as equal to the difference between current benefits payable and actual contributions payable (by both employees and government as employer).» (ESA Rev § 4.10).
- (ii) In the Supplementary Table, “Employer imputed social contributions” is a balancing item to match the differences between the change in entitlements and the transactions (equivalent to item 3. for Social security).

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<sup>5</sup> Paula Koistinen-Jokiniemi.

### 3.4 Canada

The paper “*The pension satellite account in Canada*” presented by Statistics Canada<sup>6</sup> is a good example of estimating pension entitlements in national accounts through a satellite account. The provision of a long time series allows for a deeper analysis of results and for a better interpretation of the data, which is useful for analytical purposes.

One of the most striking features of the information presented for the Canadian pension system is the level and stability of the unfunded pension plans liabilities as compared with the average European reality. In Canada this amounts to 15 per cent of GDP while in Europe it ranges between 200 and 300 per cent of GDP.

Some issues can be raised by the analysis of the data shown in the presentation. The most relevant are the fact that changes in the Social Security strategy resulted in the accumulation of assets after 2000 and the upward trend in “Other individual registered saving plans” after 2002. Both issues could be further discussed.

Additionally, some details on the methodology and sources used for the compilation of data (e.g. transactions and other flows) could be given. In particular, the main assumptions used in the estimates of the pension satellite account (discount rate, wage increases (ABO/PBO), GDP growth) could be explained.

Finally, valuation issues and data gaps for individual registered savings plans are mentioned. A description of these issues and of the solutions found would be of great interest.

## 4. Conclusions

The subject of estimating pension entitlements is still in an initial phase, thus still being subject to future discussion and, therefore, many issues are somewhat grey areas. We suggest then several issues to further reflect on.

The quantitative work of the models, even though concerning ex-post observations (“accrued-to-date liabilities”) relies on future assumptions of variables such as the discount rate, demographic projections, etc. To which extent these assumptions used within the national accounts framework are coordinated with the bodies responsible for the sustainability analysis, such as the Working Group on Ageing?

These assumptions, which are used to estimate pension entitlements across countries, like GDP growth and discount rates, are sometimes harmonised between countries. Is this a reasonable hypothesis? Does “one fit all”? Could these estimations be improved in order to take into account specific national differences, incorporating country-specific assumptions?

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<sup>6</sup> Joe Wilkinson.

Since there may exist practical difficulties to separating concepts other than pensions (*e.g.* health related), shouldn't these future benefits be also recorded as General government liabilities? So far, they are potential, but they are as well clearly a responsibility of governments towards their citizens.

Most European countries face challenges due to the migration phenomenon. The existence of strong migration flows to Europe changes the demography of these countries. Migration means a younger population and, therefore, an increase of Social Security sustainability. Should the assumptions used to estimate pension entitlements (*e.g.*, demographic assumptions) be modified? Do these assumptions take into account migration trends?

The publication of consistent and comparable data for pension entitlements will clearly show differences across countries. These differences are already evident in the results obtained through the University of Freiburg methodology. What could be the reaction of financial markets to these results? What could be the reaction of policy makers under these results?

Several organisational issues must still be debated, *e.g.*, the responsibility for the compilation of these aggregates, the publication policy, etc.

The process of revising ESA is still ongoing. In particular, the new ESA will include a specific chapter on pensions. The current version of this chapter proposes that all government sponsored unfunded employer defined benefit schemes are recorded only on the noncore accounts. This leads us to the following practical suggestions:

- (i) An operational definition of "unfunded" should be given, especially when schemes have reserves with large assets (introduction of a threshold?)
- (ii) How to define a government sponsored scheme? A clear definition of sponsor should be provided.

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# Financial intermediation services indirectly measured – A new approach<sup>1</sup>

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## ***1. Introduction***

In the wake of the financial crisis, the approach that has been adopted for measuring the service charges implicit in the financial intermediation activity (Financial intermediation services indirectly measured – FISIM) brought about some theoretically surprising outcomes, like the occurrence of negative FISIM and the high volatility of FISIM allocation, which have consequences on GDP measures.

Considering these developments, the revised European System of Accounts (ESA2010) advocates steps forward in the FISIM computation in order to have a more reliable measure of financial activity. The most important being the need to have different reference rates according to the currency in which loans and deposits are denominated.

The method presently in use in the EU<sup>3</sup> follows the findings of the final report on the reliability of the results obtained during the trial period of 1995 to 1998. Nonetheless, some of the actual concerns were already latent at that time, specifically the instability of the FISIM output caused by the reference rates volatility and the need to improve statistical data sources. The dissimilarity being that at that time negative figures were punctual and mostly concentrated in non-resident FISIM between financial entities (exports and imports).

In light of this, the assessment of whether the use of a different reference rate would overcome some of the unexpected outcomes achieved in the FISIM conventional computation urges.

By recognising the advantage of having several reference rates, this analysis assesses the impact of considering different term structures and different currency in the reference rates calculation. Furthermore, since in the context of the ESA1995 review, some Member States argued practical reasons against the introduction of several reference rates conferring different maturities, we explore the possibility of constructing a weighted average of reference rates.

The structure of the paper is as follows. The background supporting the choice of the proposed reference rate is described in Section II. Section III contains the method proposed to tackle the

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<sup>2</sup> I am indebted to Leonidas Akritidis for his helpful comments, discussions and suggestions.

<sup>3</sup> Defined by Council Regulation 448/98 of 16 February 1998, later precised by the Commission Regulation 1889/2002 of 23 October 2002.

concerns described in the introduction. Section IV discusses the application of the proposed method to the Portuguese economy. Section V summarises and concludes the paper.

## ***2. Theoretical background***

Regarding the theory supporting the choice of the reference rate, our conviction is that we should consider the opportunity cost of the funds rather than the cost of financing, since we should have a similar treatment irrespectively of the type of funding. Moreover, as stated in SNA2008, some money may have been deposited but not yet loaned and some loans may be financed by the bank's own funds and not from borrowed funds.

Therefore, in light of the fact that each operation should be seen on a standalone basis we suggest applying the discounted cash flow (DCF) analysis to the valuation of banks output. Summarising, each loan granted, or each deposit accepted, should be considered as an individual project, evaluated according to the principles below:

- 1) Only incremental flows (costs or income) resulting from the project should be considered;
- 2) Funding costs should only be considered when involving the issue of new debt (including the deposits increasing);
- 3) Sunk costs should be neglected;
- 4) Flows should reflect payments and earnings;
- 5) The opportunity cost of funds should be considered;
- 6) If funds are scarce the project should reflect it;
- 7) A discount rate that adjusts for (risk) and time value should be taken. Alternatively, in order to consider the risk component, we can use the risk free rate, adjusting all future cash flows (CF) according to the probability that they will occur ( $CF \times \text{success rate}$ ).

Conferring to these principles, using the cost of financing as the reference rate of FISIM should only be considered whenever financial resources are scarce. Additionally, we should consider the opportunity cost of funds, i.e. an interest rate that reflects the same maturity, currency, and risk of the operations. Specifically, considering principle 7, we may reflect the risk component in the cash-flow of the operation rather than in the interest rate used to discount these cash-flows.

## ***3. Methodological proposal***

From the theoretical background explained above, it is clear that the selection of the reference rate is crucial for the computation of FISIM. Therefore, considering that the reference rate should measure the opportunity cost of funds, which, in the framework of FISIM, should be the cost of reinvesting it in the same instrument (loans and deposits), we proposed to concentrate on the interbank market rates as opposed to bonds rates. In particular, we should consider that government bond market price can be driven by their relative illiquidity due to several regulations applicable to investors.

Thus, to consider the maturity and the currency mismatch of bank's operations, our suggestion is to use the inter-bank borrowing and lending rates, specifically the Euribor interest rate for short term operations and the ISDAFIX rates for medium and long term operations, adding a risk premium for reflecting the extra return investors demand to compensate the fact that a given cash flow might not materialise. This analysis will not focus on the risk component though steps onward can be taken on the basis of the Martín-Oliver et al. (2005) findings, namely regarding the following relation:

$$(1+i_t)(1-PD)+PD(1-LGD)(1+i_t)=1+i$$

Where, PD equals the probability of default and LGD the Loss Given Default.

Our proposal to use ISDAFIX rates as the reference rate for long term operations is based on the fact that those rates are considered a benchmark in interbank operations (incorporating credit premium inherent to the interbank market) and also because swap markets are rather liquid. ISDAFIX is a leading benchmark for fixed rates on interest rate swaps worldwide, providing average mid-market swap rates for the euro (EUR), Hong Kong dollar (HKD), Japanese yen (JPY), British pound (GBP), Swiss franc (CHF) and U.S. dollar (USD), at selected maturities on a daily basis. ISDAFIX rates are available on Thomson Reuters and Bloomberg.

The following section evaluates the outcome of using different reference rates by maturity and currency comparing it with the approach that takes a single reference rate, proxied by the three month Euribor.

#### **4. Case study: PT FISIM**

##### **A. Current practice**

In Portugal, the computing of FISIM on an annual basis was made in a close collaboration with the Statistics Portugal (the Portuguese national statistical office; INE). Considering that the statistical authorities responsible for the compilation of financial accounts and non-financial accounts are respectively, *Banco de Portugal* and the INE, the agreement between the two institutions, at that time, was that stock data would be provided by *Banco de Portugal* and flow data by INE.

In this context, one of the practical problems that we came across was related with the mismatch of data sources which lead to inconsistencies that need to be regularly evaluated and which were time consuming. The recording of securitisation operations both in the accounting and the statistical framework is one of the examples of the required effort.

With the need to start compiling FISIM on a quarterly basis and by consumer sector, the INE, which became the entity responsible for the compilation of quarterly FISIM, started to use the MIR statistics compiled by *Banco de Portugal* in the context of ECB statistics, instead of accounting flows. Therefore, a step forward on reducing some source of discrepancies was done at that time. Moreover, the reference rate used for the computation of quarterly FISIM started to be the three month Euribor which overcame some of the abnormal outcomes when computing the reference rate by the ratio between flows and stocks of operations between financial intermediaries.

## ***B. Proposed method***

### ***1. Effective rate – source data***

Although realising that accounting flows diverges from statistical flows, the interest rate implicit in accounting data (flows/ stocks) is compatible with MIR statistics. Therefore, for the compilation of interest income payable / receivable by Monetary Financial Institutions, the exercise encompasses the MIR statistics on stocks outstanding.

The MIR statistics only embraces the Households and the Non-financial Corporation's as counterpart sectors. For the other consumption sectors we have to continue using accounting data available at the *Banco de Portugal*. Nevertheless, our main focus will be on NFC and Households sectors that represent 98% of the FISIM consumption in December 2010.

Additionally, we also dedicate some work to the non-resident component by analysing the exports and imports on FISIM by currency and maturity. Nevertheless, the contribution of this component is residual.

### ***2. Reference rate - Multiple reference rates***

In Portugal, the operations covered by the internal FISIM are mostly on a euro basis, which simplifies the computation of FISIM since we only need to have the Euribor3M (short-term operations) and the EURFIX 3 and EURFIX5 for operations between one and five years and above five years respectively.

Regarding the exports and imports component, there was the need to extend the reference rates universe to encompass the operations denominated in USD, GBP and JPY. The reference rates taken in are listed in the following table.

***Table 1 – Interbank reference rates by maturity and currency***

<b>Type of operation</b>	<b>Reference rate</b>
Operations below 1 year	
Denominated in EUR	EURIBOR3M
Denominated in USD	LIBORUSD3M
Denominated in GBP	LIBORGBP3M
Denominated in JPY	LIBORJPY3M
Operations between 1 and 5 years	
Denominated in EUR	EURSFIX3
Denominated in USD	USDSFIX3Y
Denominated in GBP	GBPSFIX3Y
Denominated in JPY	JPYSFIXA3Y
Operations above 5 years	
Denominated in EUR	EURSFIX5
Denominated in USD	USDSFIX5Y
Denominated in GBP	GBPSFIX5Y
Denominated in JPY	JPYSFIXA5Y



### ***3. Reference Rate - Single weighted average of multiple rates***

Alternatively, in the absence of interest income (or effective interest rate) data by sector, currency and maturity, we analysed the possibility of using a weighted average of the reference rates (RR) listed in the previous section. For the computation of a weighted average the only information needed is the stocks breakdown by sector, maturity and currency. The reference rate could be computed according to the following formula:

$$RR = \frac{\sum_m^M \sum_c^C r_{mc} \times S_{mc}}{\sum_m^M \sum_c^C S_{mc}}$$

$S_{mc}$  stands for the outstanding amount of each operation within maturity band  $m$ , denominated in currency  $c$ . To each  $S_{mc}$  an individual market rate –  $r_{mc}$  - is assigned. Therefore, RR is a weighted average of the individual  $r_{mc}$  where the weights are given by the respective  $S_{mc}$ .

### ***4. Lagged reference rates***

Considering that an attribute of this kind of operations is the time lag involved in the adjustment of loans and deposits interest, we explored the possibility of considering the reference rate of the previous quarter.

For the weighted average rate, this consideration could be foreseen by simply taking the reference rate of the previous period or by considering the weights of the previous period.

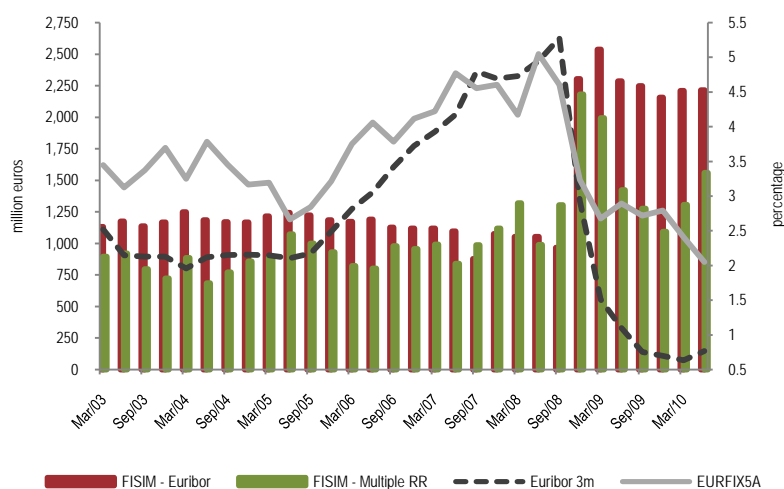
## ***C. Outcome – Internal component***

### ***1. Multiple reference rates***

This sub-section is dedicated to the evaluation of the outcome of the envisaged approaches always comparing with the one that covers the three month Euribor as the reference rate.

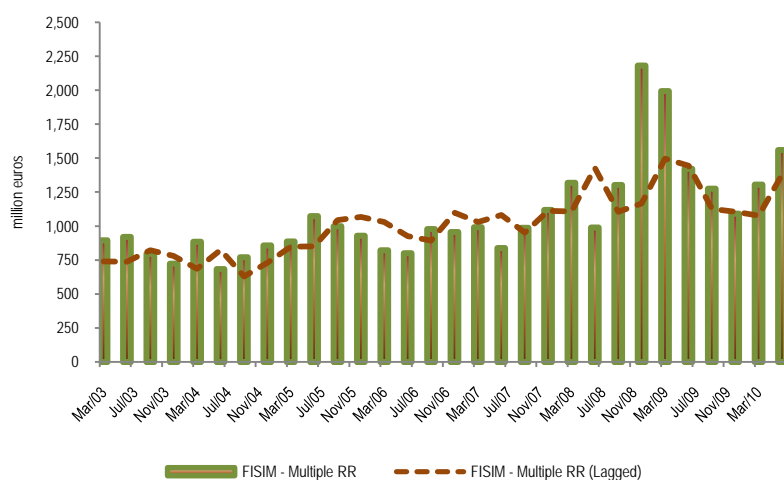
With the application of the multiple reference rates approach, we conclude that the total amount of FISIM produced on loans granted, was overestimated by 32% due to the fact that we were considering Euribor irrespectively of the maturity of the operations concerned. This finding is visible in graphic 1. Moreover, the FISIM outcome with this alternative approach is more stable.

**Figure 1 – Total FISIM – loans; Interest rates evolution (right scale)**



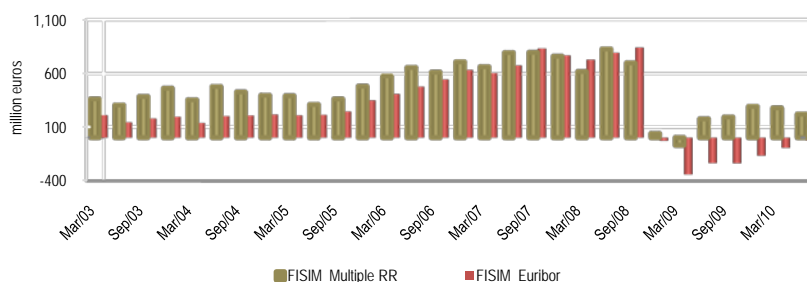
Considering the time lag of these operations, visible in the peak of December 2008, we have replaced the reference rate for the one of the previous quarter. Therefore, in periods of interest rate inflexion, there is some stability in FISIM output. Moreover, the volatility of FISIM produced on loans, in the period covered by this analysis decreases 35% if we consider the lagged rate.

**Figure 2 – Total FISIM – loans (Lagged RR)**



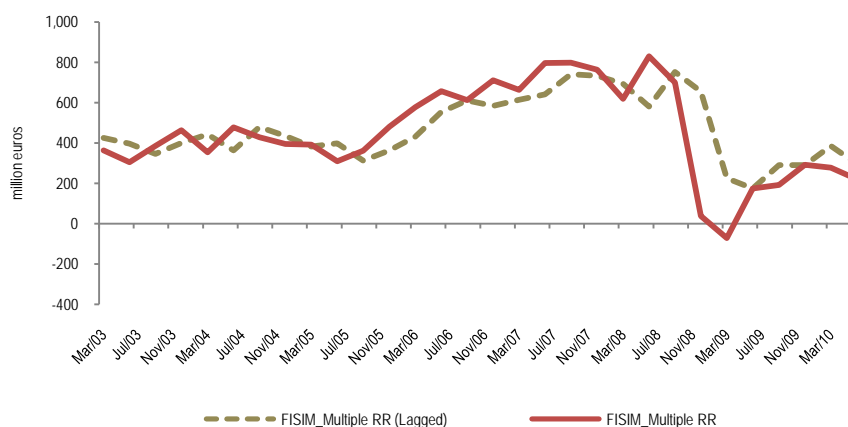
Regarding FISIM on deposits, on the basis of the same reasoning, we have the reverse conclusion given that in this case the amount of FISIM was underestimated, even reaching negative figures from the end of 2008 onwards. Therefore, this new approach would contribute to the elimination of the persistent negative FISIM in the aftermath of the financial crisis. Theoretically, it is conceivable that financial intermediaries face negative FISIM during a short period of time as a consequence of some price rigidity. Nevertheless, apart from turning points it is difficult to understand that negative FISIM sustains over a long period of time.

**Figure 3 – Total FISIM - deposits**



Again by considering the reference rate of the previous quarter, we observe that the negative FISIM of March 2009 (Figure 4) is eliminated and the volatility is reduced.

**Figure 4 – Total FISIM – deposits (Lagged RR)**



## 2. Single weighted average of reference rates

The total FISIM is exactly the same whether we apply the method with three reference rates or with one weighted average of reference rates. Nevertheless, the impact on GDP would not be the same since the FISIM by both consumption sector and purposes of consumption would diverge. This analysis will be detailed in the next section.

## 3. Allocation into main user sectors – A comparison of methods

A complete analysis of the impact of the proposed methods requires splitting the FISIM components by both consumption sector and purposes of consumption (intermediate and final consumption). It should be noted that, regardless of the consumption sector under analysis, the most

significant deviations among methods occur in the aftermath of the financial crisis, specifically from 2009 onwards.

▪ **Loans**

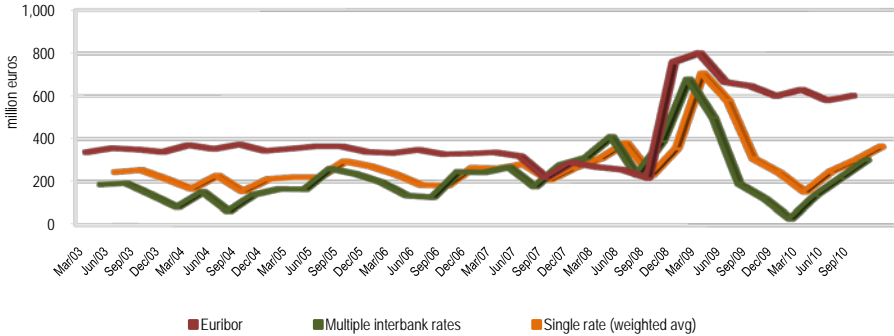
In line with our general conclusion, in the current approach (Euribor approach) we have FISIM on loans allocated to households and non-financial corporations overestimated. Focusing on the effect of using a single reference rate (weighted average of interbank rates) instead of multiple interbank rates, our assessment was that both methods lead to similar outcomes in the case of loans for consumption purposes, which is the component with higher contribution to the GDP.

*Figure 5 – FISIM on loans allocated to Households for final consumption*



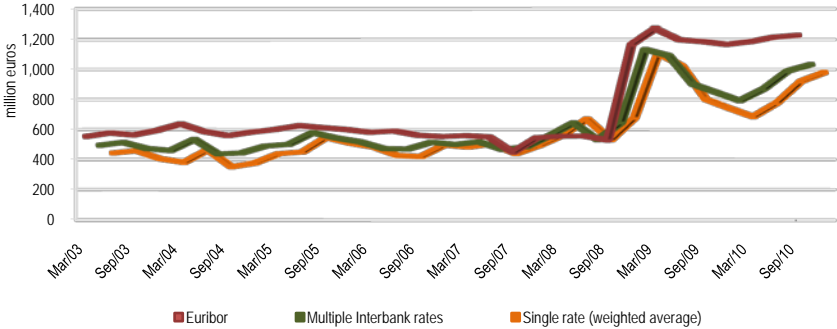
Although the larger deviation between a multiple and a single reference rate occur on loans for dwelling purposes, this just has expression from 2009 onwards.

*Figure 6 – FISIM on loans allocated to Households for intermediate consumption*



The use of multiple reference rates, instead of a single rate, leads to higher FISIM on loans allocated to Non Financial Corporations (NFC). On the contrary, the FISIM on dwelling loans is inferior by approximately the same amount; this compensation among sectors justifies the similarity of the two methods in terms of total FISIM.

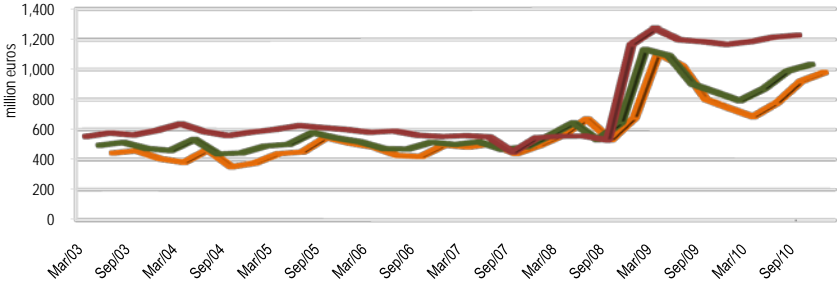
**Figure 7 – FISIM on loans allocated to Non Financial Corporations**



▪ **Deposits**

Regarding deposits both the multiple reference rate and the weighted average method lead to the same outcome in terms of final consumption, nevertheless some differences occur on FISIM produced on deposits granted by NFC. On the basis of the Euribor approach, the amount of FISIM produced on deposits was undervalued.

**Figure 8 – FISIM on deposits allocated to Households for final consumption**



▪ **Volatility of loans and deposits**

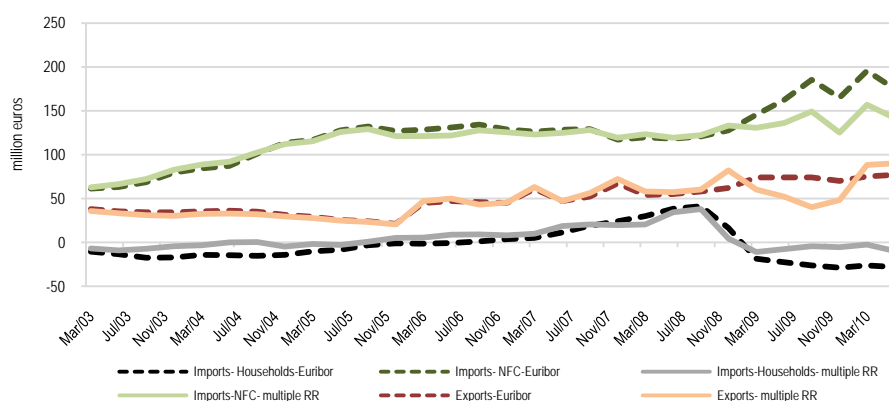
With this new approach the long-run volatility of FISIM on loans, measured through his standard deviation, decreases by approximately 29%. However, the short-run volatility, proxied by the average

of the four quarters moving volatility increases by 36%. This occurs since the rate on loans is very elastic, as banks provide a variety of different loans to adapt to client's needs. Since loans are the main goal of banks' profits, loans rate would more closely follow the dynamics of the interbank short-term reference rate. Therefore, the replacement of the reference rate by a new rate that incorporates longer maturity increases the volatility of the margin measured at short intervals. Contrarily, regarding the FISIM on deposits, with this new approach both the long and the short run volatility decreases by 38% and 5%, respectively. The deposit rate is not very elastic and from this assessment it is clear that the rate on deposits does not follow the dynamics of the interbank short-term reference rate.

#### D. Outcome – External component

From the observation of Figure 9 it seems that the discrepancy between the current approach (Euribor method) and the proposed one merely occurs from 2009 onwards, with the sharp decline of the interbank rates, which was more pronounced for the Euribor rate. In the period of divergence between the two methods, the Euribor method overestimates imports (M) of NFC and exports (X), but underestimates imports of households. Regarding imports of households there is a persistent negative FISIM across time which is eliminated or reduced taking forward the method proposed.

Figure 9 – FISIM – External component



The volatility of the imports and exports components also decreases by the implementation of the proposed approach.

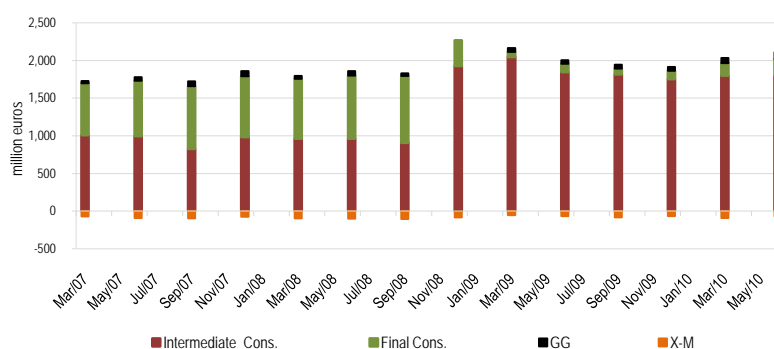
Regarding the implementation of a weighted average, the conclusions are nearly the same of the internal component. In particular, the outcome in terms of total FISIM is the same of the one obtained in the multiple rates approach, but there is some deviation on the imports for intermediate consumption which have an impact in GDP.

The computed figures lead to the conclusion that the Portuguese economy is a net importer of financial services.

## E. Impact on GDP

Although the computed FISIM is overvalued through the Euribor approach (except for 2008), in terms of the GDP impact we are under evaluating the GDP amount since in the proposed approach we allocate a superior amount of FISIM to final consumption. The higher amount allocated to final consumption in the alternative approach result from a superior component of the FISIM produced on households' deposits, which exceeds the inferior amount of the FISIM produced on loans granted to the final consumption of households.

**Figure 10 – FISIM output components (using Euribor)**



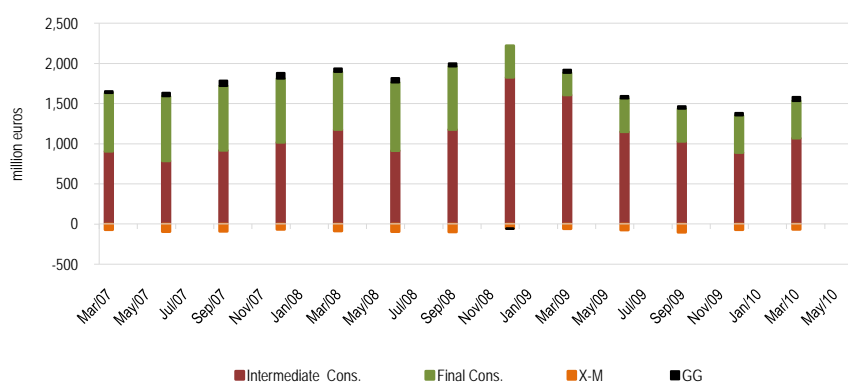
(GG – General Government; X-M Export-Imports)

The contributions of the different components of FISIM output, from 2007 onwards, are visible in figures 10 and 11. In order to illustrate the external component, the intermediate and final consumption presented on figures 10 and 11 only reflects the FISIM produced by resident financial intermediaries.

From figure 10 we observe a decrease of the final consumption contribution which became less significant from 2009 onwards. On the contrary, figure 11 shows a higher contribution of the financial consumption to GDP for 2009 onwards when compared to the previous approach.

It should also be noted that the intermediate consumption component of FISIM produced by resident intermediaries is highly volatile in the Euribor approach.

**Figure 11 – Allocation of FISIM output (using weighted RR)**



(GG – General Government; X-M Export-Imports)

Finally, the adoption of this methodology, as an alternative to the one based solely on Euribor, lead to the decrease of the FISIM produced internally, except for the 2008 period. This decrease is mainly driven by the production on loans since there is an increase of FISIM output on deposits. Nonetheless, it should be stressed that although total FISIM output is reduced, the new approach would have a positive impact on the GDP justified by the FISIM allocated to the final consumption of households which is higher in 0.26 percentage points. From table 2, we see that the allocation to final consumption of households is 1.46% on average which compares with 1.20% in the Euribor approach. Therefore, the implementation of this new approach leads to an increase in the level of GDP by FISIM from 1.13% to 1.37% when compared to the one that uses a single reference rate (Euribor).

**Table 2: Total GDP effect of allocating FISIM (in % of GDP)**

(% of GDP)	2003	2004	2005	2006	2007	2008	2009	Average
Increase in final consumption of households	1.40%	1.41%	1.28%	1.70%	1.89%	1.63%	0.93%	<b>1.46%</b>
Increase in final consumption of non-market services	0.04%	0.05%	0.12%	0.15%	0.12%	0.08%	0.08%	<b>0.09%</b>
Exports less imports for intermediate consumption	-0.08%	-0.14%	-0.25%	-0.24%	-0.18%	-0.13%	-0.30%	<b>-0.19%</b>
<b>Total GDP effect</b>	<b>1.37%</b>	<b>1.31%</b>	<b>1.15%</b>	<b>1.61%</b>	<b>1.84%</b>	<b>1.59%</b>	<b>0.71%</b>	<b>1.37%</b>
Volatility		3.78%	12.40%	39.50%	14.48%	13.55%	55.04%	<b>23.1%</b>

**Table 3: Exports and imports of FISIM (% of GDP)**

	2003	2004	2005	2006	2007	2008	2009	Average
Exports of FISIM (% GDP)	0.11%	0.12%	0.08%	0.09%	0.13%	0.16%	0.09%	<b>0.11%</b>
Imports of FISIM (% GDP)	0.19%	0.26%	0.33%	0.33%	0.30%	0.29%	0.39%	<b>0.30%</b>

## **F. Volatility index**

To analyse the stability of the FISIM allocation and its impact on GDP we computed the Index of Volatility according to the formula developed by Eurostat:

$$\frac{\text{absolute (impact on GDP}_{\text{year } n+1} - \text{impact on GDP}_{\text{year } n})}{\text{impact on GDP}_{\text{year } n}}$$



The index of volatility represents the volatility of FISIM impact on GDP.

	Multiple RR		Euribor	
	Impact on GDP	Volatility	Impact on GDP	Volatility
<b>2003</b>	1.4%		1.0%	
<b>2004</b>	1.3%	3.8%	0.9%	6.3%
<b>2005</b>	1.2%	12.4%	0.9%	3.8%
<b>2006</b>	1.6%	39.5%	1.4%	54.2%
<b>2007</b>	1.8%	14.5%	1.8%	23.9%
<b>2008</b>	1.6%	13.6%	1.6%	9.3%
<b>2009</b>	0.7%	55.0%	0.2%	85.7%
<b>Average</b>	1.4%	23.1%	1.1%	30.5%

By analysing section E and F, we are able to conclude that with this alternative approach there is some stability of the shares allocated to final demand and to imports allocated to intermediate consumption<sup>4</sup> which causes more stable figures of FISIM allocation measured by the volatility index (from 30.5% to 23.1%).

#### 4. Conclusions

This investigation advocates the use of different interbank reference rates conferring the maturity and currency of the operations under evaluation. Alternatively, in the absence of income data by sector and maturity, this methodology could also be taken onwards via a weighted average of the interbank rates. This new approach is a step forward regarding the measuring of the financial services indirectly measured as it incorporates the issue of maturity and currency, which are elements influencing banks decisions. Even in periods of financial markets turbulence the proposed method lead to economical explainable results.

Regarding the Portuguese economy, the adoption of this methodology, as an alternative to the one based solely on Euribor, leads to the decrease of the FISIM produced internally (except for 2008), but to an increase of the impact on the GDP justified by the FISIM allocated to the final consumption of households.

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<sup>4</sup> The export component has a residual effect on GDP.



# Exploring micro-databases for statistical quality control: the experience of *Banco de Portugal*<sup>1</sup>

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## 1. Introduction

One of the main purposes of the Statistics Department of *Banco de Portugal* is to ensure a statistical production with high quality standards and a statistical dissemination aiming at fully meeting internal and external user's needs, in particular in terms of strict compliance with the commitments towards the ECB and the other international organisations, fully in line with the most demanding international standards.

The statistical production responsibilities resulting from the compromises assumed both at national and international level had a considerable increase in the last years. In particular the rapid financial innovation and globalisation recently experienced created new and more demanding challenges to the statistical function of central banks, highlighting shortcomings of the current statistical framework which revealed to be, in some cases, insufficient or delayed, for, as an example, financial stability analysis.

The new data requirements raised the discussion, among others, on what kind of sources, collecting systems and statistical procedures could be particularly helpful to reduce the burden of data collection and speed up some information without compromising the quality and the coverage of the statistical production.

The use of micro-databases and item-by-item reporting, covering different statistical areas, as well as the integration of different reporting systems, are approaches that have generally been followed by central banks aiming at improving the availability of timely information and leaving behind some of the shortcomings associated with the conventional data collecting systems.

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This kind of data collection has several advantages in particular, it can:

- reduce significantly the response burden
- prevent data redundancy
- enable a more efficient data quality management
- improve the responsiveness to *ad hoc* information requests

## **2. Micro-databases in Banco de Portugal**

For some time *Banco de Portugal* has been increasing the use of micro-databases and item-by-item reporting. Currently the following micro-databases are available in *Banco de Portugal*:

- SSIS - Securities Statistics Integrated System database
- CCR – Central Credit Register database
- CBSD – Central Balance Sheet Database
- Prudential supervision data (micro-data)

Before going ahead to present the use, in *Banco de Portugal*, of these databases for statistical quality control, some of their features are briefly addressed.

### **2.1. SSIS - Securities Statistics Integrated System database**

The SSIS database is a security-by-security (s-b-s) and investor-by-investor database, except for households whose information must be reported in aggregated terms, by investor country. This database is managed by the Statistics Department of *Banco de Portugal*.

It should be mentioned that through the SSIS it has been possible to answer effectively to the several statistical requirements in the domain of securities statistics. Furthermore, the SSIS has been used in the regular reporting of statistical data to several international organisations, as for instance the Centralised Securities Database (CSDB) developed within the ESCB, and to answer several statistical enquiries of the ECB, the International Monetary Fund (IMF) and the Eurostat.

When this “integrated” system was launched (in 1999), three former different reporting systems were replaced: (i) the MFI’s securities portfolio in the context of money and banking statistics; (ii) in the case of b.o.p./i.i.p. report, residents’ portfolio in securities issued by non-residents and non-residents’ portfolio in securities issued by residents; and, (iii) securities issues statistics. In fact, the SSIS gathers, in a single database, detailed data on issues and portfolios, allowing for the collection, validation and compilation of statistics on securities issues and holdings.

The reporting institutions for portfolios are the Monetary Financial Institutions (MFI), Dealers and Brokers, and other residents with securities held outside the resident financial sector. The reported information refers to own portfolio and to customers portfolio, when applicable.

The report is on a monthly basis with a lag of 12 working days after the end of the reference month.

The definition of securities follows the recommendations of ESA1995 and the SSIS covers “Securities other than shares” (short and long term) and “Shares and other equity”; financial derivatives are not included.

As a rule, the ISIN code is used for securities identification, but for securities with no ISIN a special code must be considered, following the pre-fixed rules that attribute a specific meaning for each position of that code.

To identify the investors it is used either a company registration number, in case they are residents, or a code provided by reporting institutions, in case they are non residents. Moreover, the SSIS stores all the necessary data for the statistical classification of issuers and investors.

The information reported refers to flows (purchases and sales) and to stocks (end-of-period-values), relating to the following three main segments:

- Issues by resident entities in Portugal;
- Residents’ portfolios in domestic and external securities;
- Non-residents’ portfolios in domestic securities.

The flows are valued according to the transactions value and the stocks may be valued according to: (i) market value, (ii) acquisition value and (iii) nominal value.

To have an idea of the dimension of this database the following figures, referring to the current situation, are quite elucidative:

- About 45,000 shares, 75,000 debt securities and 5,000 mutual funds shares/units are stored;
- Above 154,000 entities (issuers and/or investors) are registered;
- Over 200,000 registers relating to portfolio data (flows and stocks) are processed monthly.

## ***2.2. CCR – Central Credit Register database***

*Banco de Portugal* is in charge of the Central Credit Register, an administrative database storing credit-related information supplied by the participants (financial institutions that grant credit) that is managed by the Statistics Department.

The information is received on an individual basis (each participant reports information related to each one of its borrowers) and *Banco de Portugal* aggregates it for each borrower and finally returns it (already aggregated and with no identification of the lenders involved) to the participants that reported it. Thus, each participant knows the total indebtedness of each of its borrowers in the whole system. It’s worth mentioning that a participant can receive information related to any other specific individual or entity that has requested for a loan, but only with previous written authorisation expressly allowing the access to this information. This way the CCR is helping the participants in their assessment of the risks attached to granting credit, and simultaneously, fulfilling all the legal requirements concerning the protection of individual data.

Besides this purpose, it is legally authorised to use the CCR data for other purposes:

- Statistics (e.g., business register, data quality control, complementary data, separate statistical outputs);
- Banking supervision and regulation (e.g., assessment of credit risk and concentration of risk exposures both, at micro and macro level, improvement of on-site inspection practices);
- Economic research and policy.

At the end of each month, all participants report to *Banco de Portugal* information on all its borrowers' credit, with a minimum threshold of 50 € mainly:

- Amounts outstanding of loans granted to individuals and entities, broken down by type and purpose (interbank market balances are excluded);
- Potential liabilities (e.g., unused amounts of credit cards and open credit lines);
- Type or value of collateral or guarantee securing the loan;
- Original and residual maturity;
- Securitised loans, syndicated loans, loans used to back mortgage bonds, etc. all identified separately;
- Credit defaults;
- Number of days loan is past due (in case of default);
- Currency;
- Country where the loan was granted (to cover loans granted to residents by foreign branches of Portuguese credit institutions).

To have an idea of the dimension of this database the following figures, referring to the current situation, are quite elucidative:

- 5.6 million private individuals are registered;
- Over 280 thousand corporations are registered;
- 216 participants, covering all the credit-granting financial institutions
- 15 types of financial products;
- 20.5 million records per month, on average.

The use of CCR for statistical purposes has clearly resulted in a reduction in the respondents' reporting burden and an improvement in the quality of MFI and OFI balance sheet statistics, as it has enabled an enhanced quality control, additional breakdowns to the existing statistics (e.g., by type, purpose, institutional sector, branch of economic activity, regions and size) and greater accuracy in the classification of the reporting entities by institutional sector. It has also allowed a better assessment of credit developments. CCR data will be particularly useful for meeting the new ECB requirements on securitisation without increasing the reporting burden on Financial Vehicle Corporations (FVCs).

### **2.3. CBSD – Central Balance Sheet Database**

*Banco de Portugal* Central Balance-Sheet Database was established in 1983 (on a voluntary basis), and after having registered several improvements, in 2000 it started covering all sectors of economic activity and a sampling method was introduced aiming at getting a greater coverage and more robust statistical results.

Given the experience in the field of the CBSD, *Banco de Portugal* started developing some initiatives, and finally participated actively in a working group comprising experts of four distinct public entities, with the purpose of defining a simplified reporting of annual corporate data, which might reduce the companies' response burden. As a result of this work, the Simplified Corporate Information (SCI) was launched in April 2007, the legal framework having been defined by a Decree Law.

The SCI (IES in Portuguese) is a joint electronic submission of accounting, fiscal and statistical information by companies to: (i) the Ministry of Finance; (ii) the Ministry of Justice; (iii) Statistics Portugal (the Portuguese national statistical office; INE); and, (iv) *Banco de Portugal*. It allows companies to fulfil four reporting obligations, in a single electronic form, and at one only moment in time.

In line with this achievement, *Banco de Portugal* decided to discontinue the CBSD annual survey and to reduce the surveys on direct investment, as part of the information needed for b.o.p. and i.i.p. purposes was already available with IES. Similarly, the Statistics Portugal stopped surveying companies on annual data included in IES. As a result, overall social costs are reduced and the quality of the information reported is improved.

Besides the financial sector, the IES fully covers the whole set of non-financial corporations (more than 350,000 companies), and, as a rule, IES shall be supplied within six months after the end of the economic year of the company.

In what refers data reported, over 1,600 items are submitted on a mandatory basis: (i) basic identifying information; (ii) comprehensive accounting data (balance sheets and income statements) on an unconsolidated basis; and, (iii) additional data for statistical and fiscal purposes (in the case of non-financial corporations).

Currently the CBSD information is largely used in several domains:

- Aggregate statistics on non-financial corporations disseminated by *Banco de Portugal* in the Statistical Bulletin and in the internet through the BPstat (the online interactive statistical database available in the site of *Banco de Portugal*);
- Contributions of Portugal to the international databases BACH (Bank for the Accounts of Companies Harmonised) and ESD (European Sectoral references Database);
- Enterprise and Sector Tables reported to companies – individual statistical data and comparable aggregated data by sector of economic activity/company size class;
- Several items for the compilation of Financial Accounts – trade credits (assets and liabilities); own funds for non-listed companies; inter-company loans; pension funds; loans granted by private shareholders;
- Several items for b.o.p./i.i.p. compilation – external trade (services); trade credits (assets and liabilities); direct investment (assets and liabilities); loans granted by foreign credit institutions; and,
- Contributions to the update of the Business Register

#### **2.4. Prudential supervision data (micro-data)**

The Statistics Department of *Banco de Portugal* has full access to the accounting data submitted for supervisory purposes to the Supervision Department. Besides its use for quality control of MFI statistics, this information is additionally used for the compilation of non MFI statistics (these institutions do not report to *Banco de Portugal* data for statistical purposes).

### **3. Quality control**

The use of micro-databases and item-by-item reporting enables a more efficient data quality management.

First of all, particularly in the case of administrative sources - where the information is collected for other purposes than statistics – the nature of the information requires to be previously approved or certified, which guarantees a minimum level of quality in the information since the beginning of the process. That is the case, for instance, of the information reported by companies within the scope of IES which is based on their annual accounts, which are official data, and, additionally, it is subject to a set of data coherence checks when companies are filling in the templates. Obviously, the same reasoning applies to prudential supervision data (micro-data) reported to *Banco de Portugal*.

The fact that the information is reported on an individual basis enables an easier and more efficient use of cross-checking on elementary data among different sources. It is worth mentioning, in this context, that besides the previously mentioned micro-databases available in *Banco de Portugal*, the MFI report for money and banking statistics is on a MFI basis, covering the whole set of MFI, and the report for b.o.p./i.i.p. purposes is on a transaction by transaction basis, identifying separately, operation type, resident entity, country, currency and date. Thus, and considering that all these databases are managed in the Statistics Department of *Banco de Portugal*, it is quite evident the enormous potential for quality control through micro data cross-checking, of which we have been increasingly making use.

This cross-checking can be performed either on elementary data, or on aggregated data, while still compiling the statistics which may be considered as an intermediate level quality control. In case of doubts on the information received, the reporters are approached and asked for further clarification, these procedures entailing a strong and quite demanding interaction with the reporting entities. As a final level cross-checking quality control, the compilation of financial accounts, which is also under the responsibility of the Statistics Department of *Banco de Portugal*, may be considered as the overall cross-checking test on the consistency among the various statistics produced in the Statistics Department.

In this context, it should be highlighted the work that has been developed in terms of monitoring and controlling the overall consistency of the data reported to *Banco de Portugal* within the scope of the different statistical production systems. Against this background, besides the quality control procedures implemented in each domain of statistical production, “Quality Assessment Reports” on the elementary statistical data submitted by the major resident financial groups (covering about 75 percent of the statistical results compiled) are prepared on a regular basis.



These procedures have been set up with the purpose of controlling the overall quality of the individual statistical data cross-checking the information reported to *Banco de Portugal* on monetary and financial statistics, balance of payments statistics, securities statistics and central credit register. Accordingly, the following cross-check analyses are performed:

- MFI report to money and banking statistics (MBS) *versus* accounting data (loans vis-à-vis the non-monetary sector, securities portfolio and deposits and securities issued);
- MFI report to MBS *versus* report for Central Credit Register (loans granted by MFI to the non-monetary sector);
- MFI report to MBS *versus* data collected/reported for securities statistics (MFI's securities issued and MFI's portfolios);
- Securities portfolios *versus* securities issues; and,
- MFI report to MBS *versus* report for b.o.p. statistics (external assets and liabilities).

Additionally, high level periodical statistical meetings are held with those responsible for the production of statistical information within these financial institutions, aiming at the quality assessment of the reported data and the analysis of the major problems/constraints identified.

The results of this work have been quite positive: (i) enhancing the overall consistency of the statistics produced in the various domains in the Statistics Department; and, (ii) impacting, sometimes, the organisational arrangements of the financial institutions themselves in order to cope with the high quality reporting requirements of *Banco de Portugal*, which, subsequently, improve the quality of the statistical information submitted to *Banco de Portugal*.

#### ***4. Conclusions and challenges ahead***

In the light of the aspects that have been presented, it seems obvious that the use of micro-databases and item-by-item reporting, covering different statistical areas, has entailed several and enormous advantages, in particular in the domain of statistical quality control, and that the Statistics Department of *Banco de Portugal* has been making good use of it, as results quite evident from the procedures described above.

Besides reducing the respondents' burden, it has been allowing an enhanced quality control, in particular by cross-checking elementary data, taking advantage of the centralised management of these databases in the Statistics Department.

Associated with the management of these databases the Statistics Department has also been facing a significant challenge of developing appropriate software and friendly interfaces in order to explore efficiently the stored information for statistical purposes.

In terms of statistical dissemination it must also be mentioned that the use of micro-databases and item-by-item reporting has been contributing to ensure a greater flexibility in terms of aggregation, allowing different outputs for different statistical needs, thus improving the responsiveness to *ad hoc* information requests from the users.

Finally, another aspect that must be highlighted is that the shared use of these databases gave a strong impetus to deepen the coordination among all staff in charge of the statistical production in the

Statistics Department, which was translated into a more cooperative work, thus impacting positively the consistency among the various statistics produced in *Banco de Portugal*.

In terms of the near future it is a firm purpose of the Statistics Department of *Banco de Portugal* to continue improving the overall efficiency of the statistical framework by further exploring the still unused statistical potential of the already existing micro-databases.

In this context, a challenge ahead will be to set up flash indicators based on information resident (already existent because of business' purposes other than statistics) provided by some representative corporations in key economic sectors, which might contribute to improve the economic/financial analysis, in particular the ability to anticipate macro risks based on micro data assessment.

Another area for future improvement is to enlarge the feedback information currently produced and delivered to the reporting entities. It is our purpose to go deeper in terms of the bilateral relation of confidence between these entities and *Banco de Portugal*, in order to increase the quality of the data received, and, simultaneously, to promote a broader and more accurate use of the statistics by those entities. Gradually, benefits will be collected from this process, both in terms of increased quality and reduced costs.

# Exploring the statistical potential of micro-databases<sup>1</sup>

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## 1. Introduction

Monetary and financial statistics provide valuable input to the decision-making process by both national central banks and governments and are pivotal in research and analysis on the activity of the different economic and financial agents.

Producing high-quality and timely monetary and financial statistics is a key responsibility of national central banks. Ensuring that these statistics remain fit-for-purpose implies keeping pace with financial innovation, assessing the statistical impact of innovations at the earliest possible stage and making the necessary amendments in a well-timed manner, if possible without overburdening the reporting agents and by making a more efficient use of the data already available. In recent years, new ways of collecting data and compiling statistics have been implemented with a view to meeting the users' growing need for real-time, detailed, coherent, reliable and comparable data.

The financial turmoil of 2007-2009 highlighted potential (and actual) gaps in the statistical framework, both at national and international level. In particular, the crisis revealed important gaps in information for the purposes of financial stability analysis, namely concerning counterpart data. The development of micro-databases and administrative records<sup>3</sup> reporting can have a major contribution in overcoming some of these shortcomings (see also D'Aguiar and Lima, 2009). They permit to develop knowledge about the activities of economic and financial agents at a more detailed level and allow for the drawing of conclusions that would not be possible should one rely solely on aggregated data. Micro-data, as a set of administrative individual registers, have a huge potential for statistical use.

*Banco de Portugal* has developed and manages several databases that have proved to be of paramount importance in monitoring and assessing developments in the Portuguese financial system, especially at the present conjuncture. This paper offers a practical example of *Banco de Portugal's* experience in using micro-databases and item-by-item reporting for statistical purposes, highlighting

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<sup>3</sup> In this paper, "administrative records" are meant to be "information that is routinely collected by organisations, institutions, companies and other agencies in order that the organisation can carry out, monitor, archive or evaluate the function or service it provides" (Calderwood and Lessof, 2006).

the advantages of this approach as regards financial innovation, and reducing the data gaps evidenced by the recent financial crisis. Empirical evidence focusing on securities statistics is included.

The remainder of this paper is structured as follows: Section two briefly describes the micro-databases used by *Banco de Portugal* in the production of statistics; Section three explains the valuable contributions of micro-databases in a financial crisis context; Section four provides some empirical evidence concerning micro-databases on securities; Section five concludes.

## ***2. Description of micro-databases developed and used by Banco de Portugal***

In the last ten years, *Banco de Portugal* has been developing and maintaining several databases based on item-by-item reporting, with proven results on reducing or eliminating previous information gaps. In particular, it has been exploring the statistical potential of various sources of information, including the Securities Statistics Integrated System (SSIS) database, the Central Credit Register (CCR), Central Balance Sheet Office (CBSO) database and prudential supervision information.

For a better understanding of the way the *Banco de Portugal* has been using these databases to produce statistics, I will proceed with a brief description of each of them.

### ***2.1 The SSIS database***

The SSIS database is an information system created in 1999 and managed by the Statistics Department that stores data on securities issues and portfolios on a security-by-security and investor-by-investor basis.<sup>4</sup> It gathers in a single database detailed data on issues and securities holders, and includes stocks and transactions of securities other than shares (short- and long-term) and shares and other equity (financial derivatives are still not included in this database, despite the pressure on the part of the users to integrate them in the reporting scheme). Both stocks and transactions are collected on a monthly basis. Information is acquired by ISIN code and afterwards is classified according to the European System of National and Regional Accounts (ESA1995) classification of financial instrument.

In the segment of issues, information is collected on securities issued by resident entities in Portugal, either issues taking place in the Portuguese market or in external markets. Data on issues are collected from several sources such as the Euronext, the Securities Market Commission (SMC), the General Government, *Interbolsa*, commercial databases, etc. As regards securities portfolios, detailed information is collected on investments by residents in domestic and foreign securities, as well as on the portfolios of non-resident investors in domestic securities. This information is reported by Monetary and Financial Institutions (MFI), dealers, brokers, the SMC, and other resident entities.

On the issues side, the system allows for the collection, validation and production of statistics on securities issued by resident sectors in Portugal and abroad. On the portfolios side, the SSIS database allows for the development of statistics of MFI (MFI's securities portfolios and investment funds

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<sup>4</sup> In the case of investors belonging to the households' institutional sector, data are aggregated by the investor's country. See Aguiar (2008) and Aguiar *et al.* (2009) for more details.

statistics), of balance of payments and international investment position (b.o.p. / i.i.p.) (the Portuguese portfolio invested abroad, and the foreign portfolio invested in Portugal), and of financial accounts (for the segments securities other than shares and shares and other equity).

The usability of this system is directly related to the data granularity and consistency as regards financial instruments, counterparties and market concentration.

The development of SSIS database is being done on a permanent basis, and the foreseeable enhancements include the integration with the Centralised Securities Database (CSDB) managed by the European System of Central Banks (ESCB).

## ***2.2 The CCR Database***

The CCR is an administrative database created in 1978 by *Banco de Portugal* to provide credit-related information to the participants (financial institutions) and to help them in their assessment on the risks attached to extending credit. In 1996 the use of the CCR data was extended for other purposes such as statistics, banking supervision and regulation, and economic research and policy. This database is managed by the Statistics Department.

The data reported to this database include, *inter alia*, amounts outstanding of loans granted to individuals and organisations, by type and purpose (interbank market balances are excluded), potential liabilities, type and value of collateral or guarantee securing the loan, securitised loans, syndicated loans, loans used to back mortgage bonds and other (separately identified), and credit defaults. The participants are both suppliers and users of CCR data.

This system has full coverage of the credit provided by financial institutions due to the very low reporting threshold (minimum of €50 per credit balance), and monthly credit balances are reported for each individual borrower by participants, who have the duty of reporting the individual identification of the borrowers, indicating only whether they are individuals or organisations. The more detailed sectoral classification of the borrowers within the scope of the CCR is internally established by *Banco de Portugal*, by the SSIS, thus ensuring the same high-quality, consistency and flexibility standards in sectoral classification.

The CCR database is used in the production of MFI statistics and Other Financial Institutions (OFI) statistics (in the segment of credit liabilities) and of financial accounts statistics (in the segment MFI and OFI credit liabilities). Furthermore, it permits further analysis to the credit data and additional breakdowns to existing statistics (such as loans granted by MFI and by OFI), broken down by type, by purpose, by institutional sector, by branch of economic activity, by region and by size), which is a main source for a better assessment of credit developments.

## ***2.3 The CBSO Database***

The CBSO is a database of economic and financial information on a representative sample of Portuguese non-financial firms, developed since 1999 by the Statistics Department. The information is based on quarterly and annual accounting data of each reporting company. The data that composes the CBSO database is reported by Non-financial corporations (NFC) under the so-called Simplified Corporate Information (SCI) system, which is a joint electronic submission of accounting, fiscal and

statistical information that companies have usually to remit to the *Ministry of Finance*, *Ministry of Justice*, the *National Statistics Office*, and *Banco de Portugal*. It allows companies to fulfil four reporting obligations through a single submission, entirely paper-free, in one moment in time.

The data available in the CBSO database has several uses related with NFC statistics. Firstly, it is a valuable contribution to the b.o.p./ i.i.p. statistics (in the segment of external trade, trade credits, direct investment, and loans granted by foreign credit institutions), and a key contribution to the financial accounts statistics (in the segment of trade credits, own funds, inter-company loans, pension funds and loans granted by private shareholders). Furthermore, it aims to contribute to a better understanding of economic and financial situation of Portuguese NFC and provides regulators relevant data to the pursuit of their duties, including the economic analysis and financial stability analysis. The published statistics, the sector tables, and the additional use of international databases – Bank for the Accounts of Companies Harmonised (BACH) and European Sectoral References Database (ESD) – allow the development of several analyses to individual data and comparable aggregate data for the sector of economic activity/company size class, and to compare the financial performances of single firms considering their sector and size. The ratios that are produced are a source of control of the developments in NFC accounts.

## ***2.4 Prudential supervision information***

*Banco de Portugal* is responsible for the prudential supervision of credit institutions, financial companies and payment institutions with a view to ensuring the stability, efficiency and soundness of the financial system. The supervisory function is supported by a micro-database managed by the Banking Supervision Department that includes items from the balance-sheet and income statement of each of the institutions supervised by *Banco de Portugal*.

*Banco de Portugal* has a long-standing tradition of fruitful cooperation between the Statistics Department and the Banking Supervision Department. In particular, the Statistics Department has access to the accounting data submitted for supervisory purposes, which allows the compilation of statistics that, besides complementing the existing ones – including statistics on non-monetary financial institutions (NMFI) – serve as an additional means to crosscheck their quality and internal consistency.

## ***3. Valuable contributions of the use of micro-databases in a crisis context***

Despite the large amounts of financial data at the disposal of national central banks, the recent financial turmoil highlighted the need for initiatives aimed at improving the availability of information and for overcoming possible statistical shortcomings related with the lack of an accurate view of the functioning of the economy. These initiatives should be twofold: they must allow for a better understanding of the past and, more important, they must provide statisticians and analysts with real-time inputs to prevent negative situations and to better tackle them beforehand. The use of administrative databases to complement traditional macro statistics, together with new data requirements and the need to minimise the reporting burden for respondents, brought to the fore the issue of further reusing and sharing of micro-data.

In a crisis context, statistical agencies are more exposed to outer scrutiny and are ultimately expected to provide convincing answers to the public at large about the different economic and financial issues that need clarification. *Banco de Portugal* is by no means an exception. Since the beginning of the current financial crisis the requests to *Banco de Portugal* for additional information and analysis have been more frequent than usual and more attention has been given to its statistical output. The *Banco de Portugal* use of micro-databases is related not only with statistical purposes but also with the need to monitor and/or to assess market developments, and to trace economic scenarios. In the context of the financial crisis, these databases have proven to be an excellent way to keep track of events that would hardly have been noticed without the availability of more granular data. In practice, micro-databases on securities, credit registers, central balance sheet offices and supervisory information have the potential to give a valuable contribution to complement the data provided by the conventional statistical systems (particularly in relevant and timely statistics that may be used as early warning indicators), and an enhanced responsiveness to *ad hoc* information requests from the users. Furthermore, this type of databases has lower reporting and maintenance costs, provides high quality data, is likely to give better coverage of the population, offers greater flexibility to the compilation process, and allows for the derivation of new statistical outputs almost in real time.

Going further into the details provided by micro-databases, the disaggregated data and the concomitant greater flexibility in exploring data and building statistical analysis allow further research in specific areas of knowledge and in-depth understanding of the economy (see also Lane, 2003 and 2007). Moreover, they make it possible to make more informed decisions than the ones based on estimations or forecasts. Economic and political decisions are most of the times taken on the basis of ratios and estimations derived from aggregated data, thus not taking into account important details that can only be seen at an itemised level. Micro information has the potential to mitigate some of the information gaps so that the decision process can be optimised when the characteristics and frictions of market players are taken into account and permits analysts to calculate marginal, rather than average effects.

The micro-databases developed by *Banco de Portugal* contain detailed data on balance sheet positions of the MFI, OFI, NFC and households sectors, and allow to analyse leverage, liquidity, and market exposures in systemically important institutions with geographical, sectoral and currency breakdowns (including counterpart information). Moreover, with micro-data it is possible to have information on the main players of the Portuguese market, their financial transactions and respective impact on the economy. In particular, the CCR database is an excellent tool to carry out structural analyses in terms of credit and detailed tests to the concentration of risk of the different economic agents.

In the wake of the financial crisis, central banks have been dedicating an increased interest to the monitoring of the economic agents' risk exposures. These are not restricted to one single risk, but rather to several different risks – some of them reflected in rate spreads, others hidden in the activity and only observed with detailed analysis. With micro-data one can assess the impact of plausible but low-probability macro-financial risk scenarios on the solvency of a set of financial institutions. Indeed, by using micro-data one can assess the internal investment policy of the banks for its own portfolio, on behalf of their clients, and of large Portuguese investors, and monitor the dependence of our agents in terms of one country (country risk), the concentration of Portuguese investments in one or more countries in one specific security (debt securities, equity, investment funds shares), or the concentration of investments in one specific company. These analyses allow the central bank to

manage the risk inherent to their strategy, to anticipate events on investors' holdings, to trace future problems in their accounts and, ultimately, to take remedial action in time. In practical terms, if one MFI, searching for higher returns, invests a substantial part of its clients' deposits and other funds in offshore centres or troubled economies, there is a high element of risk associated to those investments. With micro-data one can anticipate and monitor the risk of those investors and follow the evolution of those accounts more frequently (e.g. monthly), instead of having an annual aggregate.

Given the strategic importance of this type of data, the Statistics Department of *Banco de Portugal* has developed a very thorough set of procedures to ensure a high level of quality and control over the data. On the compilers side, the quality of the financial statistics, the data control checks, and the identification of inconsistencies are facilitated and enhanced if data are collected on an individual basis. Also, item-by-item reporting enables greater accuracy and better data monitoring. Once the classification of information for statistical purposes is done by the statistical experts, in line with a common methodological framework, and valuation adjustments follow uniform criteria, the data reported by the different agents are coherent and comparable, and allows for cross-checking with other data sources. On the reporting agents' side, despite the high amount of individual registers (possible due to information technology innovations), it is easier for them to report monthly granular data rather than aggregated data over a larger period of time. Once the reporting agents learn the methods of reporting and how to use the information systems to report the data, it is easier and less prone to error to send individual registers than aggregating it according to several statistical criteria (aggregate reporting usually means greater burden in terms of details and breakdowns to be reported every time new or additional output requirements emerge).

Another benefit of using item-by-item reporting is the contribution that some specific registers of a single database have as inputs to the development and production of other statistics (for example, registration data are useful in building and maintaining lists of units as the starting points for surveys, and transaction data can be used for new statistical products or even additional details of already existing statistics). The different areas of the Statistics Department follow pre-defined production processes and the integration of the available databases allow for efficiency gains even in the cross-checking of data between the different areas. Moreover, the different databases follow the same classification standards which lead to accuracy and higher integration between statistics. In addition, data from one database can be complemented with economic and financial indicators from other database, which allows for a more complete picture of the whole economy. In this case, attention must be paid to the statistical function of *Banco de Portugal* as an important auxiliary to the supervision function. Furthermore, the SSIS and CCR databases allow to cross micro-data and even to cross micro-data provided by reporting agents to different departments of the central bank in order to detect inconsistencies and enable a corrective action in time.

A valuable contribution of micro-data extracted from the SSIS and CCR databases is the possibility to construct the so-called "From-whom-to-whom tables". These are double-entry tables that allow evaluating which institutional sectors are financing the economy, in terms of securities and credit. These tables show the holdings of various financial instruments by the different institutional sectors, both on the asset and the liability side. Their major contribution is related to the ability to simulate propagation of local shocks in the system.

Furthermore, an important point not directly related to the essence of the data but, instead, with the reporting institution is the data reported quality index. From a practical point of view, the



custodians that reveal constant inconsistencies in the reported data demonstrate fragility not only in data quality but also inside the bank structure. This situation is a signal that the merge of accounts into one singular database and the transmission of data among the functional structure are not working efficiently and can lead to default and missing of information from the reporting agent. When this situation occurs the technical team reviews in more detail the data sent. Several contacts are made with the institution to pose questions in order to have the best approximation to the reality and to not affect the global data.

At a global level micro-databases have been enabling the harmonisation of methodologies to compile high-frequency statistics, which is a main goal to facilitate comparison and aggregation of data across countries. In a crisis context this allows to compile at a very detailed level the euro area statistics with a high degree of confidence. This initiative paves the way to a global European exchange of data on loans and securities with significant value-added to the statistical function, at a more global level.

#### ***4. Empirical evidence derived from micro-databases***

In this section I will provide some insight on the empirical results that can be obtained from the combination of the different databases available in the Statistics Department of *Banco de Portugal*.

##### ***4.1 Detailed analysis on a company-by-company basis***

I start by an illustration at the most granular level. Contrarily to a system that stores aggregated data, micro-databases allow the construction of detailed analysis by each individual company. This analysis may consider, namely: structure of assets and liabilities (in terms of deposits, loans, securities and credit); the interlinks between domestic companies and/or with others domiciled abroad; the diversification/risk exposure of portfolio investments in different companies and countries; and, the concentration in terms of sources of funding. Furthermore, it is possible to evaluate the evolution of these items over time.

As such, in addition to the aggregate values of total debt, debt-to-equity ratios, portfolio investments, which can be obtained from the macro-data, the value added from crossing multiple micro-databases is illustrated in Figure 1 where one can see the layout of a detailed analysis that can be built on a single company basis.

Figure 1 – Disaggregated information on financial assets and liabilities, by company

Information on financial assets and liabilities of Company XXX				
	Year N-1, month t-1	Year N-1, month t	Year N, month t-1	Year N, month t
<b>Assets</b>				
<b>Deposits</b>				
Resident				
Non-resident				
<b>Debt securities</b>				
Resident				
Company A				
Company B				
Non-resident				
Company XA				
Company XB				
<b>Shares and other equity</b>				
Resident				
Company C				
Company D				
Non-resident				
Company XC				
Company XD				
<b>Trade credits</b>				
Resident				
Non-resident				
<b>Liabilities</b>				
<b>Loans</b>				
Resident				
Bank A				
Bank B				
Non-resident				
<b>Debt securities</b>				
Resident				
Company A*				
Company B*				
Non-resident				
Company XA*				
Company XB*				
<b>Shares and other equity</b>				
Resident				
Company C*				
Company D*				
Non-resident				
Company XC*				
Company XD*				
<b>Trade credits</b>				
Resident				
Non-resident				

On the assets side, one can see, not only the portfolio investment strategy the company is following over time but, most importantly, in which companies/sectors it is (des)investing. Foreign direct investment operations can also be clearly identified. Similarly, on the liabilities side, in addition to the financing strategy the companies may have adopted (bank loans, debt or capital) it is possible to identify which entities are indeed financing the Portuguese corporations. For bank loans, it can be assess the level of relationship banking established for a given company, in terms of, for example, number of creditors, concentration of banking loans, main creditor. For debt and capital issues, although to a more limited extent, it is also possible to know for the most relevant operations who are the stakeholders, who has been (des)investing in the Portuguese economy through the non-financial corporations and how the domestic companies relate with each other. Interestingly, it can also be inferred the economic relationships between different types of lenders, i.e., whether the main lending bank may hold other relevant positions in debt or capital issued by the company.

This type of tables has been very recently developed in response to the growing data requests from the decision makers.

#### ***4.2 Understanding the interlinks within an economy***

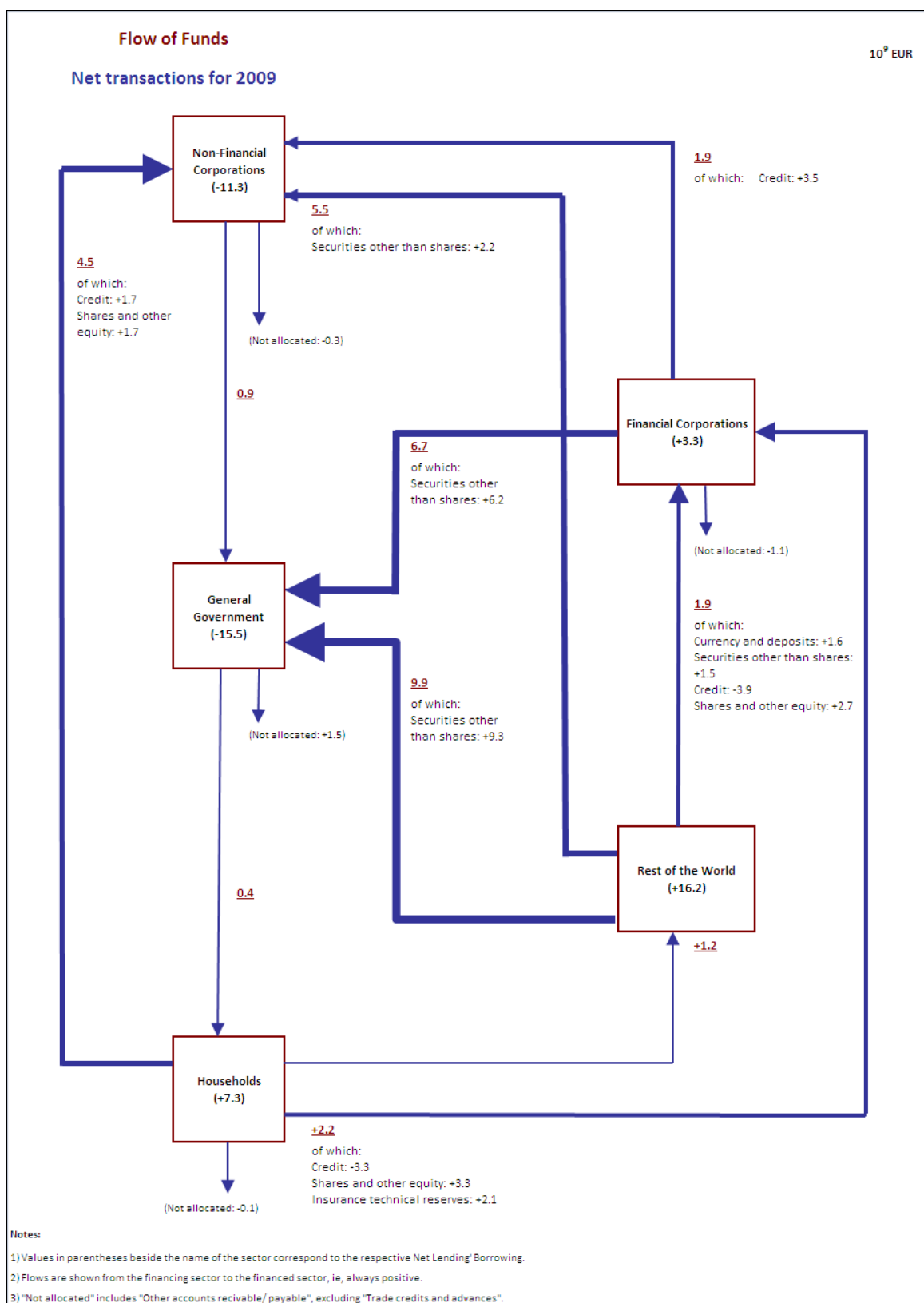
The combination of the different databases available in the Statistics Department of *Banco de Portugal* culminates in the compilation of the financial accounts for the economy as a whole including the different sectors and their interlinks.

In Figure 2 it is exhibited the flow of funds for the Portuguese economy, which reveals the net lending/borrowing of each sector vis-à-vis the remaining ones, including the Rest of the World (RoW). The availability of counterpart information at micro level for loans, debt securities and shares and other equity is crucial for the compilation of this exercise.

In 2009, the financing needs of the Portuguese economy amounted to 16.2 billion Euros. The main flows of capital were generated between the RoW and the General Government (GG), Financial Corporations (FC) and GG, and the RoW and NFC. The GG and the NFC were the institutional sectors with more financing needs.

In line with most European countries which had to adopt exceptional measures for the support of the real economy and the financial sector in 2009, the net borrowing of the GG increased dramatically compared to previous years, amounting to 15.5 billion Euros in 2009 (4.9 in 2008). The funds provided to the GG were mainly through the acquisition of securities other than shares by the RoW and the FC, with a total amount of 16.6 billion Euros.

Figure 2 – Flow of funds for the Portuguese economy, 2009



The NFC exhibited less financing needs compared to previous years mainly due to a decrease in the investment in line with the negative growth of the economy. They were mainly financed by the RoW (5.5 billion Euros) and households (4.5 billion Euros).

In turn, households increased their net lending ability from 3.2 billion Euros in 2008 to 7.3 billion Euros in 2009, as a result of a fall in final consumption and investment and an increase in the savings rate. Households applied their savings in the funding of NFC and FC (mainly), through the acquisition of shares and other equity and insurance technical reserves, partially outweighed by the credit received from the FC to finance part of their expenses.

This type of flow of funds' analysis can also be performed at a more detailed level, namely for individual financial instruments such as debt securities and shares and other equity. Making use of counterpart information available from the SSIS one can thus obtain "From-whom-to-whom" tables for these instruments.

In the "From-whom-to-whom" table for securities other than shares (Figure 3), one can observe some evolution in the financing structure of sectors considering the comparison between the first quarter of 2007 and the fourth quarter of 2009. First of all, the outstanding amount of securities other than shares issued by resident sectors reached the highest amount ever, with a growth rate of 76% between the two quarters.

Analysing in more detail the exhibited tables it is emphasised the growth of securities other than shares issued by the MFI. The outstanding amount rocketed after the outbreak of the financial turmoil and an increase of 253% in the amount outstanding of securities other than shares was verified in the last quarter of 2009, comparing with the first quarter of 2007. This increase was accompanied by a change in the funding structure of this sector which was related to head-offices resident in Portugal issuing directly rather than through their affiliates abroad. At the end of 2009 the RoW held 57% of this amount compared to 31% in the first quarter of 2007. This increase was compensated by a decrease in the relative weight of debt securities held by households in part explained by an increase in their risk aversion and preference for more traditional investments like deposits.

Analysing the issues from Other Financial Intermediaries and Financial Auxiliaries (OFIFA), it is worth noting the holdings by MFI. This is mainly related to the acquisition of securitised bonds linked to securitisation operations involving Portuguese banks as a means to have more assets eligible for collateral in the ESCB monetary policy operations<sup>5</sup>.

The GG has also issued a large amount of debt securities, with a growth rate of 33% in the two considered periods, which was mainly acquired by non-residents.

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<sup>5</sup> Securitisation operations by Portuguese banks typically involve a financial vehicle that buys the loans through the issuance of securitised bonds (if the vehicle takes the form of a securitisation firm) or securitisation units (if the vehicle takes the form of a securitisation fund). These bonds or units may be directly bought back by the originator or by a third non-resident entity which will eventually be held also by the originator.

Figure 3 – “From-whom-to-whom” tables for securities other than shares

**Securities other than shares - Stocks in 2007 Q1**

10<sup>6</sup> Eur

		Issuing Sector											
		NFC		MFI		OFIFA		ICPF		GG		RoW	
Holding Sector	NFC	147	0.5%	110	0.5%	119	1.1%	0	0.4%	15	0.0%	1,522	1.6%
	MFI	10,046	37.3%	3,044	13.3%	1,126	10.6%	0	0.0%	5,012	5.7%	26,776	28.4%
	OFIFA	1,534	5.7%	1,220	5.3%	4	0.0%	0	0.1%	57	0.1%	19,514	20.7%
	ICPF	2,909	10.8%	2,705	11.9%	649	6.1%	19	20.2%	3,437	3.9%	36,162	38.3%
	GG	51	0.2%	34	0.1%	0	0.0%	0	0.0%	7,253	8.3%	1,872	2.0%
	Households	281	1.0%	8,625	37.8%	878	8.2%	66	71.2%	34	0.0%	8,582	9.1%
	RoW	11,938	44.4%	7,078	31.0%	7,871	73.9%	7	8.0%	71,854	82.0%	-	-
	Total	26,905	100.0%	22,816	100.0%	10,648	100.0%	93	100.0%	87,662	100.0%	94,428	100.0%

**Securities other than shares - Stocks in 2009 Q4**

10<sup>6</sup> Eur

		Issuing Sector											
		NFC		MFI		OFIFA		ICPF		GG		RoW	
Holding Sector	NFC	221	0.5%	472	0.6%	280	1.4%	3	1.7%	61	0.1%	1,491	1.2%
	MFI	19,317	46.5%	12,392	15.4%	11,033	55.4%	0	0.0%	10,351	8.8%	55,859	46.4%
	OFIFA	966	2.3%	2,688	3.3%	178	0.9%	0	0.1%	362	0.3%	10,850	9.0%
	ICPF	3,084	7.4%	7,502	9.3%	394	2.0%	112	59.2%	2,988	2.5%	43,395	36.0%
	GG	58	0.1%	43	0.1%	0	0.0%	0	0.0%	7,726	6.6%	1,711	1.4%
	Households	1,044	2.5%	11,486	14.2%	806	4.0%	73	38.3%	110	0.1%	7,155	5.9%
	RoW	16,838	40.5%	46,049	57.1%	7,232	36.3%	1	0.6%	96,239	81.7%	-	-
	Total	41,528	100.0%	80,632	100.0%	19,923	100.0%	189	100.0%	117,838	100.0%	120,462	100.0%

In terms of shares and other equity, one can observe a slight increase in some sectors (such as NFC and OFIFA) and a reduction in other sectors, as a result of two different driving forces: the issuance of equity and, at the same time, a decline in equity's prices over this period. This data is summarised in Figure 4.

Figure 4 – “From-whom-to-whom” tables for shares and other equity

**Shares and other equity - Stocks in 2007 Q1**

10<sup>6</sup> Eur

		Issuing Sector									
		NFC	MFI	OFIFA	ICPF	RoW					
Holding Sector	NFC	133,210	42.3%	6,222	12.7%	6,702	7.4%	490	11.4%	33,428	46.4%
	MFI	9,603	3.1%	1,314	2.7%	9,166	10.1%	968	22.5%	9,459	13.1%
	OFIFA	13,108	4.2%	8,188	16.7%	5,047	5.5%	1,181	27.4%	9,725	13.5%
	ICPF	3,822	1.2%	1,874	3.8%	2,367	2.6%	11	0.3%	9,832	13.7%
	GG	5,171	1.6%	13,486	27.5%	3,663	4.0%	0	0.0%	2,865	4.0%
	Households	82,285	26.1%	7,478	15.2%	30,316	33.3%	641	14.9%	6,701	9.3%
	RoW	67,580	21.5%	10,474	21.4%	33,683	37.0%	1,015	23.6%	-	-
	Total	314,779	100.0%	49,036	100.0%	90,944	100.0%	4,305	100.0%	72,011	100.0%

**Shares and other equity - Stocks in 2009 Q4**

10<sup>6</sup> Eur

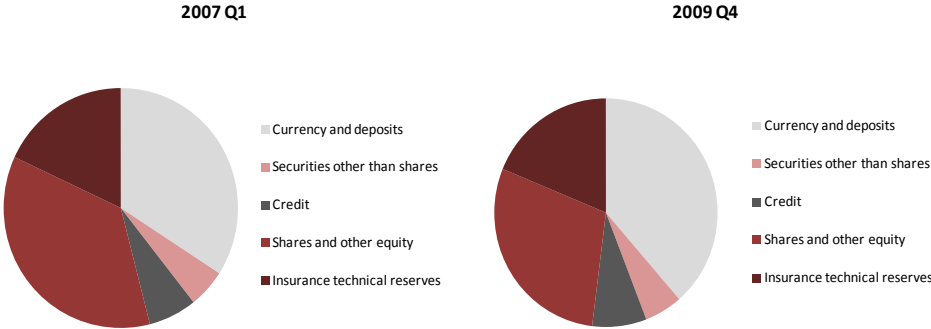
		Issuing Sector									
		NFC	MFI	OFIFA	ICPF	RoW					
Holding Sector	NFC	149,223	45.1%	5,674	12.5%	7,652	8.3%	261	7.3%	35,896	52.5%
	MFI	14,405	4.4%	729	1.6%	8,498	9.2%	944	26.4%	13,331	19.5%
	OFIFA	13,752	4.2%	6,795	15.0%	4,303	4.7%	1,087	30.5%	3,897	5.7%
	ICPF	2,715	0.8%	537	1.2%	4,752	5.2%	13	0.4%	6,543	9.6%
	GG	3,598	1.1%	18,849	41.5%	4,049	4.4%	0	0.0%	3,898	5.7%
	Households	81,110	24.5%	6,597	14.5%	17,623	19.1%	217	6.1%	4,829	7.1%
	RoW	65,826	19.9%	6,264	13.8%	45,338	49.2%	1,047	29.3%	-	-
	Total	330,629	100.0%	45,446	100.0%	92,216	100.0%	3,569	100.0%	68,394	100.0%

On the issues from OFIFA, again it is noted the impact of securitisation operations, evidenced in the acquisition of securitisation units by non-residents.

Furthermore, there was a sharp reduction in the households' holdings of investment funds shares. The value at end-2009 results both from the combination of the households' disinvestment in riskier

assets with the decline in the value of these assets in the event of the financial crisis. In fact, analysing in more detail the households' portfolio (Figure 5), it is possible to observe that, while in the beginning of 2007 shares and other equity were households' main asset (36%), at the end-2009 the pole position was due to currency and deposits with 39%, 5 p.p. more than in early 2007.

Figure 5 – Structure of households' portfolio



5. Final remarks

The experience of *Banco de Portugal* concerning the use of micro-data has revealed many advantages for the production of statistics and assessment of developments in the financing structure of the Portuguese economy. The advantages of this approach exceed largely the burden of managing so much data, considering the benefits from a refined quality control that allows for more reliable statistics and transparent data, higher compilation flexibility, and an enhanced responsiveness to *ad hoc* information requests from the users.

The analyses that can be build up with data extracted from micro-databases, including the “From-Whom-to-Whom” tables and the Flow of Funds, have valuable contributions to explore how the risk exposures and dependencies across sectors are influenced by developments on assets and liabilities of other sectors. These analyses have revealed that micro-databases can be a future improvement to deal with data gaps, both at national and international level, namely concerning counterpart information. In particular, I consider that the coverage of these databases in terms of the different financial instruments with the various levels of detailed information, namely by individual investor, by country, by the main financers, and by main counterparties, allow for the compilation of valuable statistical outputs which are of key importance for the policy makers. First and foremost, micro-databases allow for the understanding of the different relations established across the different economic agents. Extended to a global scale, with the sharing of similar data across national data producers, the benefits could be spread out worldwide.

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# How can administrative databases help us to understand the funding behaviour of non-financial corporations?<sup>1</sup>

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## 1. Introduction

The contagion effects associated with the adverse international environment, characterised by high uncertainty about the sustainability of public finances in several European countries as well as the upward revision of the estimated general government deficit in Portugal in 2009, have been negatively conditioning the evolution of the yield on Portuguese Treasury bonds. This increase in risk premiums associated with the government debt is already being reflected in other economic agents funding costs, namely banks, with potential widespread macroeconomic impacts.

This is particularly noteworthy for an economy where indebtedness has become a structural feature as the move in the International Investment Position easily illustrates. In 1999, the year when the country joined the euro, the net debtor position for economic agents resident in Portugal stood at 32 p.c. of GDP. By the end of 2009 it had soared to more than 109 p.c. of GDP, with almost half of this position corresponding to the resident banking sector, while the remainder is essentially public debt in the hands of non-residents. Given its role in financial intermediation with the rest of the world, the indebtedness of the banking sector emerges as the external counterpart of the non-financial private sector domestic debt.

This setting emphasises the critical need for having detailed data on these institutional sectors in order to assess their financial soundness and how they are being affected by the adverse economic situation. Data gaps are, however, an unavoidable consequence of the ongoing development of markets and institutions and are usually highlighted when a lack of timely and accurate information hinders the ability of policy makers and market participants to develop effective responses. The recent worldwide economic events drew attention to many data gaps and have clearly underlined the importance of going beyond traditional statistical production approaches to obtain a set of indicators in more innovative ways.

In this sense, this paper demonstrates how administrative databases can be used to fill in data gaps in the Non-Financial Corporations (NFC) sector. The focus will be twofold: on the one hand, it intends

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to unveil more detail on the NFC sector balance-sheet; on the other hand, it illustrates how these databases can be used to complement traditional macro statistics on this sector.

The report is centred on Portuguese corporate finance, in particular the amount of external financing, the choice between debt and equity, and the composition and maturity structure of debt as well as its cost. The analysis is performed in a way which allows identification of the peculiarities that depend on the activity sector and the company size. The results are particularly relevant to support productivity and economic growth, monetary policy and financial stability.

The analysis is based on data derived from two databases administered by *Banco de Portugal* under the responsibility of the Statistics Department: the Central Balance-Sheet Database (CBSD) – containing economic and financial information based on non-consolidated accounting reports - and the Central Credit Register (CCR) – containing information on every individual credit, above €50, granted by the resident financial system.

The use of these data sources has the great advantage of making available additional and more detailed information that, in the case of the CBSD, comes directly from the companies. This is particularly relevant in a sector where most of the existing data comes indirectly from other sectors' statistics or from surveys which are often based on small samples highly biased to larger companies. Another important feature is that all of this additional information is guaranteed without overburdening reporting agents given that both reports are already set up for other purposes.

The remainder of this paper is organised as follows: section 2 introduces both databases used in this study as well as some methodological issues. Section 3 presents the Portuguese NFC sector using mainly traditional macro statistics. Section 4 uses the micro data to characterise in more detail NFC funding behaviour and its cost while section 5 illustrates how these same databases are used for financial stability purposes, to analyse banks exposure to NFC. Section 6 concludes.

## ***2. Databases and methodology***

This section presents the two databases used in the paper. Firms' size distinction and activity sector aggregations are explained. Finally, the method used to control activity and size effects is presented.

### ***2.1. Databases***

All the analysis presented in section 4 and 5 is based on data gathered from two micro databases administered by *Banco de Portugal* under the responsibility of the Statistics Department: the Central Balance-Sheet Database (CBSD) and Central Credit Register (CCR). From these two sources it is possible to obtain an almost complete sample of the Portuguese Non-Financial Corporations (NFC).

An important feature of these data, as a source for statistics, comes from the fact that all the reported information concerns individual firms. This allows for an accurate classification of companies and instruments according to relevant statistical criteria, taking advantage of the knowledge and statistical reference data resources available at the *Banco de Portugal*, as part of the Portuguese national statistical system.

### 2.1.1. Central Balance-Sheet Database (CBSD)

Since 2006, CBSD data is has been based on corporate accounts reported in fulfilment of firms' statutory obligations. This database has detailed and carefully harmonised balance-sheet and profit/loss data on nearly all non-financial companies in the country. The information is reported with a delay of about seven months from the reference period.

**Table 1** – Sample coverage, by number of non-financial corporations, number of employees, turnover and total assets  
In per cent

	2006	2007	2008
Number	91.9	93.7	91.9
Employees	94.8	96.8	94.9
Turnover	96.8	98.3	97.0
Total assets	98.2	98.2	96.1

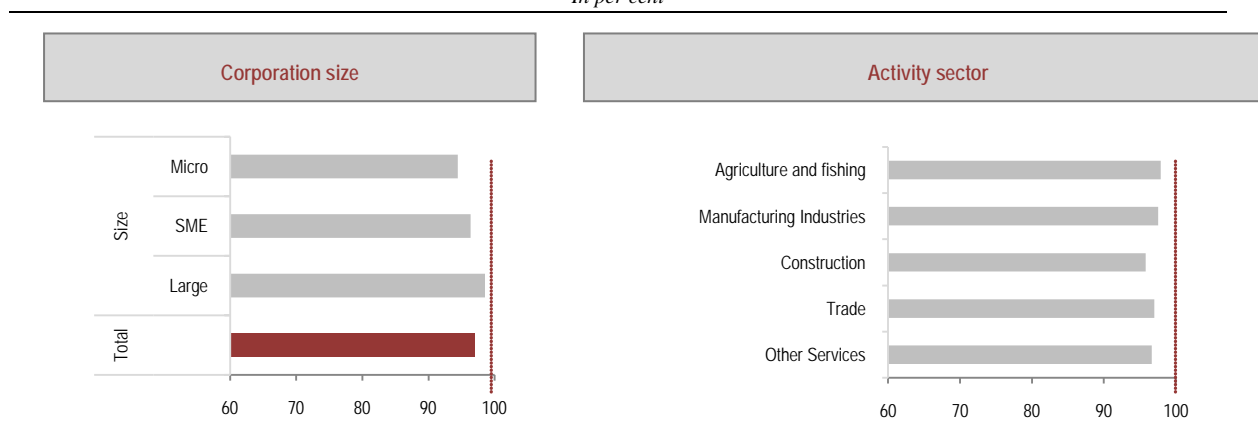
Source: Banco de Portugal

As table 1 demonstrates, the coverage level in any of the indicators (number of companies; number of persons employed; turnover; total assets) is well above 90 p.c. in every year.

Detailing the coverage indicators, at the turnover level it is possible to verify that the Portuguese CBSD has the great advantage of showing almost no bias towards larger companies or to any of the activity sectors. In fact, the CBSD represents equally well smaller and larger firms (95 p.c. for micro; 96 p.c. for SME and 99 p.c. for large) and the same happens for all activity sectors with the one with smaller coverage, “construction”, being covered at more than 95 p.c. (figure 1). This high coverage level implies that the size and sectoral structure of the Portuguese economy is being well replicated in the database.

Data quality control is a crucial step in this process. Each year, the CB receives reports from more than 350 thousand companies with each one reporting up to 1 600 indicators. The massive amount of data increases the chance for reporting errors making quality check procedures a key element in order to allow the good use of this information. The data control starts with automatic consistency tests performed at the reporting level that are later complemented with additional individual quality control at Banco de Portugal.

**Figure 1** – CBSD turnover coverage by companies size and activity sector (2008)  
In per cent



Source: CBSD, Banco de Portugal

The large amount of available data provides comprehensive disaggregated information (e.g. by activity, firm size, geographical area), tail/distribution information, and can be crossed with other data sources<sup>3</sup>.

### **2.1.2. Central Credit Register (CCR)**

The CCR contains information on actual and potential<sup>4</sup> credit granted by the resident financial system<sup>5</sup>, both positive (when contractual obligations are being duly fulfilled) and negative (when there are arrears).

Borrowers are resident or non-resident entities, both individuals and organisations, receiving credit from resident financial institutions. Information is reported to the CCR by the lenders on a monthly basis, with reference to the outstanding liabilities at the end of each month. Participants are obliged to supply the CCR with information related to all borrowers whose total debt outstanding (actual or potential) is over €50.

Given the reduced threshold used for reporting operations and the mandatory report, this database has virtually all credit operations granted by the financial system in Portugal. As reference, just for the month of December 2009, the CCR received 1 057 560 registries concerning only NFC.

The main aim of the CCR is to provide the participants with relevant data for their assessment of the risks attached when granting credit. To this end, participants can assess aggregate information on the credit liabilities of each client (borrower) vis-à-vis the financial system as a whole<sup>6</sup>. From a legal point of view, information on credit liabilities can be used for the supervision of financial institutions and for the compilation of statistics<sup>7</sup>.

## **2.2. Aggregation used**

In order to facilitate the analysis and identify common trends, some aggregations were performed at the company level, namely concerning companies' size and activity sector.

### **2.2.1 Size dimensions**

The size classes considered herein are based on the European Commission Recommendation of 6 May 2003 related to the definition of micro, small and medium sized companies.

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<sup>3</sup> See *Simplified Reporting: Inclusion of the Simplified Corporate Information in the Statistics on Non-Financial Corporations from the Central Balance-Sheet Database* (<http://www.bportugal.pt/en-US/Estatisticas/PublicacoesEstatisticas/Tumbnails%20List%20Template/sup-be-1-2008-en.pdf>) for more details about the CBSD.

<sup>4</sup> Potential liabilities consist chiefly of the situations that constitute 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.

<sup>5</sup> Banks, savings banks, mutual agricultural credit banks, credit institutions, specialised consumer finance companies, leasing companies, factoring companies and credit card issuing or managing companies.

<sup>6</sup> In 2009 financial institutions assessed data on more than 7 million borrowers (non-financial corporations and households) in the CCR.

<sup>7</sup> See *A New Source for Monetary and Financial Statistics: the Central Credit Register* (<http://www.bportugal.pt/en-US/Estatisticas/PublicacoesEstatisticas/Tumbnails%20List%20Template/sup-be-1-2005-en.pdf>) for more details about the CCR.

**Table 2 – Definition of micro, small and medium sized companies**

Enterprise category	Employees	Turnover		Balance-sheet total
Medium sized	<250	≤ €50 million	or	≤ €43 million
Small	<50	≤ €10 million		≤ €10 million
Micro	<10	≤ €2 million		≤ €2 million

Source: European Commission

In many studies these three categories are taken together as SME. Given that in Portugal micro companies account for the large majority of firms it was decided to treat them as an autonomous group in order to enable the identification of their specific characteristics. Accordingly, this study has adopted three categories: micro companies, small and medium sized companies (SME), which entails both classes referred to in the EC Recommendation, and large sized companies, which are considered to be those who are above the thresholds mentioned in table 2.

### 2.2.2 Activity dimensions

The business segments considered throughout this analysis are those foreseen for NFC in the 3rd revision of the Portuguese Economic Activity Classification (CAE rev3) that is equivalent to NACE Rev. 2. Nevertheless, in order to simplify the activity sector analysis, it was made an aggregation which, although based on NACE Rev. 2 Section codes, only comprises five categories, as shown in table 3.

**Table 3 – Categories considered in the business segments classification  
NACE Rev. 2**

NACE Rev. 2 Section	Description	Additional categories
<b>A</b>	Agriculture, Forestry and Fishing	Agriculture and Fishing
<b>B</b>	Mining and Quarrying	Manufacturing Industries
<b>C</b>	Manufacturing	
<b>D</b>	Electricity, Gas, Steam and Air Conditioning Supply	
<b>E</b>	Water supply, Sewerage, Waste Management and Remediation Activities	
<b>F</b>	Construction	Construction
<b>G</b>	Wholesale and Retail Trade, Repair of Motor Vehicles and Motorcycles	Trade
<b>H</b>	Transportation and Storage	Other Services
<b>I</b>	Accommodation and Food Service Activities	
<b>J</b>	Information and Communication	
<b>L</b>	Real Estate Activities	
<b>M</b>	Professional, Scientific and Technical Activities	
<b>N</b>	Administrative and Support Service Activities	
<b>P</b>	Education	
<b>Q</b>	Human Health and Social Work Activities	
<b>R</b>	Arts, Entertainment and Recreation	
<b>S</b>	Other Service Activities	

Source: NACE Rev.2 – Statistical classification of economic activities in the European Community, Eurostat, 2008

### **2.3 Method of adjusting financial indicators**

In order to unveil the respective influence of the firm's size and activity sector on the firm's financial structure, the financial indicators taken from the CBSD and CCR were adjusted.

For the size effect, the adjustment consists in imposing on each size class the same sectoral structure as that observed at aggregate level (taking all size classes together). In analytical terms, that is expressed as:

$$Y(d)_t = \sum_s y(d)_{s,t} \cdot w_{s,t}$$

Where:

$Y(d)$  = aggregate value of the variable at the size class  $d$  level

$y(d)_s$  = individual value of the variable at the size class  $d$  – sector  $s$  level

$w_s$  = weight of each sector in total value added (taking all size classes together)

$s = 1, \dots, S$  sectors

$d = 1, \dots, D$  size classes

$t = 1, \dots, T$  years

To reveal the sector effect, the adjustment means considering that the class structure within each sector is equivalent to that observed at aggregate level (taking all sectors together), expressed as:

$$Y(s)_t = \sum_d y(s)_{d,t} \cdot w_{d,t}$$

## **3. The Portuguese non-financial corporations sector – a macro statistics approach**

The NFC sector plays a major role in the Portuguese economy. Indeed, in 2009 NFC were responsible for more than two thirds of the employment and more than half of the gross value added of the Portuguese economy.

### **3.1. Companies structure**

This sector is composed essentially by very small firms<sup>8</sup>, as they represent 87 p.c. of the total although in terms of employment and turnover they stand for only 26 p.c. and 15 p.c., respectively. With large companies the opposite situation takes place. With a weight of less than 1 p.c. in number, they stand for 27 p.c. of employment and 42 p.c. of turnover. SME hold, however, the largest share of persons employed (47 p.c.) and turnover (43 p.c.).

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<sup>8</sup> This analysis does not consider self-employed businessmen as they are, for statistical purposes, part of the household sector.

**Table 4 – Non-financial corporations sector structure, by size and by activity sector (2008)**  
In per cent

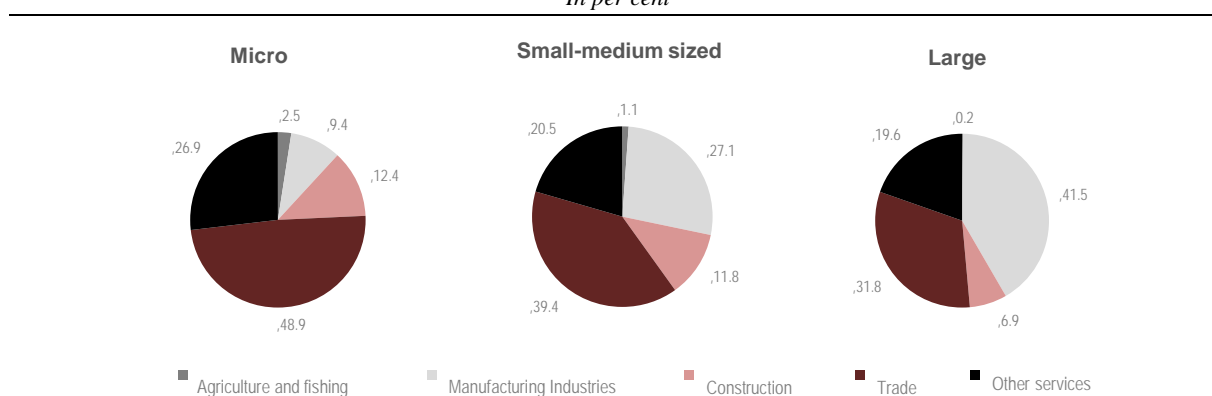
	Nr. of NFC	Employees	Turnover
<b>By size dimension</b>			
Large	0.3	27.4	41.9
Small and medium sized	13.2	46.6	42.8
Micro	86.5	26.0	15.3
<b>By economic activity</b>			
Agriculture and fishing	2.5	1.5	0.9
Manufacturing industries	11.9	25.4	29.4
Construction	13.6	13.7	9.6
Trade	27.3	20.6	36.4
Other services	44.7	38.8	23.7

Source: Banco de Portugal

From an economic activity perspective, the services sectors emerge as the most relevant no matter the indicator being considered. When “trade” and “other services” are merged, they represent 72 p.c. of the companies, 59 p.c. of total employment and 60 p.c. of total turnover. “Construction” and “manufacturing industries” are balanced in terms of number of companies, yet the second clearly dominates in number of persons employed (25 p.c against 14 p.c) and turnover (29 p.c. against 10 p.c.). The primary sector is nowadays almost inexistent (table 4).

Combining dimensions - size and activity sector - and focusing on turnover, it is clear the large relevance that “trade” has in all size aggregations although its influence decreases with company size (figure 2). Indeed, for micro companies and SME, “trade” is the most relevant activity with almost half of the total turnover for the former and 39 p.c. for the later. For large companies it appears only as the second most relevant with 32 p.c.

**Figure 2 – Structure of the non-financial corporations turnover by size and by activity sector (2008)**  
In per cent



Source: Banco de Portugal

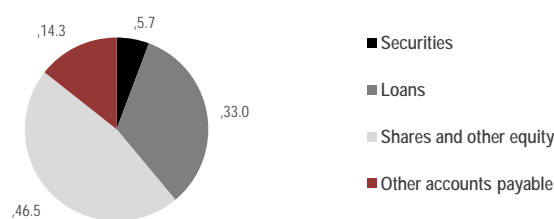
“Manufacturing industries”, being in general a sector involving large investments, shows the opposite trend, increasing its relevance in total turnover with the firm’s size, having the highest weight for large companies (42 p.c.). “Other services” are balanced across size dimensions with a slight bias

towards smaller companies while “construction” is about two times more relevant in micro and SME than in large firms.

### 3.2. Funding structure

Financial Accounts data show that own funds represent almost half of the total value (47 p.c.) followed by loans (33 p.c.) and other accounts payable, which include trade credits and advances (figure 3). The share of debt securities (6 p.c.) demonstrates the small relevance that this instrument has for Portuguese firms.

**Figure 3 – Non-financial corporations’ liabilities structure (2009)**  
In per cent



Sources: Financial Accounts, Banco de Portugal

Comparing the actual structure with the one existing at the beginning of the decade, financial debt (loans and securities other than shares) increased its weight by 7 p.p. while own funds and trade credits reduced by 3 p.p. and 2 p.p., respectively. The boost in debt can be seen by the large increase in the financial debt ratio<sup>9</sup>, which has moved from 65 p.c. in the year 2000 to 83 p.c. in 2009.

This increase in debt also had effects on the maturity structure. In the year 2000, the weight of long term financial debt in total financial debt was 72 p.c. while in 2009 it rose to 78 p.c. However, it is interesting to notice that this is due to the large weight that loans have in total financial debt given that in the case of securities other than shares, in the same period, the short term component increased its relevance from 43 p.c. to 56 p.c. essentially due to higher amounts of issued commercial paper. The increased relevance of this instrument can be explained in part by the problems associated with the issue of debt securities at longer terms in the most recent periods.

Given this liabilities structure, it is important to know which sectors are financing the NFC. Analysing whom-to-whom tables, also derived from Financial Accounts, it is possible to see that more than 62 p.c. of the funding is coming from other institutional sectors with emphasis on the Financial Sector with a share of 42 p.c. of this value while the Rest of the World and Households represent around 29 p.c. and 27 p.c., respectively.

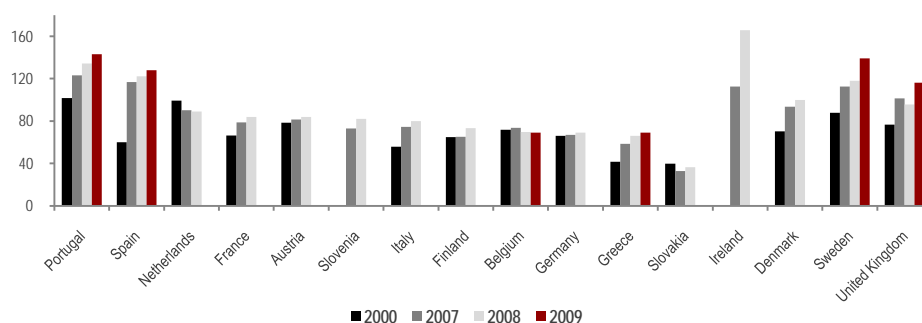
Detailing by instrument, debt securities are mainly in the hands of the Financial Sector (55 p.c.) and Rest of the World (42 p.c.). The largest component of loans is granted by the resident Financial Sector (55 p.c.). Concerning shares and other equity, more than 45 p.c. are in the hands of other companies inside the NFC sector (45 p.c.), Households detain 25 p.c. and the Rest of the World 20 p.c.

<sup>9</sup> Ratio between financial debt and shares and other equity.



Focusing only on the magnitude of other sectors' exposure to NFC, through the consolidated financial debt it is possible to verify that, at the end of 2009, the indebtedness of NFC to other institutional sectors in instruments paying interest amounted to 143 p.c. of GDP, one of the highest in the euro area. This comparatively high level of debt is recurrent but, as figure 4 demonstrates, the gap to most of the other countries has widened in these last ten years.

**Figure 4 – Non-financial corporations' financial debt**  
As a percentage of GDP



**Note:** Consolidated amounts except for Ireland and the United Kingdom  
**Source:** EUROSTAT

Within a framework of a meaningful differentiation of sovereign risk at international level, with the Portuguese Republic rating under downward revision, firms will probably face more constraints to accessing debt markets and bank financing, namely by incurring higher costs. The high indebtedness level and the prevalence of credits with rates indexed to money market interest rates makes Portuguese NFC even more vulnerable to this situation. Given that, for Portuguese firms, bank loans represent a significant share of the financial debt, this instrument interest rate can be a key indicator to analyse NFC funding costs.

### 3.3. Funding cost

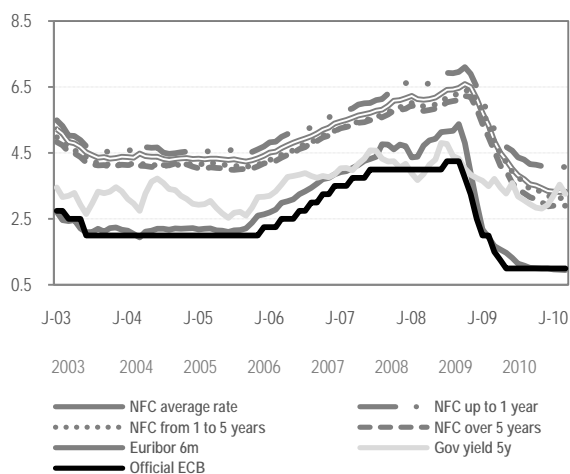
The ECB, along with the euro area national central banks, publishes, on a monthly basis, data on a set of euro area interest rates on lending business. These Monetary Financial Institutions (MFI) Interest Rate statistics (MIR)<sup>10</sup> provide a comprehensive, detailed and harmonised picture of the level of interest rates applied by the MFI, and their changes over time. They are particularly useful to analyse the monetary policy transmission mechanism, especially the extent of the pass-through of official rates to the lending and deposit rates paid and received by the Households and NFC.

The interest rate on outstanding amounts of loans granted to NFC reflects the weighted average interest rate applied by MFI to the stock of these loans in a certain time reference period. It covers all loans used and not yet repaid by customers in all the periods up to and including the reporting date, although excluding bad loans and loans for debt restructuring at rates below market conditions. The figures for individual countries reflect loans granted by the resident banking sector to all companies resident in the euro area.

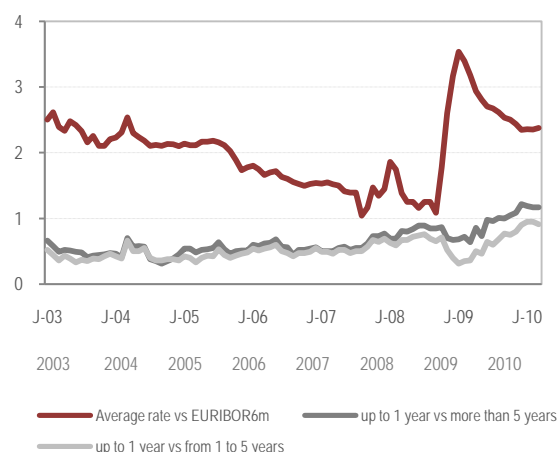
<sup>10</sup> These statistics are covered by the Regulation (EC) No 290/2009 of the ECB, of 31 March 2009, amending Regulation (EC) No 63/2002.

Figure 5 demonstrates that the average interest rate on outstanding amounts of loans granted by MFI to NFC closely follows the market interest rates' behaviour, here represented by the six month EURIBOR. It is also noticeable that the spread between both rates shrank until the first tensions in the financial sector were felt in summer 2007.

**Figure 5 – Interest rates**  
In per cent



**Figure 6 – Non-financial corporations' interest rate spreads**  
In percentage points



Sources: Banco de Portugal, author's calculations

With the Lehman Brothers bankruptcy in September 2008, and all the turbulence that it provoked in financial markets, central banks started a substantial cut in their official interest rates in an effort to pull down market rates, which eventually happened. Nevertheless, although more than 98 p.c. of the new loans granted to NFC are with initial rate fixation up to one year, the fast decline in market rates was not immediately reflected to the total stock of loans. Given this, between September 2008 and January 2009 the spread between these rates increased markedly (figure 6). Since that date, it has started to decrease again although, in the latest months, it has remained flat, probably reflecting more careful behaviour from the banks.

Also from figure 5 it is possible to see that, even with the referred link of NFC loans to short term interbank rates, credits with shorter maturity pay higher rates. That differential in costs between short and medium and long term loans has also increased in the latest periods<sup>11</sup>.

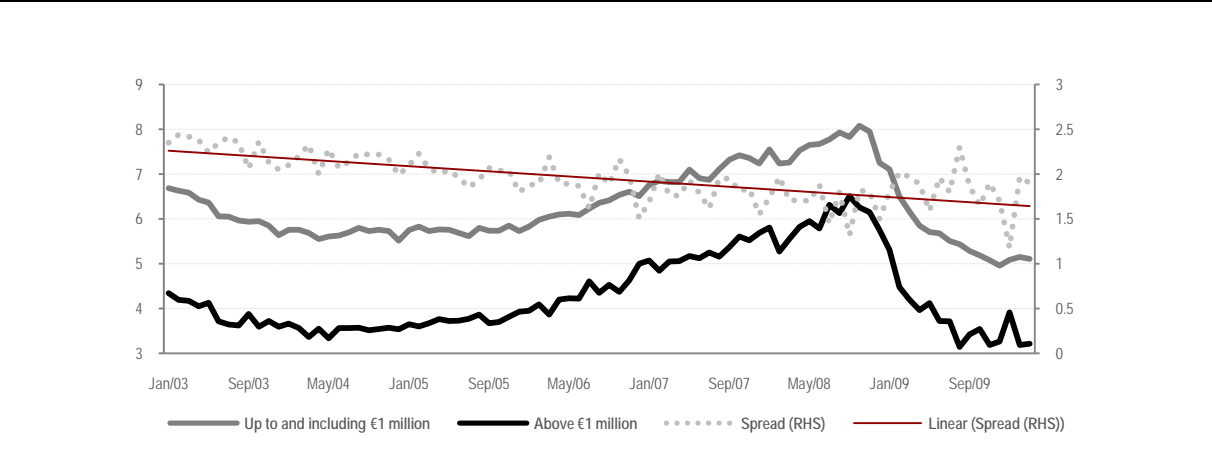
MIR statistics also include figures on new operations from which it is possible to gain a better idea of the interest rate level being currently applied by banks. In these statistics, for NFC, a distinction is drawn between loans above and below €1 million in order to have an approximation to the effect of the company size on the interest rate level. As can be seen from figure 7, larger loans have smaller interest rates along the entire series.

Rates on larger amounts present significant volatility - due to the impact that some large operations have on the average rate - making the spread highly variable. Nevertheless, adding a linear

<sup>11</sup> Another remarkable feature that can also be seen in figure 5 relates to the most recent events in sovereign debt markets and how they managed to pull the government bond yields above the average interest rate paid by banks on bank loans.

trend to it, it is possible to detect that this differential has been presenting a slightly downward tendency. In January 2003 it was 2.4 p.p. while in December 2009 it stood at 1.7 p.p.

**Figure 7 – Interest rates on new loans to non-financial corporations**  
*In per cent*



Sources: Banco de Portugal, author’s calculations

This section presented, by means of traditional macro statistics, the NFC sector structure, funding sources and related costs. One of the points highlighted here relates to the high indebtedness level presented by NFC which is a major source of concern in the current difficult economic context, marked by credit restrictions to the Portuguese economy.

This situation will surely have negative impacts on many firms. In order to support economic growth, policy makers are expected to intervene and for that, they need to be aware of which subgroups of companies and instruments must be targeted, a goal which can only be accomplished if more detailed data is available.

The conclusions presented here, being based on macro figures, mask all scope of heterogeneous behaviour than can be found by looking into smaller subsets of companies. The relevant issue then, is to ascertain if these conclusions are in fact valid for all types of companies. Are smaller companies paying similar interest rates to the larger ones? Do all activity sectors use the same funding sources? Which companies are riskier in terms of credit? All these questions are difficult to answer based on aggregate figures and the cost of collecting additional, more detailed, data is high. The next two sections of this paper show how these questions can be addressed in a cost effective way by using existing administrative micro databases.

**4. Micro databases – complementing traditional macro statistics**

National accounts provide a full picture of the transactions and financial positions of institutional sectors in a country. They enable a comprehensive analysis of the links between financial and non-financial developments in the economy and the relationships between the various institutional sectors.

MIR statistics provide a comprehensive, detailed and harmonised statistical picture of the level of interest rates applied by the MFI, and their changes over time. They facilitate the analysis of the transmission mechanism of monetary policy, especially the extent of the pass-through of official rates to the lending and deposit rates paid and received by the Households and NFC.

Both statistics, however, only allow analysis at a high aggregation level making it impossible to identify important heterogeneities existing inside institutional sectors. This section, with the help of micro data, deepens the analysis by showing additional details by activity sector and company size. The use of CBSD and CCR data to complement Financial Accounts and MIR statistics reveals the usefulness of administrative databases in overcoming the lack of more detailed data on the NFC balance-sheet position and funding cost. It is worth mentioning that the additional information obtained from these databases does not imply overburdening of reporting agents given that these are administrative tools created mainly for other purposes. Yet, in recent years, that information has started being treated and employed also for statistical purposes. This additional usage has also carried large benefits in terms of the quality of those databases. Indeed, the thorough statistical use demands detailed quality control of the basic registries, often implying crosschecks with other statistical sources. Any inconsistency detected needs to be explained, resulting quite often in error correction.

The conclusions derived from this analysis are notably relevant in a context marked by an economic crisis and among fears that NFC access to credit is being restricted.

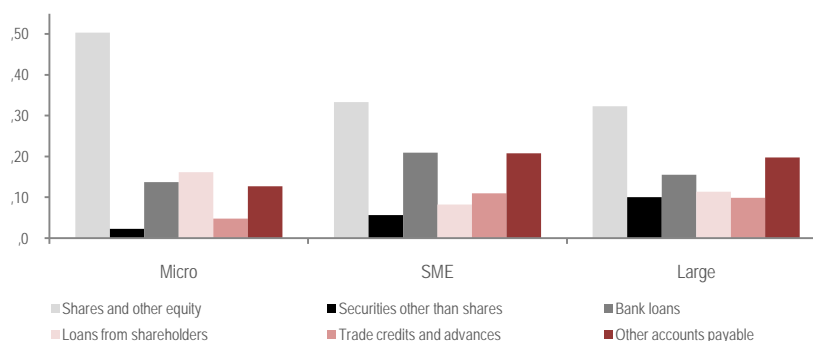
#### ***4.1. Balance-sheet data***

Decomposing the funding structure into three size classes immediately highlights some relevant disparities (figure 8). Larger companies are the ones presenting more diversified funding sources as their dependence on the various instruments is more balanced. Going to the instrument detail, although own funds is the major funding source for all groups its relative weight varies deeply. For micro companies it represents 50 p.c. while for large companies, the same component weight drops to 32 p.c. This shareholder dependence showed by micro companies is also evident in the weight of loans granted by their capital owners (16 p.c.) that compares with 8 p.c. for SME and 11 p.c. for large companies.

Another important funding source is financial debt (excluding loans granted by shareholders). Breaking down this component, it is clear that bank loans are the most relevant source of funding for all companies, with some emphasis on SME, where it reaches 21 p.c. of total liabilities. The balance between loans and securities other than shares, as a source of funding, grows with company size. Indeed, for micro companies the difference between the two instruments is 12 p.p. (2 p.c. for securities and 14 p.c. for bank loans) while for large it goes down to 6 p.p. (10 p.c. for securities and 16 p.c. for bank loans).

Trade credit and advances are twice as relevant for SME and larger companies than for micro companies. Remaining debt, including diversified components such as taxes, accruals and deferrals and other debtors, is also less relevant in micro companies.

**Figure 8 – Non-financial corporations' liabilities structure, by company size (2008)**  
As a percentage of the total

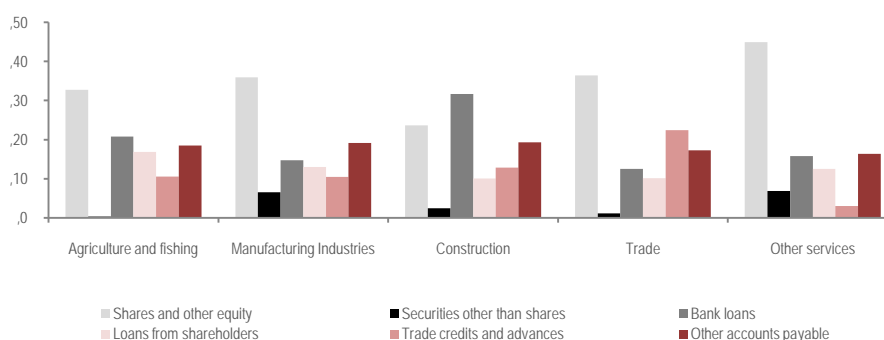


Source: CBSD, Banco de Portugal

The same analysis can be made by activity sector. Figure 9 compares the financial structure indicators in the five activity sectors used in this study: agriculture and fishing; manufacturing industries; construction; trade and other services.

The first important remark highlighted by the graph is that bank loans are the major source of funding for “construction” while for all the remaining activities it is own funds. Securities other than shares only present some relevance for the “manufacturing industries” sector and “other services”, while for “trade” and especially for “agriculture and fishing” these are almost inexistent. The remaining instruments present some equilibrium between activities with the main highlights being the higher significance of trade credits for the “trade” sector and loans from shareholders in “agriculture and fishing”.

**Figure 9 – Non-financial corporations' liabilities structure, by activity sector (2008)**  
As a percentage of the total



Source: CBSD, Banco de Portugal

All this analysis directly based on the figures reported by firms can be biased if there is a large concentration of a certain activity in one particular company size group, or vice-versa. A great advantage of using individual balance-sheet data is that it enables one to detect and control specific effects. The remainder of this section takes activity sector and companies' size composition into consideration.

### 4.1.1. Size dimension

Various points suggest that small firms financing methods differ from those used by larger firms, or may even be subject to financial constraints<sup>12</sup>. Problems of information asymmetry are probably more significant in the case of small firms, which often suffer from a degree of information opacity in the sense that they don't face such an intense scrutiny as listed and larger companies. Therefore, it is usually harder for small companies to build a reputation ending up, most of the time, being judged by the average behaviour.

Information asymmetry entails costs (screening, contracting, monitoring costs, etc.) for the lender and those often have a large fixed component, making the average cost decline for larger borrowers and encouraging the banks to prefer larger customers. Small firms generally also have relatively fewer assets available to use as collateral, to protect creditors against adverse selection or moral hazard problems and clearly have less bargaining power than larger companies.

The previous analysis, being based on data taken directly from the companies' accounts, may imply that some of the figures are biased by the activity distribution existing in each class. That is, some results may be mainly reflecting the characteristics of an activity that has more weight in that company's size group. To overcome this situation, all indicators presented in this section were adjusted for the activity sector effects by using the method described in section 2.3.

Table 5 presents a set of selected financial ratios that, by synthesising information provided by the financial statements, are useful indicators of firms' performance and financial situation.

**Table 5 – Financial ratios, by company size**  
3 year (2006-2008) average adjusted for activity effects; in per cent

	Micro	SME	Large
<b>Debt to equity</b>	188.0	220.6	260.0
<b>Financial debt/Turnover</b>	87.4	56.4	40.0
<b>Weight of long term financial debt on total financial debt</b>	51.5	61.8	59.0
<b>Days in receivables</b>	106.5	99.1	74.4
<b>Days in accounts payable</b>	122.3	90.5	77.3
<b>Cost of debt</b>	11.3	5.1	4.4
<b>EBITDA/Interest and similar charges</b>	124.1	242.8	289.6
<b>Liquidity ratio (current ratio)</b>	121.2	125.9	107.8
<b>Reduced liquidity ratio (quick ratio)</b>	81.3	89.7	88.2
<b>Return on Assets (ROA)</b>	7.0	5.1	5.4

Sources: Banco de Portugal, author's calculations

The first conclusion that can be derived from the indicators presented in table 5 is that Portuguese firms are highly leveraged with that effect growing with the company size. Indeed, adjusting for the activity sector effects, the debt-to-equity ratios are 188 p.c. for micro companies, 221 p.c. for SME and 260 p.c. for large companies.

<sup>12</sup> The Flash Eurobarometer 174/184 – SME access to finance - conducted in 2006 by the European Commission showed that a considerable proportion of small and medium sized enterprises did not have enough financing to enable them to complete their projects.

Higher leverage increases the potential return of the company, but also the risk. Assuming everything else remains constant, if the Return on Assets (ROA) of the company is greater than the rate of its financing, then the Return on Equity (ROE) will be greater than it would if the company was not leveraged. Conversely, if the company's ROA is lower than the interest rate on its financing, then the ROE will be lower than it would if the company was not leveraged.

According to the available data, the leverage effect seems to be particularly positive for larger companies while for micro companies it appears to be negative. Indeed, for large companies the implicit interest rate<sup>13</sup> on financial debt is 4.4 p.c. while ROA stands at 5.4 p.c., whilst for micro the values are 11.3 p.c. and 7 p.c., respectively. The easier access larger companies have to debt markets seems to enable them to benefit from a leverage effect. In any case, the high dependence on debt is also a source of risk particularly in a crisis context where the ROA may well be affected negatively.

Given the high debt level presented by Portuguese NFC it is important to examine their ability to meet their financial obligations. Bearing in mind that financial debt has a higher weight in larger companies' financing structure, it is noteworthy that for this size class it represents only 40 p.c. of total turnover while for micro companies it reaches 87 p.c. Also from table 5, it is possible to verify that for micro companies only 52 p.c. of the debt has a long term maturity, compared to 59 p.c. for large and 62 p.c. for SME. These figures show that a large portion of micro companies' debt has to be paid, or revolved, briefly.

Liquidity ratios can help assess their ability to meet their immediate financial obligations. As table 5 demonstrates, all groups present current ratios above 100 p.c. meaning they have enough liquidity to cover short term liabilities. Comparing across dimensions it is possible to see that larger firms are the ones presenting lower values for that indicator (108 p.c.). However, focusing on the quick ratio<sup>14</sup> the values are more balanced between segments with the micro companies being now the ones appearing with the lowest value (81 p.c.). It is clear then, that the higher liquidity showed by smaller companies through the current ratio is due to inventories which quite often include items that are not that easy to transform into money.

Besides the repayment of the credit, companies also have to be able to pay the associated costs. The interest coverage ratio, obtained by dividing EBITDA by interest costs, indicates how well the firms' operational earnings can cover the interest payments on their debt. There is a clear difference between the capacities shown by different groups of firms, with micro companies showing the lowest coverage (124 p.c.) while SME and especially larger companies present a more comfortable situation (243 p.c. and 290 p.c., respectively).

The CBSD also allows the calculation of days in receivables and in accounts payable. This information clearly demonstrates that the time lag used for payments and receivables has a negative correspondence with the companies' size, with the difference between micro and large companies reaching 32 days for receivables and 45 days for payments. These figures also indicate that micro companies manage to finance themselves by trade credit, in net terms<sup>15</sup>. On average they take 122 days to pay their accounts while they manage to receive in 107 days. By this analysis, it is also

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<sup>13</sup> The rate is obtained by the ratio of all interest costs and the financial debt taken directly from the CBSD. This rate is merely indicative as its calculation has some methodological drawbacks. Section 4.2 identifies some of these shortcomings and presents another funding cost estimation method.

<sup>14</sup> The quick ratio, often referred to as the acid test, removes inventories from current assets in the liquidity ratio numerator.

<sup>15</sup> This is indeed an important funding source given that in general bears no interest costs.

possible to see that SME have the opposite situation (99 days to receive and 91 to pay) while for large companies both maturities are balanced.

In brief, the figures presented in this section indicate that micro companies are the group showing a more fragile financial situation. Indeed, these companies present a high indebtedness level with a large portion having short term maturity, meaning that many of these loans will have to be paid or renegotiated briefly. Given that the debt incurring interest payment covers 87 p.c. of the turnover, paying their loans immediately would imply a big effort for these firms. The option then would have to be renegotiating. However, in a context of restrictions to credit access this option also brings concerns. Indeed, given that currently interest costs already cover a large part of the operational earnings, it will be difficult to support higher interest levels. Commercial credit seems to be the better source of funding for micro companies. In any case, their bargaining power is probably small making it difficult to continue to benefit from this source of finance if larger companies feel serious problems in getting credit through their usual channels.

#### 4.1.2. Sectoral Dimension

This section presents figures at the sectoral level in order to detect if the aggregate indebtedness is comparatively high due to a widespread and uniform use of external resources in all activity sectors, or whether, by contrast, it happens in only some of them. To better understand the funding structures it is necessary to disentangle the size effect from them. Table 6 presents a set of selected financial ratios adjusted for this effect using the methodology presented in section 2.3.

**Table 6 – Financial ratios, by activity sector**  
3 year (2006-2008) average adjusted for activity effects; in per cent

	Agriculture and fishing	Manufacturing industries	Construction	Trade	Other services
Debt to equity	163.1	207.0	324.3	210.6	236.0
Financial debt/Turnover	37.6	28.1	60.9	9.8	97.4
Weight of long term financial debt on total financial debt	53.2	49.8	59.3	34.6	64.5
Days in receivables	100.7	96.0	121.8	66.9	88.6
Days in accounts payable	109.7	90.5	126.5	70.7	88.8
Cost of debt	3.1	3.9	5.4	2.5	9.1
EBITDA/Interest and similar charges	390.5	293.9	179.7	257.6	209.5
Liquidity ratio (current ratio)	140.2	114.3	159.4	130.6	101.5
Reduced liquidity ratio (quick ratio)	84.2	84.4	92.3	93.2	86.5
Return on Assets (ROA)	4.0	4.9	4.0	5.8	6.3

Sources: Banco de Portugal, author's calculations

From the leverage point of view, it is clear that all sectors rely more on debt than on own funds. Here, “agriculture and fishing” and “construction” are noted for being in opposite positions. The former presents a debt-to-equity ratio of 163 p.c., being the activity relying more on own funds, while the later, with a ratio of 324 p.c., which is by far the highest among all activities, shows that on average these companies funding structure depends over three times more on external finance than on own funds.



Comparing “construction” sector ROA (4.0 p.c.) with its implicit cost of debt (5.4 p.c.) it appears that the leverage effect is negatively affecting the sector’s profitability. A similar situation is happening in the “other services” sector<sup>16</sup>, while for all the other activities the leverage effect seems to be positive.

Knowing that the “construction” sector depends heavily on financial debt as a source of finance, it is interesting to notice, however, that this debt has a higher weight in “other services” turnover (97 p.c.) than in “construction” (61 p.c.). The opposite scenario can be found in the “trade” sector, where financial debt represents only 10 p.c. of the turnover, which is probably explained by its more intensive use of trade credit.

The interest coverage ratio, given by the ratio EBITDA to interest and similar charges, also shows that “construction” and “other services” are the sectors presenting the lower coverage of interest expenses by operational earnings (180 p.c. and 210 p.c., respectively).

In terms of liquidity, from the current ratio values it is possible to see that, on average, all activities have enough liquid assets to cover their short term liabilities, with “construction”, “agriculture and fishing” and “trade” presenting higher coverage. Removing inventories, to consider the most liquid assets only, the ratios drop below 100 p.c., showing however more equilibrium between activities.

Concerning commercial credit, a noteworthy feature is the balanced values presented in days in receivables and payables by most of the activities, when the size effect is controlled. This indicates that, on average, most of the sectors cannot finance themselves, in net terms, by trade credit. The results also show that the larger delays in this credit are verified in “construction” (122 days for payments and 127 for receivables) and the lower ones happen in “trade” (67 days for payments and 71 for receivables).

Summing up, “construction” stands out in most indicators by presenting a somewhat more vulnerable financial situation. This is particularly patent in its high indebtedness level, associated with a negative leverage effect, and by the large proportion of its operational revenues being channelled to cover interest costs.

## **4.2. Funding cost**

Given the high dependence shown by Portuguese firms on debt it is important to evaluate its cost. In section 3, this institutional sector aggregate funding cost was examined using MIR statistics. Here, using data available from the CBSD and CCR, MIR figures are disaggregated, namely to identify the effect owed to the company size and activity sector.

To perform this study we need for each individual company, a proxy of the interest rate paid on loans granted by MFI. In the accounting report to the CBSD, NFC are asked to provide the total amount of interest paid to banks for their loans. This is an item from the profit and loss account and so it comes as a flow, i.e., gives the total amount of interest paid during one year to banks, and it will be used in the numerator to calculate the interest rate.

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<sup>16</sup> Highly affected by real estate activities.

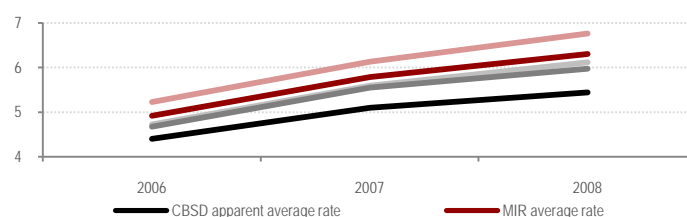
In the denominator, the corresponding amount of loans during the year is needed. From the CBSD it is only possible to obtain the outstanding amount at year end as this data comes as a stock from the accounting balance-sheet. Besides that, it also does not discriminate banks from other credit institutions. These are two major setbacks. First, by having only outstanding amounts at year end, it is likely there will be incoherencies between this value and the total amount of interest paid during the year. An example would be a company that had a significant amount of loans during the year but in December, in order to publicise lower indebtedness, paid back a significant portion of the credit. Using the data from the CBSD, this company would present a high level of interest paid to a low amount of received loans creating an abnormal estimated interest rate. Second, the fact that the CBSD does not isolate MFI from all other credit institutions would imply a lower estimated interest rate, if those values were used. The size of this effect depends on the weight of loans granted by MFI in the total loans granted by credit institutions.

In order to solve these problems, CCR data on monthly loans granted by banks to NFC is used<sup>17</sup>. Given that this database has individual information on the lending institution, it enables the creation of any needed aggregation. Thus, using this monthly average as the denominator in the interest rate calculation completely unravels the problem of differentiating MFI from other credit institutions and also reduces substantially the problem of loans with very short maturity appearing in the component of interest paid but not in loans received.

There are other methodological differences worth mentioning. First, MIR considers all companies in the euro area, while here only those resident in Portugal are taken into consideration. Also the interest reported in the CBSD includes loans received in other countries while MIR does not. Finally, MIR excludes bad loans and loans for debt restructuring at rates below market conditions, while the CBSD does not.

Figure 10 presents the aggregate values obtained by using CBSD methodology along with the ones published by MIR for the period 2006-2008. All rates show similar increasing behaviour along the period with the difference in levels being mostly explained by the above mentioned methodological differences.

*Figure 10 – Interest rates on bank loans' outstanding amounts  
In per cent*



Sources: Banco de Portugal, author's calculations

These rates are broken down in the next two sections. First, by firm size, controlling for activity effects and later for activity sector, controlling for companies' size effects.

<sup>17</sup> Data from both data sources can be assembled given that both use companies' fiscal number as a unique identifying code.

### 4.2.1. Size dimension

Some arguments defending the view that smaller companies tend to face more constraints in order to obtain external finance were already mentioned. The analysis of the figures presented in table 7, where loan interest rates are broken down by company size and adjusted for activity sector effects, helps us to understand that this is indeed the case in Portugal for bank loans.

For the period under analysis, the interest rate has a negative association with the companies' size. In 2008, for example, the average interest rates were: 6.23 p.c. for micro companies, 5.64 p.c. for SME and 4.79 p.c. for large companies.

*Table 7 – Apparent interest rates on bank loans' outstanding amounts, by company size  
Adjusted for activity effects; in per cent*

	2006	2007	2008
<b>Micro</b>	5.37	5.78	6.23
<b>SME</b>	4.52	5.10	5.64
<b>Large</b>	4.53	5.00	4.79

Sources: Banco de Portugal, author's calculations

These figures support the idea that the cost of loans is one of the constraints faced by smaller firms which can possibly help explain the lower weight of this type of funding on their balance-sheet when compared to the larger companies.

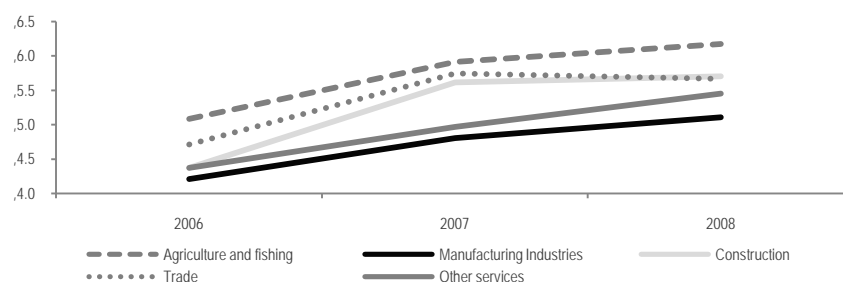
Section 3 showed how MIR statistics on new business use loan size as an approximation to company size. It was clear from the results that higher amount loans pay lower interest rates. The numbers presented here can also be used to support that approximation.

### 4.2.2. Sectoral dimension

Using the available micro data it is also possible to detail interest rates based on a sectoral perspective. The primary sector is clearly the one facing higher interest rates on its bank loans. This is a sector with very low relevance in the Portuguese economy and it is usually associated with low profitability, being very reliant on government support and extremely risky in the sense that it is highly dependent on unpredictable climatic events. Against this background it is very likely that banks charge higher spreads to these companies in order to deal with the perceived risk.

The “manufacturing industries” sector seems to be the one paying lower rates. The explanation probably lies in the fact that companies in this sector usually need large investments in fixed assets, which makes them more attractive for banks as they possess more assets to use as collateral. In addition, this sector, unlike “agriculture and fishing”, is usually associated with higher profitabilities.

**Figure 11 – Apparent interest rates on bank loans’ outstanding amounts, by activity sector  
Adjusted for activity effects; in per cent**



Sources: Banco de Portugal, author's calculations

Concerning other sectors, the numbers are not so clear but they seem to indicate that “trade” and “construction” have faced similar costs in 2008. The evolution is however noticeable as the later starts from a lower level in 2006 (4.37 p.c. against 4.71 p.c.) and ends up in 2008 with a slightly higher rate (5.70 p.c. against 5.67 p.c.). This is probably consequence of the negative impact of the economic crisis on construction companies that resulted in a boost in their default levels<sup>18</sup>. Likely, banks started to be more cautious and this was reflected in higher spreads charged to this sector. “Other services” present through the period a somewhat lower rate.

## 5. Financial stability – going deeper

The figures presented in section 3 highlighted the NFC funding structure and how it is financed by other institutional sectors. For financial stability analysis, the quality of these exposures is a major concern, particularly in a setting characterised by the acceleration of fiscal consolidation and a significant sovereign risk differentiation that are expected to carry higher short term costs to economic activity and greater materialisation of credit risk.

This section, focusing on bank loans, illustrates how the micro databases used in this study can also be used to complement and validate the aggregate figures available through macroeconomic statistics.

### 5.1. Banks’ exposure to the non-financial corporations sector

Data from money and banking statistics show that, at the end of 2009, the credit portfolio vis-à-vis the non-monetary resident sector accounted for about 72 p.c. of the Portuguese banks’ total assets, on a consolidated basis. Of this, 41 p.c. of the loans and 45 p.c. of the securities had NFC as counterparts.

From the same source, it is possible to see that loans to NFC registered substantial growth rates until 2007, the year where the rate reached 11.2 p.c. Since then, credit has started to grow at decreasing rates, ending 2009 with a value of 1.9 p.c. (table 10). In terms of default, the aggregate figures show that the default ratio, reflecting the economic crisis, more than doubled between 2007 and 2009 (from 1.8 p.c. to 4.2 p.c. - table 8).

<sup>18</sup> NFC default level will be addressed in section 5.

Once again, it must be noticed that the analysis based on aggregate statistics hinders relevant details that can only be detected with individual data. The use of CCR information in this context illustrates the relevance of micro data. The first striking feature arising from this more detailed analysis is that, at the end of 2009, 18 p.c. of the NFC had credit in arrears (table 8). This, however, only corresponded to 4 p.c. of the total credit, meaning that most of these defaults involve very small amounts. Nevertheless, the total amount of credit granted to these firms stood for 17 p.c. of the total credit granted to NFC. This is an interesting indicator in the sense that if these companies already defaulted on some of their credits it probably means that they are facing financial problems that may well force them to default on other loans as well.

Also interesting is to see the evolution of these indicators over the last few years. As table 8 demonstrates, all those figures have been growing although presenting higher intensity in the last couple of years. For example, from 2006 to 2007 the percentage of companies in default increased roughly 2 p.p., the credit overdue only rose 6 b.p. and the total amount lent to them rose 1.5 p.p. Doing the same math for 2009, against 2008, those indicators went up by 2.2 p.p., 1.8 p.p. and 3 p.p., showing a clear credit quality deterioration.

In order to derive implications for macroeconomic and financial stability the next two sections detail these indicators by company size and activity sector.

### ***5.1.1. Size dimension***

Individual data gives the necessary flexibility to analyse the bank exposure by loan size, using CCR data, or by company size, using CBSD information.

Table 8 splits credit indicators by loan size – above (large exposures) and below (retail exposures) €1 million – to see how different was these two groups' behaviour. The first salient feature which can constitute an additional risk to the banking sector is the very high concentration of large loans to a very small percentage of companies. Indeed, 6 p.c. of the firms receive more than 79 p.c. of the total loans, or, seen from another perspective, small exposures have 21 p.c of loans value although they represent 94 p.c. of the borrowers.

In historical terms this concentration can be considered relatively benign to the banking sector as large exposures have always posted the lowest default rates and registered the smaller increases. In any case, it is important to notice that in 2009 the credit overdue in this segment doubled its size when compared to its 2008 value (1.8 p.c. to 3.6 p.c.) and also, for the first time in this series, it presents a higher percentage of companies in default than the retail segment (19 p.c. for larger exposures against 18 p.c. for retail).

**Table 8 – Default indicators of credit granted to NFC broken down by the size of the exposure**  
In per cent

	2006	2007	2008	2009
<b>Total exposure</b>				
Number of defaulters (1)	12.2	14.2	16.0	18.2
Credit overdue (2)	1.8	1.8	2.4	4.2
Total credit to defaulting NFC (2)	8.7	10.2	13.8	16.8
<b>Large exposures (higher than or equal to €1 million)</b>				
Number of borrowers (1)	5.8	5.9	6.1	6.1
Total credit in this portfolio (2)	76.8	77.9	79.3	79.5
Number of defaulters (3)	11.2	11.8	15.9	19.3
Credit overdue (4)	1.2	1.2	1.8	3.6
Total credit to defaulting NFC (4)	7.4	9.4	13.2	16.5
<b>Retail exposures (lower than €1 million)</b>				
Number of borrowers (1)	94.2	94.1	93.9	93.9
Total credit in this portfolio (2)	23.2	22.1	20.7	20.5
Number of defaulters (3)	12.3	14.3	16.0	18.1
Credit overdue (4)	3.7	4.0	4.7	6.7
Total credit to defaulting NFC (4)	12.7	13.2	16.2	18.2

Note: (1) As a percentage of the total number of borrowers, (2) As a percentage of total credit, (3) As a percentage of the total number of borrowers in this portfolio, (4) As a percentage of total credit in this portfolio

Sources: Banco de Portugal, author's calculations

This split by loan dimension is often taken as a distinction between large and small companies. Using the CBSD it is possible to break down the data by company size and verify the validity of that assumption. From table 9, it is clear that the default rate decreases with the company size both for the number of companies and for credit overdue. Still, it is important to notice that the default indicators are rising in all segments. From 2008 to 2009 the weight of credit overdue almost doubled its size for SME (2.0 p.c. to 3.9 p.c.) and also for large companies (1.2 p.c. to 2.4 p.c.).

The relevance of the exposure of banks to each segment of firms through the years has been stable in number of companies. Yet, concerning the credit amount it is possible to notice a slight increase in the larger companies' significance as their weight rises from 20.7 p.c. in 2006 to 25.3 p.c. in 2009.

Comparing table 8 and table 9 it seems to be acceptable that the default indicators of large exposures show the behaviour of large companies and a subset of the SME groups, probably the medium size companies, while the retail group gets much closer to the smaller companies' behaviour.

**Table 9 – Default indicators of credit granted to NFC broken down by company size**  
In per cent

	2006	2007	2008	2009
<b>Large</b>				
Number of borrowers (1)	1.1	1.2	1.2	1.2
Total credit in this portfolio (2)	20.7	23.2	24.2	25.3
Number of defaulters (3)	9.8	10.4	13.2	16.0
Credit overdue (4)	0.8	0.7	1.2	2.4
Total credit to defaulting NFC (4)	5.9	7.3	10.3	13.0
<b>Small-medium</b>				
Number of borrowers (1)	20.8	20.3	20.0	19.7
Total credit in this portfolio (2)	52.4	51.4	50.8	49.8
Number of defaulters (3)	11.3	12.9	14.8	17.8
Credit overdue (4)	1.4	1.6	2.0	3.9
Total credit to defaulting NFC (4)	8.1	10.0	13.2	16.5
<b>Micro</b>				
Number of borrowers (1)	78.1	78.5	78.8	79.1
Total credit in this portfolio (2)	26.9	25.4	25.1	24.9
Number of defaulters (3)	12.5	14.5	16.3	18.3
Credit overdue (4)	3.2	3.4	4.6	6.7
Total credit to defaulting NFC (4)	11.9	13.3	18.5	21.4

Note: (1) As a percentage of the total number of borrowers, (2) As a percentage of total credit, (3) As a percentage of the total number of borrowers in this portfolio, (4) As a percentage of total credit in this portfolio

Sources: Banco de Portugal, author's calculations

### 5.1.2. Sectoral dimension

Table 10 presents credit growth rates detailed by selected activity branches. Here, it is interesting to see how the deceleration of loans was differentiated by sector, reflecting a gap in the transmission of shocks to different activities. Indeed, lending for activities related to real estate lose pace immediately at an early stage of the crisis. From 2007 to 2008, “construction” moved from a growth rate of 10.7 p.c. to 8.6 p.c. and “real estate activities” changed from a rate of 14.4 p.c. to 8.5 p.c. At this period many other activities were still registering increasing credit growth rates, being only affected in 2009, the period where the overwhelming majority of the activities show decreasing growth rates. This situation is perceptible in “trade, hotels and restaurants” with a slight increase in their credit growth rate in 2008, from 6.3 p.c. to 7.5 p.c., but then experiencing a marked slowdown in 2009 closing the year with a negative growth rate of 0.4 p.c.

The last column in table 10 shows that, in opposition to what happens to loan size, bank loans are not very concentrated in one activity. Although they are more centred on the services sector, when these heterogeneous activities are disaggregated, none of those represents, by itself, more than 20 p.c. of total loans. Yet, it needs to be noticed that 39 p.c. of loans are granted for activities related directly to real estate (19 p.c. for “construction” and 20 p.c. for “real estate activities”).

**Table 10 – Loans to non-financial corporations – by sector**  
Annual rates of change at end of period, in per cent

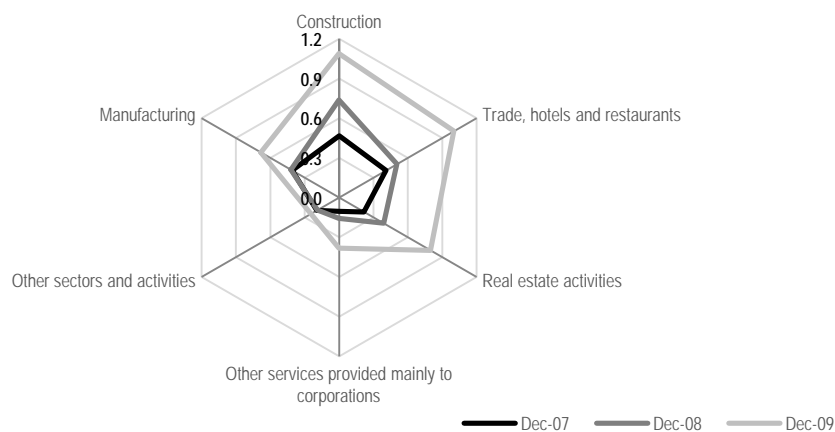
	2004	2005	2006	2007	2008	2009	Proportion in total loans (Dec. 2009)
<b>Total</b>	2.5	5.0	7.1	11.2	10.5	1.9	100.0
<b>By activity sector:</b>							
Agriculture, fishing and mining	1.8	3.6	6.4	13.6	20.3	4.0	2.2
Manufacturing	-3.8	-3.0	0.7	7.9	7.7	3.2	12.9
Electricity, gas and water	-2.0	37.9	-11.3	13.7	47.8	10.7	3.1
Construction	6.0	10.7	5.4	10.7	8.6	2.5	19.3
Trade, hotels and restaurants	2.0	3.0	7.1	6.3	7.5	-0.4	16.9
Transport, post and telecommunications	-4.5	-10.6	0.7	11.0	18.3	3.9	6.0
Real estate activities	14.0	12.0	12.9	14.4	8.5	1.3	19.7
Services provided mainly to corporations	-1.7	6.6	13.8	16.6	14.1	-2.0	14.3
Other services activities	2.9	-3.6	9.6	10.0	6.2	9.1	5.6

**Note:** Rates of change are calculated on the basis of the ratio between outstanding bank loan amounts at the end of the period and transactions calculated on the basis of balances adjusted for reclassifications. They are also adjusted for securitisation operations and write-offs/ write-downs from assets and foreign exchange and price revaluations.

**Sources:** Banco de Portugal, author's calculations

Having seen how credit is spread around different sectors, from a financial stability perspective, it is interesting to verify its default rate. Figure 12, prepared with CCR data, enables the detection of the sectors giving higher contributions to the evolution of the aggregate rate.

**Figure 12 – Sectoral contribution to the non-financial corporations' default ratio**  
In per cent



**Source:** Banco de Portugal



Companies in the “construction”, “trade, hotels and restaurants” and “real estate activities” sectors and, to a lesser extent, companies in the “manufacturing industries” had higher default ratios at the end of 2009 than those recorded by the non-financial corporations aggregate, having, this way, the largest contributions to the value of the aggregate rate (4.2 p.c).

Also in the default ratio it is possible to spot a time lag in the transmission of shocks to different sectors of activity. While the “construction” sector register a balanced increase in its contribution to the aggregate default rate through the years, loans to companies in the “trade, hotels and restaurants” and “real estate activities” sectors saw their weight increase heavily only in 2009.

## **6. Conclusion**

In a context of a deep financial and economic crisis, policy makers are compelled to intervene and for that it is crucial to have access to detailed information on the relevant subject. The recent worldwide events highlighted many data gaps that need to be addressed going beyond traditional statistical production approaches.

This paper has demonstrated how administrative micro databases can be used to complement traditional macro statistics, like national accounts or money and banking statistics, with the advantage of not overburdening reporting agents.

The main focus of the study was on understanding Portuguese corporate finance and its impact on the banking sector exposure to NFC. This analysis is particularly relevant for a country where the NFC sector presents relatively high indebtedness levels when compared to its euro area counterparts.

The individual data gathered from the two micro databases administered by *Banco de Portugal* give the flexibility to perform a thorough analysis according to the firms’ characteristics. In the course of the study, a distinction between activity sector and companies’ size was presented. These breakdowns enable the detection of company subgroups with specific behaviours and particular problems, providing meaningful information to policy makers.

An assessment of the differences between the financial position of micro, SME and larger firms requires sectoral composition effect to be controlled for. Once this has been done some differences emerge more clearly. The highlight arising from this analysis is the delicate financial situation that micro companies face. Indeed, a large component of their high indebtedness level has short term maturity, meaning that many of these loans will have to be paid or renegotiated briefly. However, the debt incurring interest payment already covers 87 p.c. of these companies’ turnover, making the option of paying back the loans immediately very costly. The other option would be to revolve those loans, yet, given the current difficult access to credit markets, which will probably imply higher costs. Bearing in mind that interest costs already cover a large part of the operational earnings, there is not much leeway to support higher interest levels.

Larger companies show more diversified funding sources. It is notorious that all company groups, no matter the size, rely more heavily on debt than on own funds, which can be a risk factor in case their access to this type of funding is restricted. Nevertheless, larger firms present higher leverage, which is probably explained by its positive effect on profitability given that the return they take from assets seems to be bigger than the cost they pay for debt. It is also possible to see that interest

payments are better covered by firms' earnings as the company size grows, indicating that larger firms are better prepared to absorb possible interest rate shocks. Another indication in this sense comes from the bank loan interest rates disaggregation, where it is clear that there is a negative relationship between these costs and the companies' size.

From a financial stability perspective, a noteworthy feature is the high concentration presented by bank loans to large companies and large amounts. Given their better financial position, this concentration can be seen as relatively benign. In any case, it must be noted that, in 2009, this segment's default indicators presented the larger proportional increases.

The funding behaviour also differs across sectors, a phenomenon explained mainly by specific characteristics of firms' activities. Construction related segments are the ones standing out in most indicators. Although all sectors are more dependent on debt than on own funds, "construction" is the only activity where, as an individual instrument, bank loans clearly overcome own funds as the major source of funding. This activity's dependence on debt is confirmed by a clearly higher debt-to-equity ratio than all the remaining groups. This can be a challenging position in the sense that the leverage effect in "construction" seems to be negative, meaning that losses are being amplified by these firms' high indebtedness. This is probably a result of the financial and economic crisis that was reflected very early in this sector with a significant decline in the credit growth rate and higher default ratios on bank loans.

The approach presented here has its merits but also its own drawbacks. The most important one is clearly the large time span between the reference date and the availability of data that, in the CBSD case, reaches seven months. The amount of data, the vast number of companies and all the necessary quality control involved makes very unlikely any relevant decrease in this time gap. Given this, the CBSD is clearly more suitable to be used for structural analysis and forecast models. The way to overcome urgent information needs is through smaller samples that can work as advanced indicators. In Portugal this is being done by a questionnaire (ITENF) that collects from a minor sample of companies a smaller set of the most relevant indicators. This data is available with a three month lag, which allows the authorities to follow the NFC sector more promptly. The results are later confirmed and complemented by the CBSD.

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# Measuring international spread of knowledge: the Portuguese technology balance of payments<sup>1</sup>

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## **1. Introduction**

In a globalising world, distances and national borders have largely diminished as most of the barriers to market entry have been removed. In this global market, transnational enterprises are a key factor through which globalisation has occurred and continues to evolve. As a result of information and communication technologies, companies have organised themselves into multinational networks in response to severe international competition and the need for strategic interactions. Foreign direct investment has contributed to a growth of technology transfers from parent companies to their partners abroad and most of these transactions correspond to operations between them. The accelerating pace of globalisation has encouraged a raise of inter-company trade in technology. The intense competition that characterises globalisation has driven more and more firms to focus on core competencies in which they benefit from competitive advantages. As a consequence of that strategy, firms are bound to

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obtain technologies and intangible assets which are essential for them but which they do not have the means to develop themselves, in many circumstances attaining them abroad.

The context of globalisation poses great challenges to statisticians, since indicators of research and development (R&D) and science and technology (S&T) are not easy to define and produce. Innovation surveys are an attempt to measure this phenomenon from the output perspective. Another option is to explore existing data sources. The Technology Balance of Payments (TBP) is one of these sources, not always broadly disseminated or well interpreted. The TBP is a sub-division of the balance of payments, compiled according to OECD guidelines, commonly used to collate invisible transactions relating to trade in technical knowledge and technology-related services between entities in different countries. In other words, the TBP measures international trade in intangible assets used in production: licenses, patents, know-how, research and technical assistance.

According to the standards defined by the OECD, there are two important forms of internationalisation of technology other than those measured by the TBP, which are not going to be covered in this document: industrial R&D and trade in high-technology products (technology embodied in goods).

The paper describes the compilation practices followed by *Banco de Portugal* for the data collection and compilation of the TBP, which are presented in chapter three, after a brief description of the main concepts and definitions in chapter two. Chapter four is devoted to an interpretation of the main figures of the Portuguese TBP, in the context of other OECD countries, and emphasis is put on its recent change of pattern. Finally, some remarks on the limitations of these statistics are presented and some suggestions are made in order to enhance its accurate interpretation.

## ***2. Definitions and standard components***

Some countries compile their TBP in the context of R&D surveys, while others do it in the framework of the balance of payments statistics (b.o.p.). There may be appointed several advantages and disadvantages in both choices. The former option may introduce distortions, particularly when surveys have inappropriate samples, for instance, with regard to technology payments, since the purchase of foreign technology concerns all firms and not just those with R&D activities. Nonetheless, in the context of the revision of the European System of National and Regional Accounts (ESA1995) there are some expectations for enlarging the scope and coverage of the R&D surveys with the aim of compiling a R&D satellite account. On the other hand, an advantage related with the existing R&D surveys would be that samples may be carefully designed to exclude some non technological transactions that may be included in b.o.p. items.

The main advantage that can be appointed in favour of the use of the b.o.p. statistics is that they are universally recognised and comply with international standards in its compilation. The *Balance of Payments Manual, 5<sup>th</sup> edition* (IMF, 1993), also known as BPM5, is a guide that provides international standards for compiling the b.o.p.. In addition, the basic definitions concerning the TBP are based on those described in the *Technology Balance of Payments Manual* (OECD, 1990). As mentioned, the TBP may be defined as a sub-division of the balance of payments – that is the case for the Portuguese TBP.

One of TBP main disadvantages is the heterogeneity of its content at country level making international comparison a difficult exercise. On the other hand, some components of the TBP may include transactions involving industrial property without significant technological content. Moreover, due to the high volume of trade between parent companies and their affiliates, there may be problems linked to “transfer pricing” i.e. the price of some technology related services can be determined by parent companies under a global strategy to transfer costs or revenues to their affiliates. Even with these and other limitations, the TBP should not be underestimated as an instrument to measure diffusion of knowledge and integration of countries into international trade of intangible assets and of technology-related services.

Three basic conditions determine whether a given transaction is to be included in the TBP: the transaction must be international, i.e. involve partners in different countries; the transaction must be commercial and involve a flow of revenue/expenditure between the partners; the transaction must concern payments relating to trade in intangible assets and/or the supply of technological services. Accordingly, the Portuguese TBP distinguishes four types of transactions, which are described in table 1.

*Table 1 – Main items of the Portuguese Technology Balance of Payments*

TBP item	B.o.p. label	Definition	Comments
Acquisition and use of royalties and license fees	Royalties and license fees <sup>3</sup> (BPM5§260)	“Royalties and license fees cover the exchange of payments and receipts between residents and non-residents for the authorised use of intangible, non-produced, non-financial assets and proprietary rights (such as patents, copyrights, trademarks, industrial processes, franchises, etc.) and with the use, through licensing agreements, of produced originals or prototypes.”	This category contains a large number of items involving technology transfers. Transactions involving non-industrial intellectual property (films, recordings, copyright materials) have to be excluded from the TBP. Similarly, software trade should be excluded, except where the software is protected as part of a patented process.
	Acquisition/disposal of non-produced, non-financial assets <sup>4</sup> (BPM5§312)	“In concept, acquisition/disposal of non-produced, non-financial assets comprises transactions associated with tangible assets that may be used or needed for production of goods and services but have not themselves been produced (e.g. patents, copyrights, trademarks, franchises, etc. and leases or other transferable contracts).”	Against payment, a patent may accordingly be bought or sold either in whole or in part; in the latter case, the sale may cover one or more applications.  However, some inventions are not patented by the inventor, and others are not patentable on legal grounds.
Technical assistance services	Architectural, engineering and other technical services (BPM5§264)	“Architectural, engineering and other technical services cover resident/non-resident transactions related to architectural design of urban and other development projects; planning and project design and supervision of dams, bridges, airports, turnkey projects, etc.; surveying, cartography, product testing and certification and technical inspection services.”	Includes services that call for the supplier to make use of technical skills and help the user to carry out a productive activity. Preliminary technical studies and engineering work required for the design and preparation of industrial projects, including product definition, process and plant specification, general design and detailed drawings for the installation. Services such as architectural ought to be included if they have an undoubted engineering content.

<sup>3</sup> Under the sixth edition of the Balance of Payments Manual (*BPM6*) the category “Charges for the use of intellectual property n.i.e.” replaces “royalties and license fees.” The content of this category was also clarified (paragraphs 10.137–10.140 and Table 10.4 of *BPM6*).

<sup>4</sup> According to the *BPM6* (paragraph 10.147), the outcome of research and development, such as patents and copyrights should be classified as produced assets, specifically as research and development services and no longer as nonproduced assets in the capital account.

**Table 1 – Main items of the Portuguese Technology Balance of Payments (cont.)**

TBP item	B.o.p. label	Definition	Comments
Research and development	Research and development (BPM5§264)	“Research and development services cover those services that are transacted between residents and non-residents and associated with basic research, applied research and experimental development of new products and processes. In principle, such activities in the sciences, social sciences and humanities are covered; included is the development of operating systems that represent technological advances.”	Only the industrial and technological R&D must be included in the TBP. The financial flows relating to R&D are of two kinds: • Funds provided by multinational firms to finance R&D performed by their affiliates, as well as funds which affiliates remit to their parent companies as an “entry fee” or advance payment for a subsequent transfer of technology; • Financial flows between related and unrelated firms which have agreed to conduct joint R&D either in existing research facilities or in a subsidiary company they have set up together for that purpose.
Other technical services	Computer and information services (BPM5§259)	“Computer and information services cover computer data and news-related service transactions between residents and non-residents. Included are: data bases, such as development, storage, and on-line time series; data processing – including tabulation, provision of processing services on a time-share or specific (hourly) basis, and management of facilities of others on a continuing basis; hardware consultancy; software implementation – including design, maintenance and repair of computers and peripheral equipment”	Software purchases and sales includes software programmes protected by intellectual property rights (royalties) which provide entitlement solely to their utilisation, and those involving a patent, which are protected by industrial property and allow a genuine transfer of technology to take place. Only this latter category of software should be included in the TBP.
	Agricultural, mining and on-site processing services. (BPM5§264)	“Agricultural, mining and on-site processing services provided by or to residents to or by non-residents cover services associated with agricultural crops; forestry services; mining related services and on-site processing of, or work on, goods that have been imported but not re-exported (e.g. nuclear waste processing) or vice versa”	Includes general technical assistance for industrial operation and maintenance, including staff training, secondment of technicians, consultancy services and assistance for quality control and trouble-shooting. Major civil engineering contracts, mineral and petroleum prospecting, contract work and repair activities should be excluded.

### 3. Institutional framework and compilation system

*Banco de Portugal* has been responsible for compiling and producing the Portuguese b.o.p. statistics since 1963. Following the full liberalisation of foreign exchange regulations and the commitment by Portugal with regard to statistical harmonisation at the European level, a new methodological and statistical production system was introduced in 1993 in close cooperation with the banking community. The legal basis for the compilation of b.o.p. statistics are the Organic Law of *Banco de Portugal* and the National Statistics System Law, empowering *Banco de Portugal* as a public authority in the field of statistics. These laws allow *Banco de Portugal* to request information from any public or private body for statistical purposes, in particular within the scope of its cooperation with the European Central Bank (ECB). *Banco de Portugal* is authorised to collect data from both banks and non-banks and there is a specific law which imposes a general obligation on banks and non-banks (as direct reporters) to report b.o.p. transactions. The Portuguese b.o.p. is in compliance with the standard components of the BPM5 and the compilation of the Portuguese TBP statistics follows the recommendations of International Organisations, in particular those laid out by the OCDE in the context of S&T statistics.



The main sources for the production of the TBP are the resident banking system and the resident enterprises that engage in transactions with the rest of the world. Banks are required to report the following types of external transactions: those carried out on behalf of their resident and non-resident customers or on their own account, whether acting as an intermediary between a non-resident (bank or non-bank) and another resident bank, or carrying out interbank operations affecting an external position. Some enterprises, known as direct reporters, communicate the statistical data directly to *Banco de Portugal*. The direct reporters provide information on all transactions with non-residents, whether settled through a resident bank or not. Those residents holding current accounts with non-residents must report all settlements cleared through those accounts. Concerning the timeliness of the data the reporting agents have ten working days from the end of the reporting period (month) to submit data to *Banco de Portugal*.

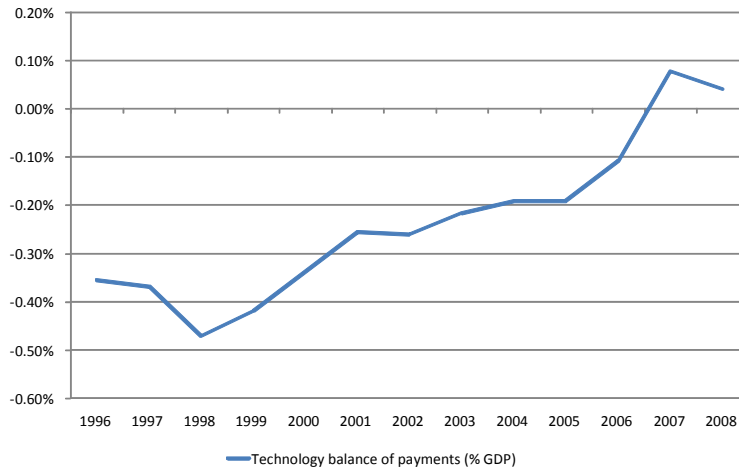
Under the general reporting system, banks may be exempted from reporting transactions in an amount of below €50,000. Transactions below €50,000 are estimated according to historical information about such transactions. Data collection is based on a so called “closed-system” since it includes, theoretically, the communication of all flows (debits and credits), that helps to calculate the change in positions (assets/liabilities) of resident entities vis-à-vis the exterior. The reporting of the data takes place, usually, on an “operation-by-operation” basis. Nowadays, more than 800 direct reporters and around 100 banks report data to *Banco de Portugal* on a monthly basis. Regarding the information that falls within the scope of the TBP, there is an average of 11,000 monthly observations.

Taking into account data availability, *Banco de Portugal* compiles and produces a monthly Portuguese b.o.p. and TBP, which are first released on the website of *Banco de Portugal* and subsequently published in the Statistical Bulletin. Monthly data consistent with the BPM5 are available since January 1996, while monthly TBP data consistent with the OECD Manual are available since January 1999. Monthly b.o.p. and TBP data are available within six weeks of the reference period. Since the beginning of 2006, *Banco de Portugal* has been providing internet access to its Statistical Interactive Database (BPstat – statistics online), which allows the dissemination of more detailed b.o.p. relative to the printed publication. *Banco de Portugal* also provides full monthly and quarterly b.o.p. data to the ECB in line with the timeliness laid down in a Guideline on the statistical reporting requirements of the ECB and annual TBP data to the OECD for the S&T statistics.

#### **4. Main results**

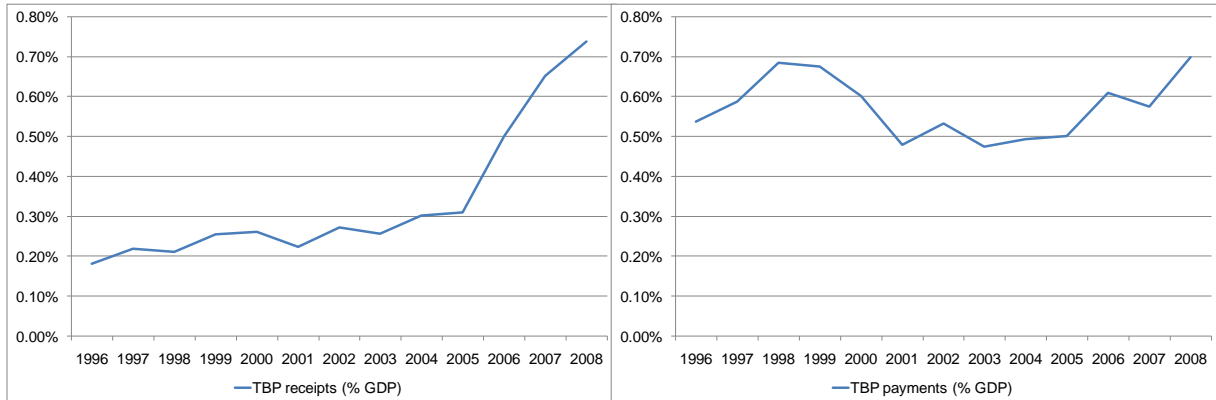
Through the analysis of the Portuguese TBP it is possible to notice that until very recently Portugal was a net importer of technology. Nevertheless, the difference between international outwards and inwards of intangible assets (expressed by the net figures of the TBP) has been decreasing during the period under analysis (Figure 1), i.e. between 1996 and 2008. Moreover, since 2007, as Portugal has raised its technology exports, those started to exceed imports on an annual basis and Portugal became a net exporter of technology, measured by the TBP.

**Figure 1 – Portuguese TBP (as a percentage of GDP)**



The recent pace of the TBP net flows is mainly explained by the behaviour of technology exports (or b.o.p. receipts), which have increased considerably in the last few years (Figure 2). In fact, between 1996 and 2005 the receipts of TBP were below 0.35 percent of GDP, but they have surpassed 0.7 percent of GDP in 2008. On the other hand, technology imports (TBP payments) have been around 0.4 and 0.7 percent of GDP during the same period.

**Figure 2 – TBP receipts and payments (as a percentage of GDP)**



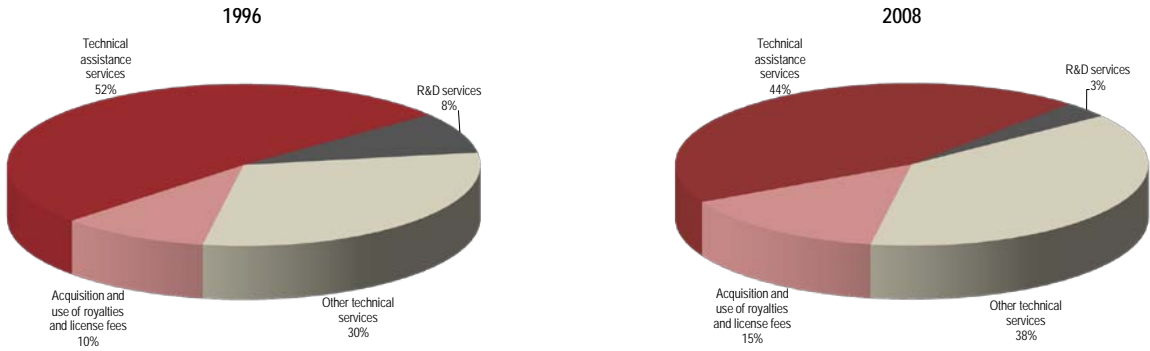
These data may be broken down by type of technical knowledge. In the Portuguese TBP, receipts and payments are split into four different items: acquisition and use of royalties and license fees; technical assistance; research and development services and other technical services, such as computer and IT services.

Taking into account the contribution of each item and comparing two somewhat distant years, 1996 and 2008 (Figures 3 and 4), one can conclude that technical assistance services were the main contributors for technology outflows in 1996, with more than 50 percent of the total receipts. In 2008, the structure of receipts is, to some extent, different from the one observed 12 years before, since technical assistance services and research and development services lost significance, and acquisition and use of royalties and license fees and other technical services gain weight.

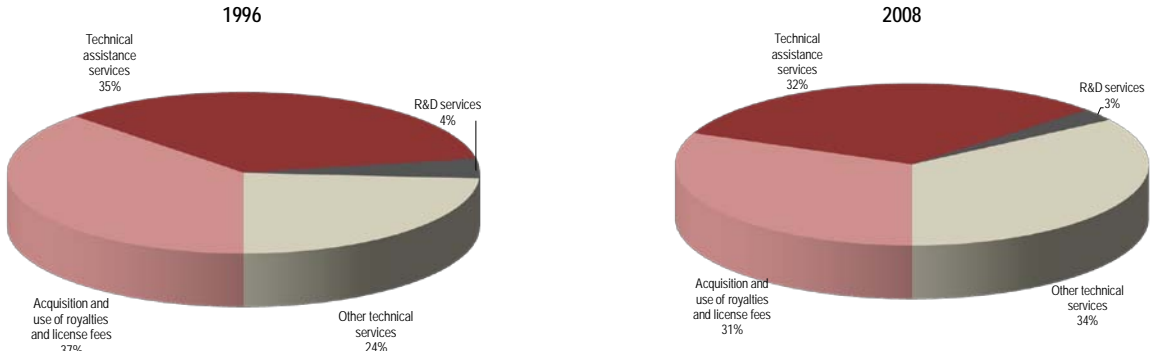
On technology inflows side, the main variation between 1996 and 2008 was the increase of other technical services. In the same period the other items presented a decrease, mainly the decrease in acquisition and use of royalties and license fees and the technical assistance services.

Summing up, the acquisition and use of royalties and license fees is the only item that showed a distinct evolution between outflows and inflows, over the period under analysis. In fact, exports of this kind of technology increased and imports decreased, revealing that Portugal has become more specialised concerning this type of technical knowledge. The other items present an evolution that is similar for the outflows and the inflows.

**Figure 3 – TBP receipts by type of technical knowledge**

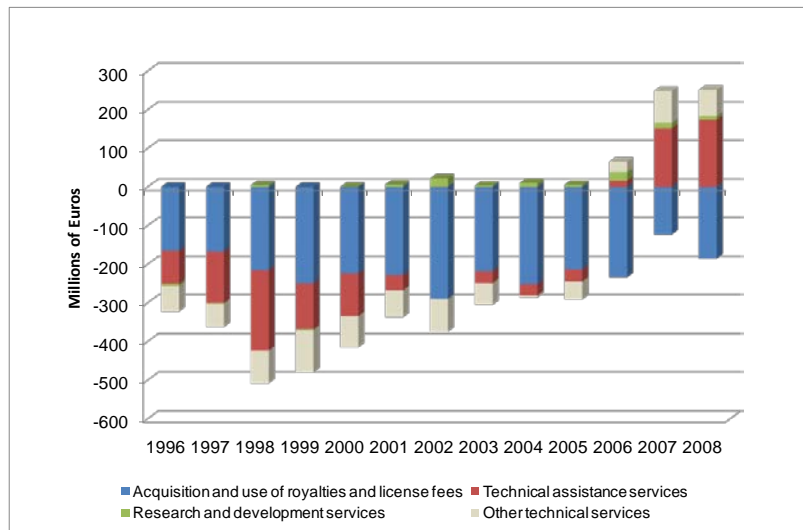


**Figure 4 – TBP payments by type of technical knowledge**



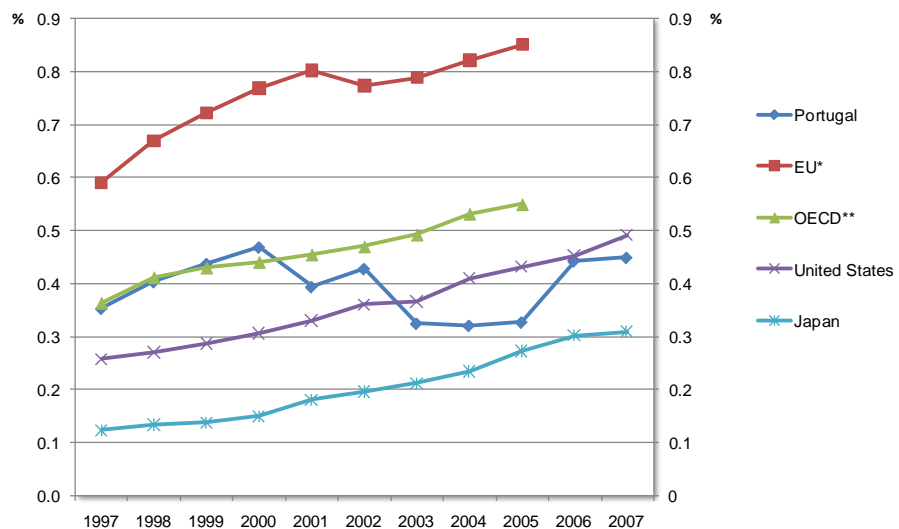
Regarding the evolution of TBP net flows, since 1996 and until 2006, the acquisition and use of royalties and license fees used to be the main contributor for its negative sign. Although as explained above, that contribution experienced a change in recent years, which might be confirmed in Figure 5. On the other hand, in the last two years, technical assistance services were fundamental for the upturn of the net flows. These technology services that include architectural, engineering and other technical services and call for the supplier to make use of its technical skills, are the main contributors for the positive sign of TBP. Although at a lesser extent, even other technical services have undergone a contribution to the positive net flows of the TBP in the last few years.

**Figure 5 – TBP net flows by type of technical knowledge**



To better evaluate the importance of the TBP in the context of the global spread of knowledge, the following paragraphs are devoted to an international comparison using OECD data. Figure 6 illustrates TBP flows as a percentage of GDP. Although the technology balance of payments reflects a country's ability to sell its technology abroad and its use of foreign technologies, a deficit position does not necessarily indicate low competitiveness. As so, figure 6 illustrates average flows (between payments and receipts of a specific year) instead of net flows, in order to measure the country's openness or integration into technology trade. In general, a positive trend is observed between 1997 and 2007. The European Union (EU) has the top rank position every year and an average of technology receipts and payments around 0.85 percent of GDP in 2005. Portuguese figures are not far from the ones of the OECD and the US, with an average of 0.45 percent of GDP in 2007. As highlighted before, figures observed for 2006 are mainly due to the dynamics of the exports/receipts side of the TBP.

**Figure 6 – Average TBP flows as a percentage of GDP**



\*Including intra-area flows. Excluding Denmark and Greece for 1997-2005.

\*\*Excluding Iceland and Turkey for 1997 - 2005.

A detailed international comparison can be observed in figures 7 and 8. In 1997 only three European countries were net exporters of technology: Switzerland, Belgium and Sweden (the UK deficit appeared in some years of the last decade). Belgium had very large amounts of receipts and payments as a percentage of GDP. The Irish case, in 1997, can be seen as the typical example of a virtuous TBP deficit, since its receipts plus payments are very large. The massive presence of foreign affiliates, which imported technology from their origin countries, is probably the main explanation for the Irish situation. Taking into account the recent economic development of Ireland, a deficit does not necessarily mean low competitiveness. In fact, Ireland shows a strong dynamic on the exports side recently, and is no longer a net importer of technology.

In 1997, Portugal was a net importer of technology. Although, as we noted before, the Portuguese TBP changed its path in the last few years, being in 2007 a net exporter of technology (Figures 9 and 10). It should be emphasised that, although the data analysed in this international comparison have the same origin – the OECD database – heterogeneity of their content at country level makes this comparison a difficult exercise. Much work still has to be done in the field of international harmonisation of the TBP data.

Figure 7 - Flows as a percentage of GDP, 1997

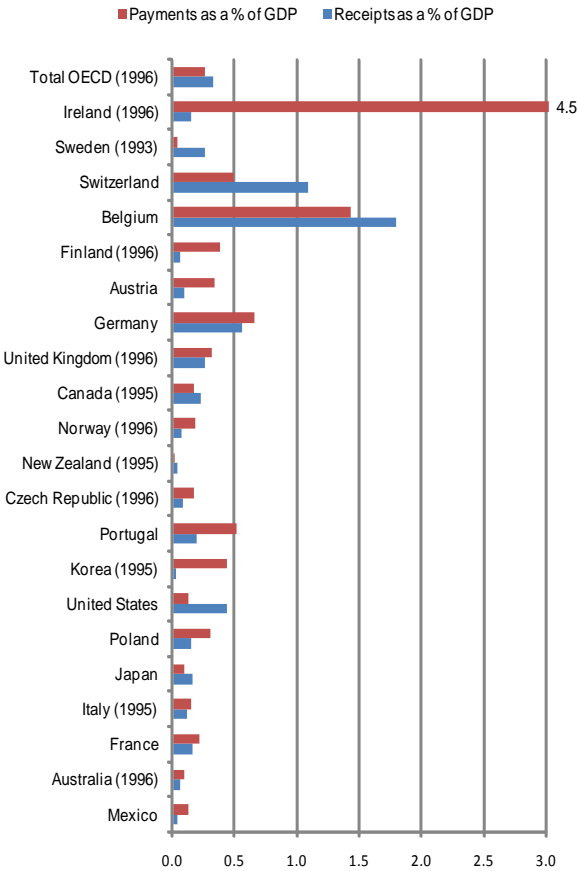


Figure 8 - Balance as a percentage of GDP, 1997

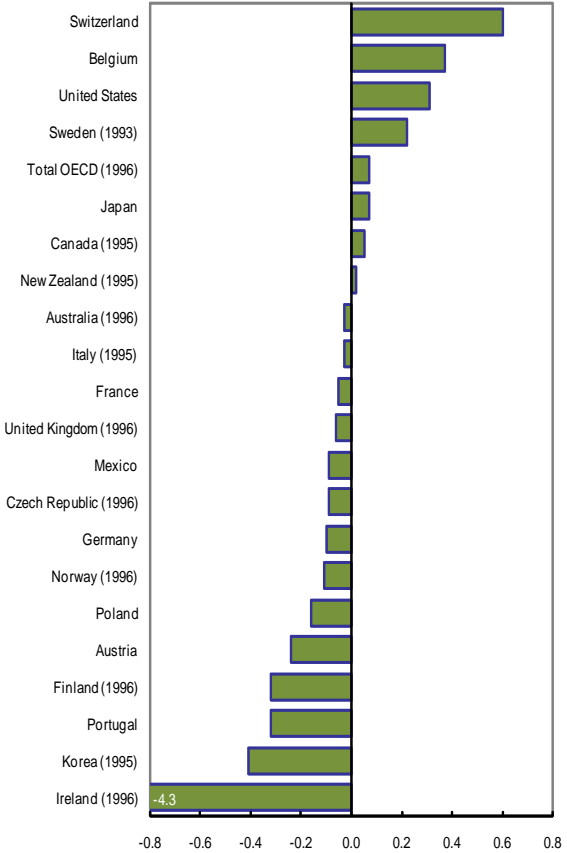


Figure 9 - Flows as a percentage of GDP, 2007

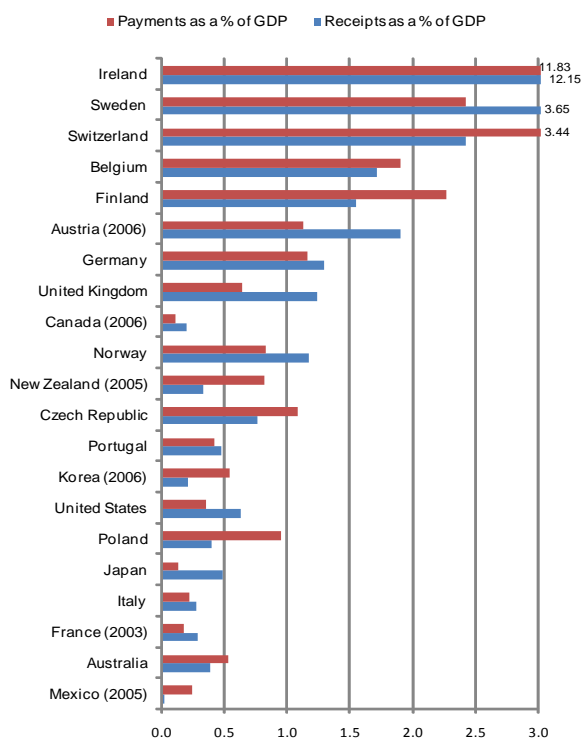
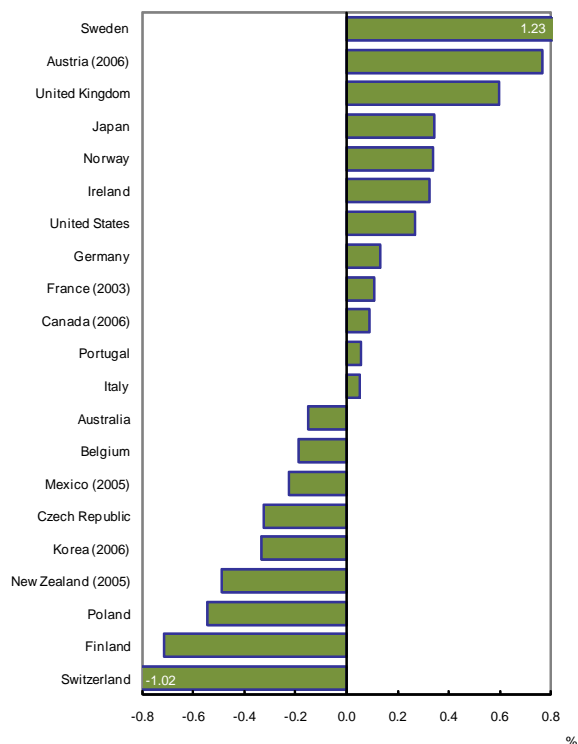


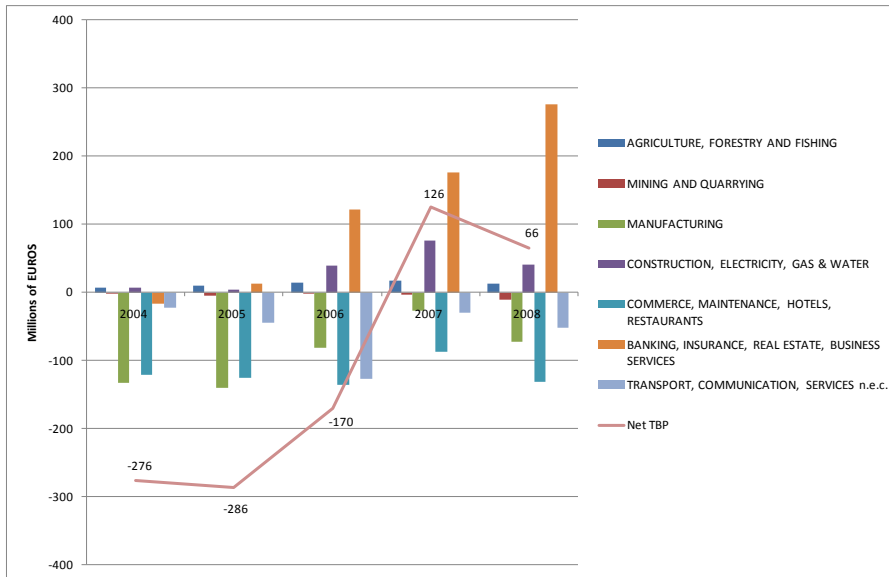
Figure 10 - Balance as a percentage of GDP, 2007



Extending the analysis by economic activity (Figure 11), the evolution of the TBP net flows since 2006 is mainly explained by “Banking, Insurance, Real Estate and Business Services”, especially the last-named. Concerning this particular industrial activity, the average net flows between 2006 and 2008 is around 192 million Euros, with the figures for 2008 being very close 300 million Euros. The economic activities “Construction, Electricity, Gas, Water” and, at a lesser extent, “Agriculture, Forestry and Fishing” have also contributed positively to the recent pace of net TBP. In other words, these particular economic activities contributed to the position assumed by Portugal as a net exporter of technology-related intangible assets and, consequently, the country holds a *revealed technological advantage*<sup>5</sup> in this type of activities. On the other hand, in activities like “Manufacturing”, “Commerce, Maintenance, Hotels, Restaurants” and “Transport and Communications” the country presents a deficit *vis-à-vis* the rest-of-the-world.

<sup>5</sup> As defined by the OECD in its scoreboard for Science, Technology and Industry.

**Figure 11 – Net TBP flows broken down by activity (ISIC revision 3)**



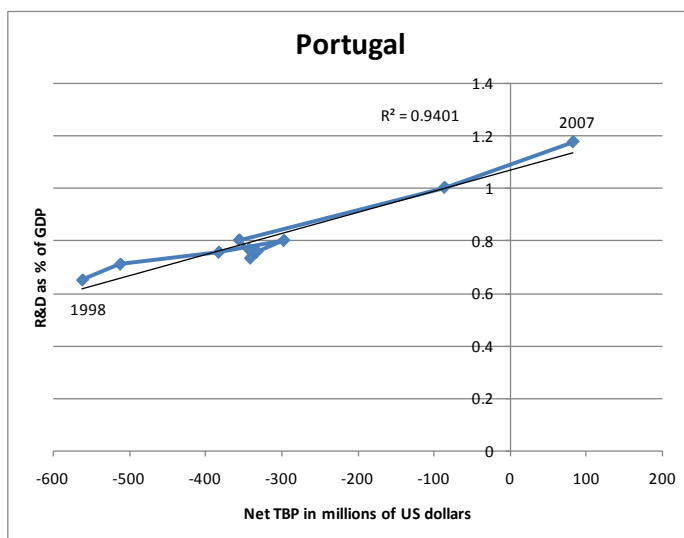
In order to go deeper into the possible determinants of the international trade of intangible assets and technology-related services, table 2 presents the Pearson's correlation coefficient between R&D as percentage of GDP and the net TBP, based on data from OECD from 1998 to 2007.

**Table 2 – Pearson's correlation coefficient – R&D as a % of GDP and Net TBP**

Pearson's correlation coefficient					
Australia	-0.11	Ireland	0.60	Spain	-0.39
Belgium	0.12	Italy	0.65	Sweden	-0.25
Czech Republic	-0.57	Japan	0.86	Switzerland	0.50
Finland	-0.52	Norway	-0.54	United Kingdom	-0.49
Germany	0.44	Poland	0.70	United States	-0.36
Hungary	-0.36	Portugal	0.87		

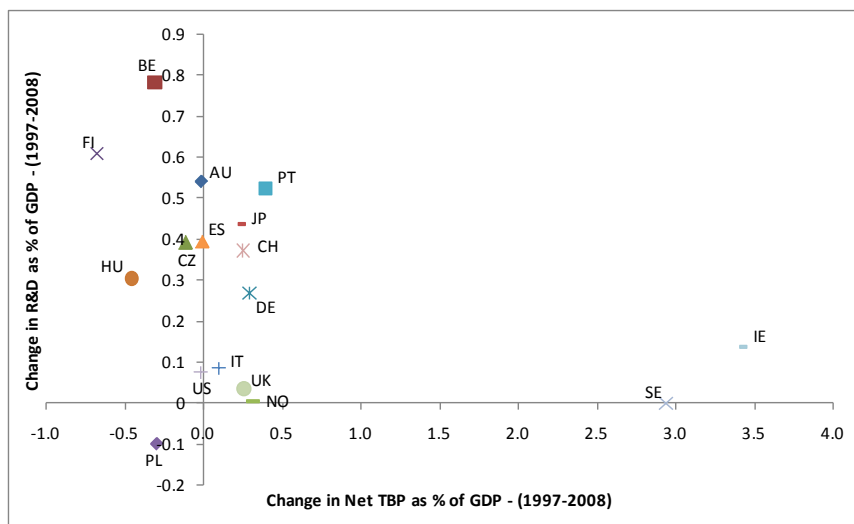
When Pearson's correlation coefficient lies between 0 and  $\pm 0.25$  then there is a low degree of correlation. This is the case of Australia, Belgium and Sweden. We found a moderate inverse correlation in Czech Republic, Finland, Hungary, Norway, Spain, UK and US. On the other hand, Germany, Ireland, Italy, Poland and Switzerland have a positive moderate correlation. A high degree of positive correlation, i.e a Pearson's coefficient above 0.75, from 1997 to 2008, is found for Japan and Portugal. The same interpretation can be found in Figure 12.

**Figure 12 – Relationship between R&D as % of GDP and net TBP (millions of US Dollars)**



Although one should expect a positive correlation between these variables, for some countries the evidence is quite the opposite or, at least, inconclusive, as it can be seen from Figure 13. The dissimilarities across countries seem to be due to a large number of other variables that could affect the net TBP in the long run. For example, a country could have a branch of a multinational company located there, which is responsible for the increase in R&D spending and, at the same time imports technology in the form of intangible assets from other country where its headquarters is located.

**Figure 13 – R&D Expenditure as % of GDP and net TBP as a % of GDP<sup>6</sup>**



<sup>6</sup> Year 1999 used instead of 1998 for Norway and Sweden; year 2000 used instead of 1998 and 2004 instead of 2007 for Switzerland; year 2003 used instead of 1998 for Ireland and 2006 instead of 2007 for Australia and Italy.



## ***5. Concluding remarks***

Figures for the Portuguese TBP were analysed, broken down by its components, and an integrated analysis was made in the context of other OECD countries. Until very recently the acquisition and use of royalties and license fees used to be the main contributor for the negative sign of TBP net flows. Since 2007, technical assistance services were fundamental for the upturn of the net flows, as Portugal has raised its technology exports, which started to exceed imports on an annual basis and Portugal became a net exporter of technology related services, measured by the TBP. In 2008, the structure of receipts is, to some extent, different from the one observed 12 years before, since technical assistance services and research and development services lost significance, and acquisition and use of royalties and license fees and other technical services gain weight. On payments side, the main variation between 1996 and 2008 was the increase of technical assistance services and other technical services, and the decrease in acquisition and use of royalties and license fees.

The Irish case was given as an example to emphasise the idea that a TBP deficit does not necessarily means lack of competitiveness. The average flows of receipts and payments has been presented as an alternative indicator to net flows in order to measure the country's openness or integration into international trade of technology in the form of intangible assets. A positive trend was observed between 1997 and 2007 for the net flows as a percentage of GDP. The European Union (EU) has the top rank position every year and an average of technology receipts and payments around 0.85 percent of GDP in 2005. Portuguese figures are not far from the ones of the OECD and the US, with an average of 0.45 percent of GDP in 2007. Figures observed for 2006 are mainly due to the dynamics of the exports/receipts side of the TBP. Moreover, the positive TBP net flows since 2006 are mainly explained by "Banking, Insurance, Real Estate and Business Services", especially the latter. Finally, a high positive correlation is found for Portugal between R&D expenditures as percentage of GDP and the net TBP, from 1997 to 2008, but the same was not observed for several other OECD countries, indicating that there are other determinants not included in the analysis.

Final remarks of this document are for the caveats of the TBP. Among other factors, heterogeneity of its content at country level makes international comparison a difficult exercise. Even with these and other limitations, the authors argue that the TBP should not be underestimated as an instrument to measure diffusion of knowledge and integration of countries into international trade of intangible assets and technology-related services.

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# From the border to the chart: Freight services in the Portuguese balance of payments statistics<sup>1</sup>

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## 1. Introduction

Nations are increasingly integrated and interdependent in a globalised world. Each one is committed to sell its manufactures, to purchase what it lacks and also to produce more efficiently than other nations. As sustained by economic theory, international trade promotes economic efficiency by providing a wider diversity of goods and resources at lower costs. Although international trade has taken place centuries before the modern age, as trade routes promoted by the Portuguese discoveries can testify, the scale, volume and efficiency of international trade all have increased unprecedentedly over the last 20 years. This expansion has been motivated by significant growth in the transport services sector. Not only the amount of merchandise being traded has increased, but also a large diversity of origins and destinations has been promoted by international transport services. On the

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other hand, international transport has been under increasing stress to keep up with additional demands in volume and distance. As a consequence, nowadays larger distances can be overcome for a decreased amount of time, at similar or lower costs.

The context of globalisation poses great challenges to statisticians, since a multiplicity of goods and services are traded in several markets with a variety of companies, using a wide range of modes of transport. In this context the balance of payments (b.o.p.) is a statistical statement that systematically summarises, over time, all transactions of an economy with the rest of the world. Among other items, the b.o.p. records the economic transactions on merchandise freight services undertaken between resident and non-resident companies. Effectively, transport services are one of the most significant items of the services account of the Portuguese b.o.p.. These flows (payments and receipts) have grown considerably in the last decade, alongside with the expansion of international trade in goods. As a consequence, some Portuguese based companies have emerged as important regional players in the market. The intention of the authors is not only to disseminate and promote the use of the b.o.p. statistics for transport research, namely imports and exports of this type of services, but also to contribute to a short description of transport activity in Portugal.

The remainder of this paper is organised as follows. After a brief description of the main concepts, definitions and underlying institutional framework in chapter two, the methodology followed by the Portuguese Central Bank for the data collection and compilation of the transport services in the b.o.p. statistics is presented in chapter three. Chapter four is devoted to an interpretation of the main figures of the transport services of the Portuguese b.o.p., in the context of other European Union (EU) countries. The main results are broken down by mode of transport (sea, air, road and others). Some concluding remarks are discussed in chapter five. Finally, in chapter six, future plans to improve the "fobisation method" are presented, according to novel international recommendations.

## ***2. Definitions and Institutional framework***

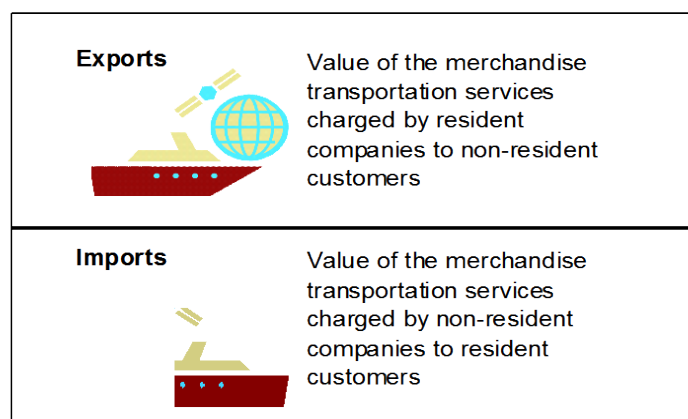
### ***2.1 Definitions***

According to the fifth edition of the Balance of Payments Manual (BPM5, IMF, 1993:§230), transport services covers all modes of transport (sea, air, and other - including land, rail, internal waterway, space, and pipeline) that are performed by residents of one economy for those of another and that involve the carriage of passengers, the movement of goods (freight), rentals (charters) of carriers with crew, and related supporting and auxiliary services, which covers a range of services provided in ports, airports, and other terminal facilities.<sup>3</sup> A freight service charged by a resident transport company to a non-resident customer is recorded as an export of services in the b.o.p., and, similarly, a freight service charged by a non-resident transport company to a resident customer is recorded as an import of services (Figure 1).

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<sup>3</sup> Some interconnected transport activities are excluded from the b.o.p. transport services: freight insurance, which is included in insurance services; repairs of transport equipment, which are included in goods; repairs of railway facilities, harbours, and airfield facilities, which are included in construction services; and rentals (charters) of carriers without crew, which are included in other business services.

*Figure 1 – Freight Transport Services in the Balance of Payments*

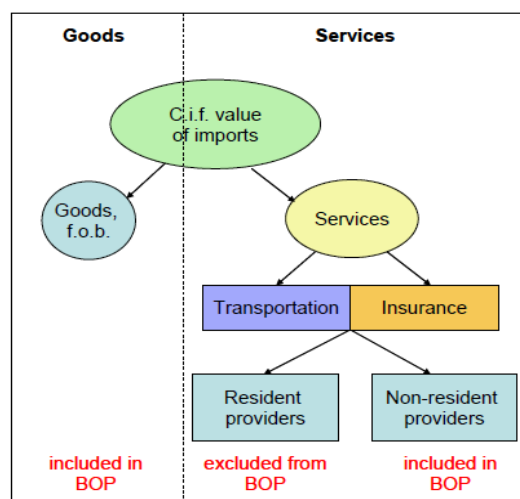


Only the transport services related with the movement of goods or resources, i.e., freight services, will be discussed in this paper.

The measurement of transport services is affected by the convention that goods should be valued on a fob (free on board) basis at the customs frontier of the exporting economy — and also by the assumption that freight charges are supported by the importing economy. (IMF 1993: §234). Therefore, those freight charges performed beyond the customs frontier of the exporting economy are included in transport services. These services cover transport of goods to the customs frontier of the importing economy and, within that economy, to the point of delivery. Thus, imports (payments) should only be recorded when (i) these services are performed by non-residents and (ii) when these services are performed after the goods are loaded on board of a carrier at the customs frontier of the exporting economy. Conversely, exports (receipts) should only be recorded between resident companies and their non-resident clients when such services are performed after the goods have been loaded on board a carrier at the customs frontier.

While the adoption of a uniform valuation method, i.e., exports and imports valued both at fob basis, may be analytically useful, statistical problems arise. An additional source of complexity arises from non standardised shipping practices, i.e., the documents on which the compiler must usually rely as the basis for estimates of goods and transport services will often cover shipping services performed on both sides of the customs frontier, without detailing shipping costs. Consequently, there is at least one major measurement difficulty worth mentioning. Usually goods are derived from collection forms that show imports valued at the frontier of the importing economy (cif valuation), consequently, a separate estimate must be made for the value of the transport services performed beyond the customs frontier of the economy from which the goods are exported – this is known as the estimate for the cif-fob margin or the “fobisation method”. This treatment implies reallocating transport services included in the cif value of imports from goods to transport and insurance services (Figure 2).

Figure 2 – Decomposition of cif value of imports (UN, 2008:§4.73)



## 2.2. Institutional Framework

*Banco de Portugal* has been responsible for compiling and producing the Portuguese b.o.p. statistics since 1963. Following the full liberalisation of foreign exchange regulations and the commitment by Portugal with regard to statistical harmonisation at the European level, a new methodological and statistical production system was introduced in 1993 in close cooperation with the banking community. The legal basis for the compilation of b.o.p. statistics are the Organic Law of *Banco de Portugal* and the National Statistics System Law<sup>4</sup>, empowering *Banco de Portugal* as a statistical authority. These laws allow *Banco de Portugal* to request information from any public or private body for statistical purposes, in particular within the scope of its cooperation with the European Central Bank (ECB). Particularly, there is a specific regulation that imposes a general obligation on banks (as indirect reporters) and non-banks (as direct reporters) to report the b.o.p. transactions, i.e., those reported between residents and non-residents. The details of the information to be reported under the b.o.p. framework are provided in a *Banco de Portugal* Instruction on External Statistics. The Portuguese b.o.p. is in compliance with the standard components of the BPM5 and the compilation of the transport services also follows the recommendations of a Manual (UN, 2002) developed by several International Organisations, in the context of trade in services.

Against this background, *Banco de Portugal* compiles and produces a monthly Portuguese b.o.p., which is first released on the website of *Banco de Portugal* and subsequently published in the Statistical Bulletin (print edition). Monthly data consistent with the BPM5 are available since January 1996. Monthly b.o.p. and, consequently, transport services data are available within six weeks of the reference period. Since the beginning of 2006, *Banco de Portugal* has been providing internet access to its Statistical Data, through a Statistical Interactive Database (BPstat – statistics online), which allows disseminating a more detailed b.o.p. than the one published in the Statistical Bulletin. *Banco de Portugal* not only provides monthly and quarterly b.o.p. data to the ECB and Eurostat, in line with the timeliness laid down in guidelines and regulations on the statistical reporting requirements, but also reports annual data to the Eurostat, IMF and OECD for the purpose of trade in services statistics.

<sup>4</sup> Law 22/2008, 13<sup>th</sup> May.

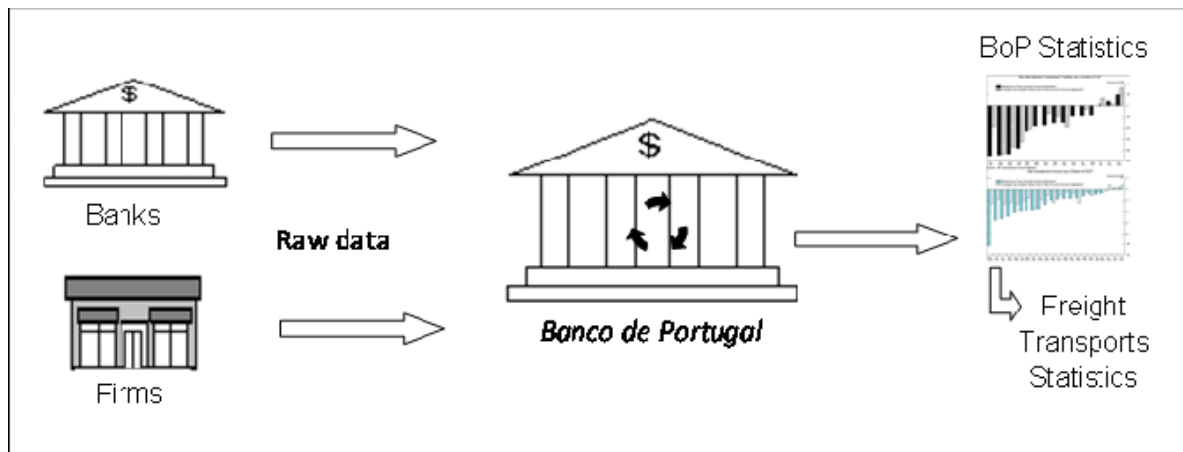
### 3. Compilation system

The compilation method used for exports is different from the one used for imports of freight transport services because of the dissimilar characteristics of the data. In this section these two different compilation methods are briefly explained.

#### 3.1 Exports of transport services


The main sources for the production of transport services exports are the resident banking system and the resident transport companies that engage in transactions with the rest of the world (Figure 3).

**Figure 3 – Balance of Payments Statistics compilation system for exports of transport services**



In general, banks are required to report the following types of external transactions: those carried out on behalf of their resident and non-resident customers or on their own account. Regarding transactions on behalf of costumers banks have to report operations where it act as an intermediary between a non-resident (bank or non-bank) and another resident bank, and also other interbank operations whenever it affects an external position. Some companies, known as direct reporters, communicate the statistical data directly to *Banco de Portugal* according to some defined standards (Figure 4). The direct reporters provide information on all transactions with non-residents, whether settled through a resident bank or not. Those residents holding current accounts with non-residents must report all settlements cleared through those accounts.

**Figure 4 – Direct report for exports of transport services**

Resident Firm's Name	
	- Customer's ID: non resident Company X
	- Value of transaction: 1,000,000
	- Service: road freight
	- Customer's Country: France
	- Currency: EUR
	- Type: Credit

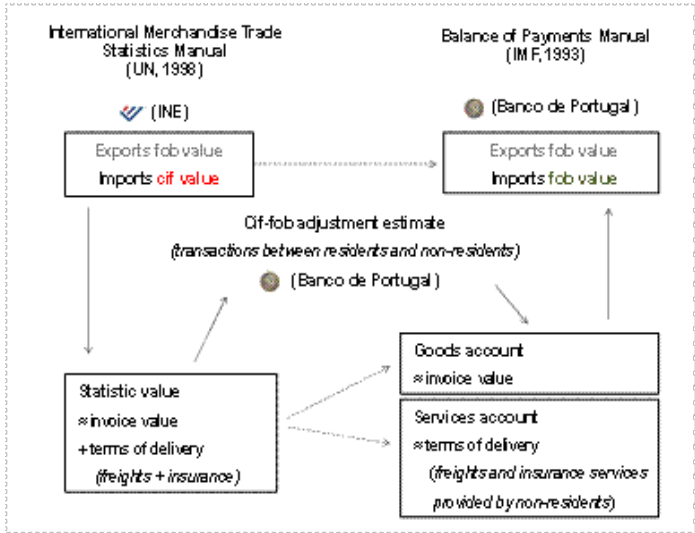
Concerning the timeliness of the data both direct and indirect reporters have ten working- days from the end of the reporting period to submit monthly data to *Banco de Portugal*. Under the general reporting system, banks may be exempted from reporting whenever transactions fare below €50,000. Missing data concerning transactions below €50,000 are estimated according to historical information

about such transactions. Nowadays, more than 100 direct reporters and around 30 financial institutions report data to *Banco de Portugal* on a monthly basis for transport services exports. Furthermore, there is an average of 4,000 monthly observations.

### 3.2 Imports of transport services

The main data source for the b.o.p. compilation of transport services imports are the Merchandise Trade Statistics (MTS) collected by Statistics Portugal (the Portuguese national statistical office; INE). The recorded value of all imported goods follows the cif method, i.e., all transport and insurance services from the exporter’s frontier to the importer’s frontier are included in the value of imported goods. However, for b.o.p. purposes compilers must convert the values from cif-type to fob-type, removing from the total amount of imports the distributive services element (mainly transport and insurance). This adjustment is made just for the services that have been provided by non-residents. The deducted values are then allocated to the merchandise transport and in the insurance b.o.p. item. Because the collection of information about these two services by the INE is optional, the cif-fob adjustment is usually obtained by an estimation method (Figure 5), which will be described in the following paragraphs.

Figure 5 – Cif-fob adjustment estimate



The current cif-fob adjustment methodology followed by *Banco de Portugal* was set up in 1996. In the context of this initial study, data from different sources were used for 1992 as the base year (Figure 6). Data on trade volumes of imports cif value were based on statistics of INE on Merchandise Trade, while data on share of mode of transport were based on statistics of INE on Transport Sector. For international transport costs data (mode of transport, type of product, type of load, distance and respectively freight rates) a sample survey was conducted among non-resident carriers, for each mode of transport, in order to gather information about the average unit costs of international transport. For the data on insurance costs (insurance premium rate by type of product) Portuguese Insurance Companies Association was asked to supply information in order to compile the average insurance rate of international transport of merchandise.



Figure 6 – Cif-fob adjustment estimate sources




Cif-fob adjustment estimate (transactions between residents and non-residents)	
Data	Source
 INSTITUTO NACIONAL DE ESTATÍSTICA	Trade volumes of imports (cif value)
	Share of mode of transportation
	Insurance costs by resident and non-resident
	International transportation costs
	Merchandise Trade Statistics
	Annual Transportation Sector Statistics
	Internal surveys
	Sample survey conducted among non-resident carriers

Figure 7 – Cif-fob adjustment monthly estimate variables

Cif-fob adjustment estimate (transactions between residents and non-residents)	
VARIABLE TYPE	DATA VARIABLE
CONSTANT	Share of non-residents carriers companies
	Share of non-residents insurance companies
	Share of freight values on trade volumes of cif value imports broken down by mode of transportation and type of merchandise
	Share of insurance value on trade volumes of cif value imports broken down by mode of transportation and type of merchandise
DYNAMIC – f(t)	Average unit costs of international transportation
	Share of mode of transportation on trade volumes of cif value imports

Total transport costs were calculated multiplying volumes by freight rates. Costs were then broken down according to carrier's country of residence information, which was estimated by the survey to carriers. Total insurance costs were calculated multiplying the volumes of imports (already deducted from total transport costs) by insurance risk rates. On the basis of this information, it was possible to set up, for further years, the share by resident and non-resident companies, for both the total freight costs and the total insurance costs.

On a monthly basis, the above information about freight costs broken down by market shares of non-residents carriers and by mode of transport is used together with data on total insurance costs broken down by non residents companies. On the basis of these compilations, import cif values figures are converted into fob figures obtaining the b.o.p. figures for goods, transport and insurance services accounts (Figure 7)<sup>5</sup>. For example, cif-fob adjustment (mcf) for the year of 2007 is calculated as follows (Figure 8):

$$\begin{aligned} \text{mcf}_{2007} = & [\text{Air}](0.0549 \times 0.078) + [\text{Rail}](0.0215 \times 0.001) + [\text{Sea}](0.0687 \times 0.267) \\ & + [\text{Road}](0.0292 \times 0.654) + [\text{Other}](0.0077 \times 0) + [\text{Insurance}]0.0034 = 0.0452 \end{aligned}$$

➔ 4.52% of imports value corresponds to transport and insurance related services.

<sup>5</sup> Some items are not included in this estimate because they are not valued at cif-basis by INE. For instance, the following items: electricity and aircraft imports, goods for processing, natural gas, pipeline and some governmental trade.

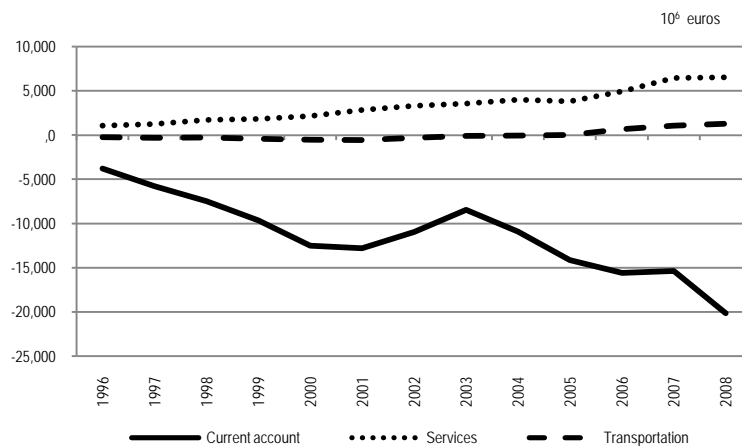
Figure 8 – Cif-fob adjustment (sample)

Mode of transport (j)	Share of freights by mode of transport and insurance in imports cif value (fim <sub>j</sub> e sim)	Residents (R)	Non-residents (nR)	Share of modes of transport in imports cif value (j <sub>k</sub> )							
				2001	2002	2003	2004	2005	2006	2007	2008
Air	5.49%	26.8%	73.2%	6.4%	5.4%	5.4%	4.7%	4.3%	7.6%	7.8%	3.8%
Rail	2.15%	0.0%	100.0%	0.6%	0.4%	0.4%	0.8%	0.7%	0.1%	0.1%	0.8%
Sea	6.87%	4.6%	95.4%	28.3%	26.7%	25.2%	27.7%	30.7%	26.3%	26.7%	34.4%
Road	2.92%	46.8%	53.2%	64.7%	66.4%	69.0%	66.7%	64.3%	66.1%	65.4%	61.0%
Other	0.77%	0.0%	100.0%	0.0%	1.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Insurance	0.34%	22.9%	77.1%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
<b>Total Freight+Insurance</b>	<b>CIF-FOB ADJUSTMENT (mcf<sub>k</sub>)</b>			<b>4.54%</b>	<b>4.43%</b>	<b>4.39%</b>	<b>4.47%</b>	<b>4.58%</b>	<b>4.49%</b>	<b>4.52%</b>	<b>4.71%</b>

#### 4. Results

This chapter analyses the main figures of the transport services recorded in Portuguese b.o.p. A cross-comparison with other EU countries is made and differences are highlighted. Through the analysis of the Portuguese current account it is possible to notice that, despite its continued worsening during the period under analysis, the services account has been on a slight upward trend (Figure 9).

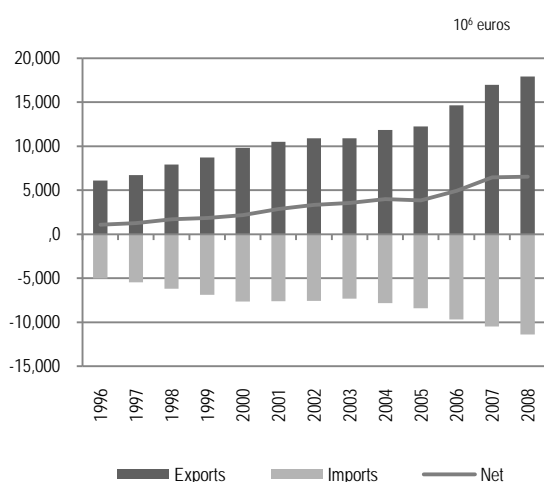
Figure 9 – Balance of Payments: Current account, services and transport – net



Source: Banco de Portugal

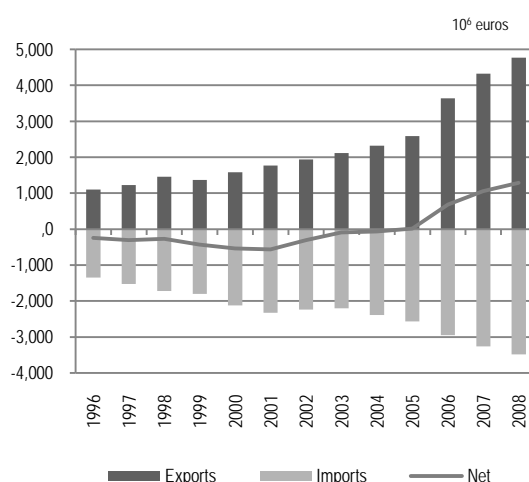
By and large, travel or tourism services are the main contributors to the positive net value of the services account. However, it is worth mentioning the recent trend of transport services, which not only became positive since 2005 as well as its share on services account has widely increased, year after year (Figure 10 and Figure 11), with an annual average increase of two percentage points since 2006 (from 13.9 per cent in 2006 to 19.7 per cent in 2008), reaching about €1.3 billion in 2008.

**Figure 10 – Services account**



Source: Banco de Portugal

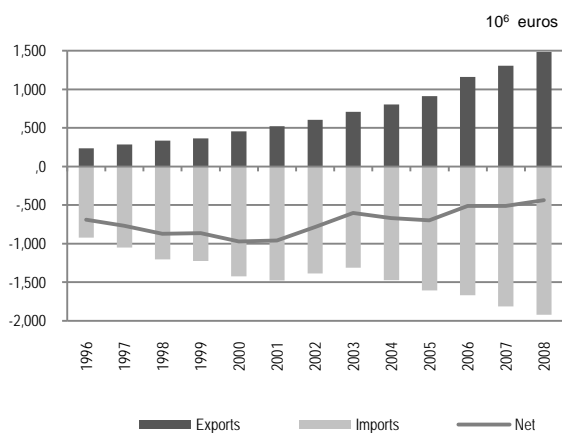
**Figure 11 – Transport services account**



Source: Banco de Portugal

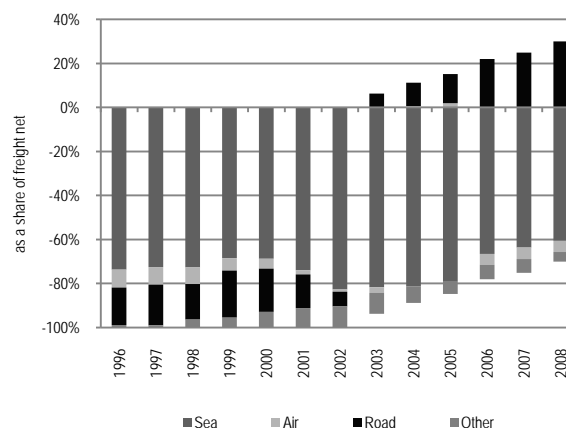
As mentioned before, b.o.p. transport services include not only freights but also the transport of passengers that also had widely contributed for the improvement of transport services account. Considering only the former, since our purpose is just to assess the transport of goods and resources, the net value of the transport services account is negative over time, (Figure 12). Nevertheless, the same chart suggests the freight and services account has been on a path of recovery since 2001, in line with transport services.

**Figure 12 – Freight transport services account**



Source: Banco de Portugal

**Figure 13 – Freight services by mode of transport**



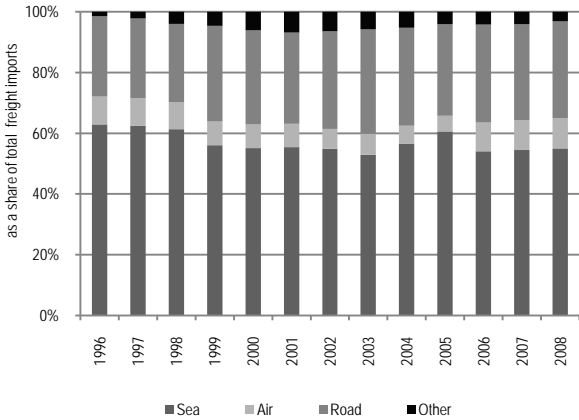
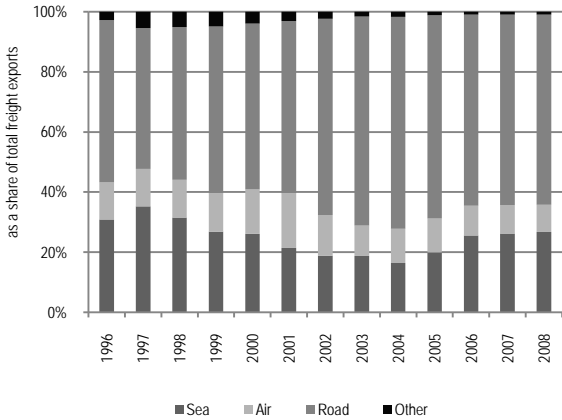
Source: Banco de Portugal and authors' calculations

Breaking down freights services by mode of transport it is possible to notice that the increasing path of its exports net of imports as a percentage of freights is explained mainly by road mode, whose contribution has risen considerably in the last few years, especially since 2003 (Figure 13). Sea freights relative improvement has also contributed for this trend especially since 2006.

Figure 14 presents the share of each mode of transport in total Portuguese exports of freights. Road freights have a substantial share in the total of freights, representing more than 60 per cent of Portuguese exports in 1996-2008. However, there was a slight reduction of its share in total freights exports in the last years, in particular since 2004. In contrast, after a decline between 1997 and 2004,

the share of the second most relevant mode of transport in Portuguese exports of freights, sea freights, increased since 2004, accounting for around 25 per cent of total in the most recent period. The shares of each mode of transport in total Portuguese imports of freights are presented in Figure 15. Two modes of transport have substantial shares in freight imports. Sea is the most important one, representing more than 50 per cent of Portuguese imports of freight services in the 1996-2008 period. The share of the second most relevant mode of transport in Portuguese imports of services, road freights, accounts for around 30 per cent of total. Note that Exports and Imports by road are interconnected, since freight companies that carry the merchandise from Portugal to other EU countries take the opportunity to bring other products, or vice-versa, wherever possible, in order to increase profits obtained in each trip. Future research is required to advance more explanations on this subject.

**Figure 14 – Exports of freight services by mode of transport**      **Figure 15 – Imports of freight services by mode of transport**



Source: Banco de Portugal and authors’ calculations.

Source: Banco de Portugal and authors’ calculations.

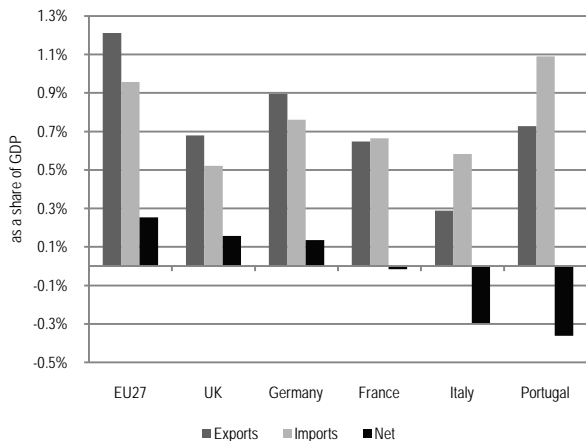
The analysis of the Portuguese freight services can be enhanced by taking a set of countries as a benchmark, and investigating their relative behaviours. The following charts will present figures for some of Portugal’s trading partners (EU5)<sup>6</sup> and for the current 27 EU countries (EU27), considering the period between 2004 and 2008.<sup>7</sup> Subsequently, the evolution of the Portuguese export and import structure of freight services is placed in perspective against its trading partners to evaluate the relative specialisation of Portugal.

Figure 16 shows the exports, imports and the net values of freight services as a percentage of each country GDP. The EU27 as a whole<sup>8</sup>, the United Kingdom (UK), Germany and France are net exporters of freight services while Italy and Portugal are net importers, meaning that resident companies pay more for freight services to non-residents than non-resident companies pay to resident carriers. All these countries differ in aspects related with the geographical location or the type of goods exported and imported, imposing different figures for the freight services charged. The peripheral location of a country like Portugal and its multiple accesses by road, sea, air or rail are crucial factors to bear in mind when doing comparisons with other countries.

<sup>6</sup> Unfortunately, the detailed and complete data on freights are not available for some countries, in particularly the other initial EU Cohesion Fund beneficiaries (Spain, Greece and Ireland).  
<sup>7</sup> Except for France, to which the period available is 2005-2008.  
<sup>8</sup> The EU27 exports and imports vis-à-vis the rest of the world, which excludes the trade between the EU27 countries.

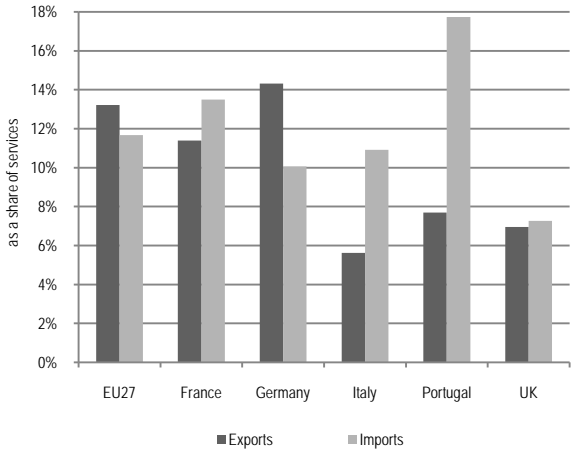
When freight services are placed as a percentage of services (Figure 17), the conclusion is that these services are much more significant in Portugal's imports than in other countries, which represent about 18 per cent of total services. Once again, future research is required to advance more explanations on this subject.

**Figure 16 – Freight services by country (% GDP) (2004-2008)**



Source: Eurostat and authors' calculations.

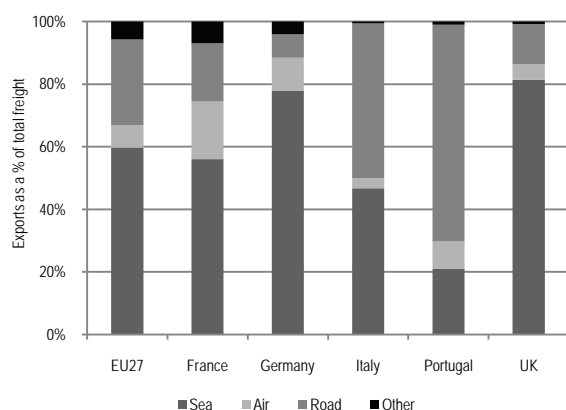
**Figure 17 – Freight services by country (% services) (2004-2008)**



Source: Eurostat and authors' calculations.

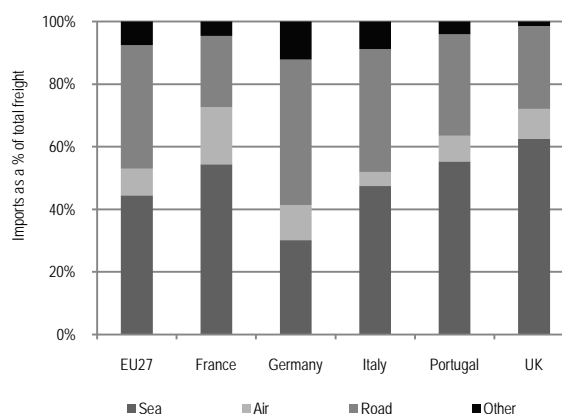
According to Figure 18 sea and road freight exports represent 87 per cent of total freight exports in the EU (shares of 60 and 27 per cent, respectively). Freight exports by sea are the most important mode of transport in the UK, as expected, followed closely by Germany, both above the EU27 average. France is the most relevant country for the case of air freight exports as a share of total freight exports, being also relevant on road freights. In contrast to other EU27 countries, the most representative mode of transport in Portuguese freight exports is by road, representing 69 per cent of total freight exports, followed distantly by sea mode with a share of only 21 per cent of total freight exports. Once again, the geographical location and the destination of Portuguese exports of goods may be the main causes of this outcome, given that the EU27 accounted for more than 75 per cent of these exports during the same period. Similar reasons might explain the Portuguese share of freight imports by mode of transport in total freight imports as presented in Figure 19. However, for imports, it is noticeable the inversion of the relevance of almost all modes of transport, particularly when considering sea and road, accounting for more than 50 per cent and around 30 per cent, respectively. The contrasting situation is observed for Germany's profile of freight imports and exports by mode of transport, i.e. sea is the most representative mean for freight exports and road is the most representative mean for German freight imports. Interestingly, for the aggregate EU27 the share of sea and road freight imports by mode of transport is equivalent. France and Italy imports share by mode of transport do not present relevant differences when compared to exports.

**Figure 18** – Freight exports by country and mode of transport (2004-2008)



Source: Eurostat and authors calculations.

**Figure 19** – Freight imports by country and mode of transport (2004-2008)

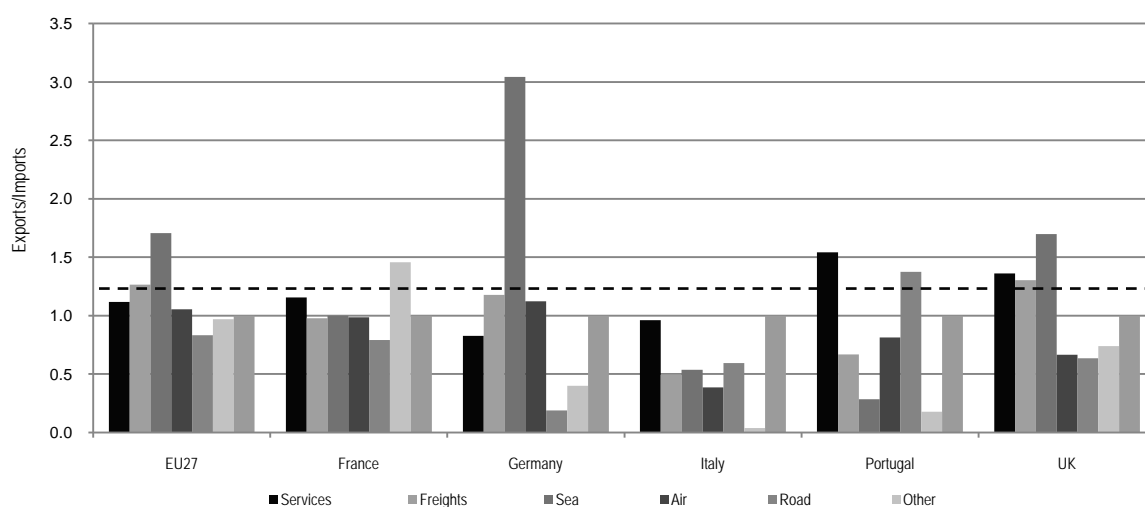


Source: Eurostat and authors' calculations.

The exports-to-imports ratio or trade balance ratio (Figure 20) is above 1 for Portugal for the services account (1.54) and below 1 for freights (0.67); this means that between 2004 and 2008 services exports exceeded imports by about 54 per cent, but freight exports covered only 67 per cent of imports. This outcome is a likely consequence of the negative balance of goods account, given that Portugal has had continued deficits in the current account.

By mode of transport, only for road freights the exports-to-imports ratio in Portugal has been above 1, with a ratio of 1.37. When compared to other EU countries, the exports-to-imports ratio of road freights is larger in Portugal due to its peripheral location in west-southern Europe and, consequently, to the large development of the road transport sector in the country. Different conclusions can be drawn for other countries. For instance, the value of sea freights exports' exceeds imports in Germany and in the UK by 3 and 1.7, respectively, and air freights exports' exceeds imports in Germany by 1.12.

**Figure 20** – Exports-to-Imports ratio by country and mode of transport (2004-2008)

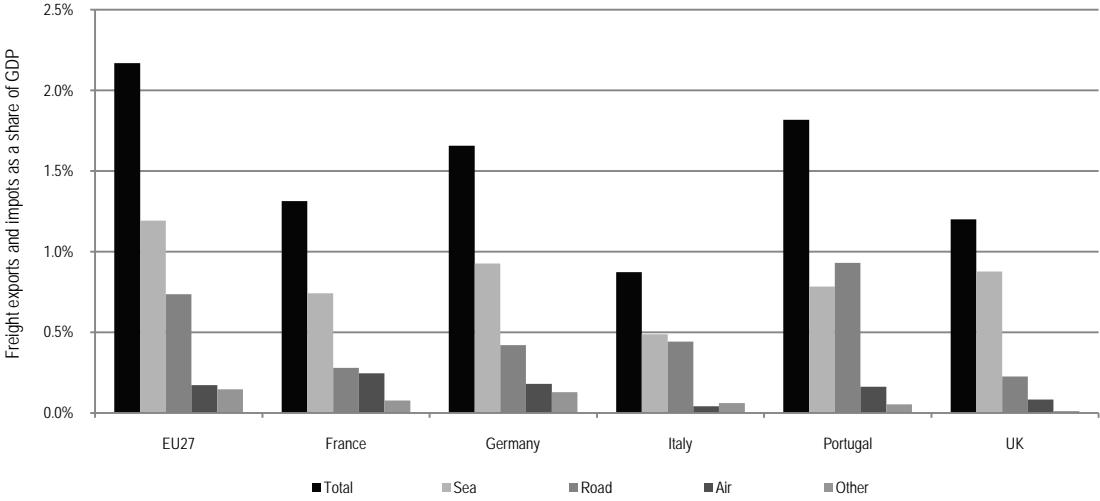


Source: Eurostat and authors' calculations.

The trade-to-GDP-ratio for freights, defined as the share of the sum of freight exports and imports in total GDP, is presented in Figure 21. This indicator measures a country’s “openness” or “integration” into the rest of the world, since it represents the degree of dependence of domestic producers on foreign markets (for freight exports) and the degree of reliance of domestic demand on foreign supply of freight services (for freight imports).

The trade-to-GDP-ratio for Portuguese freights is 1.8 per cent, greater than that of France, Germany, UK and Italy ratios, while is lesser than the current composition of EU27, on average for the period 2004-2008. By mode of transport, trade-to-GDP-ratio for road freights is 0.9 per cent greater than the other countries and the EU27.

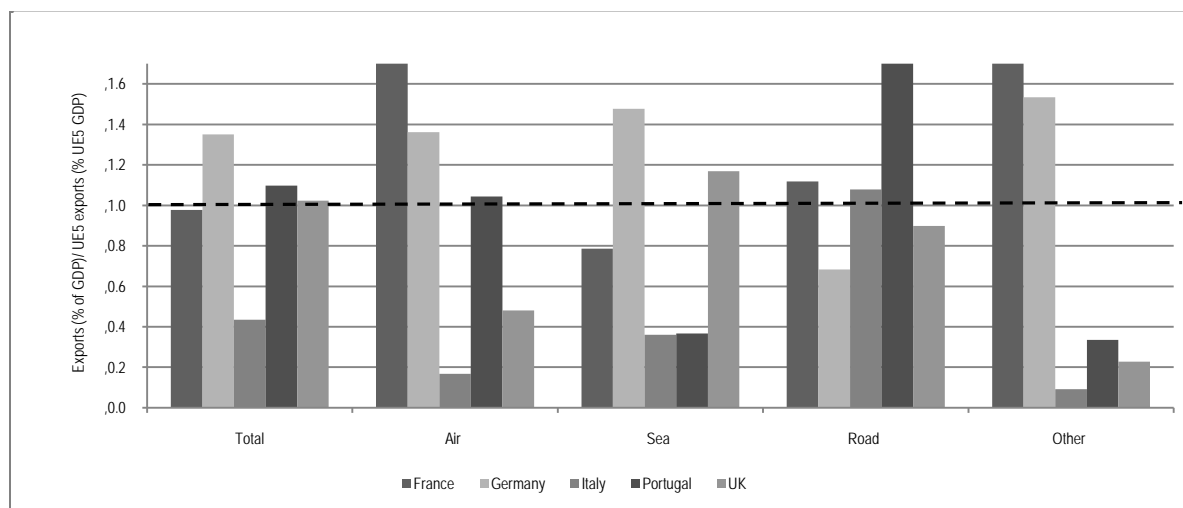
**Figure 21** – Trade-to-GDP-ratio for freights, by country and mode of transport (2004-2008)



Source: Eurostat and authors’ calculations.

The Portuguese export structure of freight services can be placed in perspective against its trading partners (EU5) average to evaluate the share and the relative specialisation of Portugal. For that purpose, the analysis of the specialisation of Portuguese exports of freight services is made through the use of an indicator similar to the traditional index of revealed comparative advantages presented in Balassa (1965), as it is usually done for international trade in goods. The Balassa index is defined as the ratio between the share of a given sector in total exports of the country under analysis and the share of that sector in total world exports. In this case, the indicator is the ratio between the share of freight exports in the country’s GDP and the share of EU27 freight exports in its GDP (Figure 21). If the indicator reaches a value higher than 1, the country is classified as being relatively more specialised in that mode of transport, that is, as having a revealed comparative advantage in the sector.

**Figure 22 – Relative specialisation of freight services (2004-2008)**



Source: Eurostat and authors' calculations.

Figure 22 suggests that Portugal reveals a clear comparative advantage in road freight services, in the period 2004-2008. Portuguese sea and other modes (rail, pipeline and inland waterway) freight services are relatively less specialised than the EU5 average, although the superior degree of specialisation of air freight services when compared with Italy and UK. Additionally, as expected, Germany and UK also reveal a clear comparative advantage in sea transport especially the former. Finally, France and Germany are the most specialised in air mode of transport of the five countries under analysis, especially the former, which reveals a clear comparative advantage in this mode of transport of both countries.

## 5. Concluding remarks

The aim of this work was to disseminate and promote the use of the b.o.p. statistics for transport research, specially imports and exports of freights, shortly describing the transport activity in Portugal. b.o.p. figures for the Portuguese freight services were analysed, broken down by mode of transport, and an integrated analysis was made in the context of other EU countries.

Net exports of total freight services were found to be negative throughout the period under analysis, although improving since 2001. The increasing path of net exports was explained mainly by road and sea freight services, whose contribution rose considerably in the last few years. Road freights were found to have a substantial share in total of freights, representing more than 60 per cent of the Portuguese exports during 1996-2008. In contrast, after a decline between 1997 and 2004, the share of the second most relevant mode of transport in Portuguese exports of freights, sea freights, increased since 2004, accounting for around 25 per cent of the total in the most recent period. Regarding imports of freight services, sea was found to be the most important one, representing more than 50 per cent of Portuguese imports of freight services in the 1996-2008 period. The share of the second most relevant mode of transport in Portuguese imports of services, road freights, accounted for around 30 per cent of total.

The exports-to-imports ratio or trade balance was found to be 0.67 for total freights, meaning that on average between 2004 and 2008 freight exports covered only 67 per cent of imports. There is only one mode of transport in which the exports-to-imports ratio in Portugal was above 1, the road freights,



with a ratio of 1.37. When compared with other EU countries, the exports-to-imports ratio of road freights is greater in Portugal due to its peripheral location in west-southern Europe and, consequently, to the large development of the road mode of transport sector in the country. Although the share of Portuguese exports of freight services in the EU27 exports was found to be practically insignificant, about 1 per cent, Portugal reveals, on average, a comparative advantage in road freight services, in the period 2004-2008.

## **6. Future Plans**

A final word for the future prospects of the b.o.p. statistics. Bearing in mind a recent EU regulation, in two or three years time the resident banking system will reduce the details reported to *Banco de Portugal* on behalf of their clients for the b.o.p. statistics purposes. The compilation system will need to adjust and will, almost certainly, move forward to more direct reporting from firms engaged in operations with non-residents. Consequently, this particular feature will also impose adjustments into the compilation of freight transport services exports, implying the collection of data directly from carriers and other transport companies. Regarding imports of freight transport services, there are also plans to revise the estimate for the cif-fob margin. As it was explained in chapter three, imports of freight transport services are obtained from this estimate. In general, the future estimation will follow some minimum standards defined by International Organisations engaged in the harmonisation of statistics among countries, namely Eurostat for the EU countries. The minimum standards that should be applied by the EU member States are the following, listed in order of priority (Eurostat 2008:11) i) different partner countries must be considered; ii) should be updated at least every five years; iii) should follow different means of transport (air, road, rail, sea, pipeline, etc.); iv) must take into account different product groups or product characteristics as they impact the transport costs; v) and, finally, should be consistent with the ratios used by neighbouring countries whenever trade patterns are somehow similar.

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# The use of payment cards data for travel statistics<sup>1</sup>

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## **1. Introduction**

The balance of payments statistics are relatively well recognised by a wide audience. They are usually used for economic policy purposes since they provide information, among other things, about the current account, the trade balance or the worker remittances. For instance, decision-makers use them as an indicator of the export performance and competitiveness of resident companies or as an indicator of the borrowing needs of a country.

Despite their importance from a macroeconomic perspective, balance of payments statistics are also very useful for the analysis of some specific sector of activity. In fact, these statistics measure the receipts and payments related to the exports and imports of several services, like communication, construction, insurance, etc. Since Portugal is an important tourism destination in Europe, one of the most relevant services included in the balance of payments statistics is the item Travel. For instance,

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Travel receipts represent about 50% of the exports of services<sup>3</sup> and it has been a major factor behind the maintenance of an average surplus in the services account close to two per cent of GDP in the last two decades, giving a significant contribution to offset the deficit of the Portuguese current account.

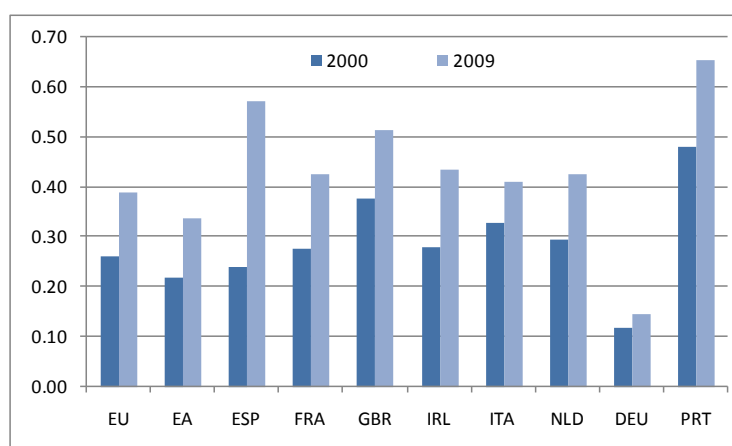
Even though the balance of payments statistics are recognised by the public, the notion of Travel exports might not be clear for all. The lack of knowledge about the concept often leads to a misuse of the data (or even to ignore them), for instance, on sector analysis about tourism. If one is interested in knowing if a country is becoming more attractive to visitors, some may use several indicators like the number of night stays, the hotel revenues, the number of passengers arriving in airports, etc. Nevertheless, in general, the amount of money spent by visitors from abroad on goods and services in a country, during visits of less than one year, is given by the item Travel of the balance of payments.

Due to the difficulty in collecting data directly from retailers, accommodation facilities, and all other sort of providers of goods and services to travellers, the data used to compile the item Travel in the balance of payments might have to be obtained through some indirect means. In effect, the compilation of Travel is not an easy task. To compile Travel as accurately as possible the balance of payments compilers need to capture all sorts of financial flows involving travellers' expenses. A traveller usually pays for restaurants, accommodation and other goods and services with cash (brought with him/her from abroad or withdrawn in the visiting country), bank transfer, traveller cheques or payment cards.

The authors of this paper intend to give a brief explanation about one of the sources that seems to be very promising to compile the item Travel: data on payment card transactions. On the one hand, the development of payment systems is leading to a growing importance of this instrument relative to other payment instruments, as it can be seen from Figure 1. On the other hand, with a reduced number of international brands (Visa, Mastercard, American Express, etc) and processors, data collection may represent a reduced statistical burden for reporters.

*Figure 1 – Structure of European Union payments*

(payment cards as a percentage of total cashless payments)



Source: ECB - Payments and Settlement Systems Statistics

<sup>3</sup> Amador and Cabral (2009) analyse the specialisation pattern of Portuguese exports of services using the traditional Balassa (1965) index of revealed comparative advantages, as it is usually done for international trade in goods. The study confirms the importance of Travel services to the Portuguese economy, since it reveals a clear and sustained comparative advantage in this sector over the last decade.

The paper is organised as follows. A concise explanation of the compilation practices of the item Travel followed by the Portuguese balance of payments will be given in the second chapter of the paper, including a brief description of the institutional and methodological framework. Moreover, payment cards as a data source and its dimensions will be described in the third chapter. The advantages and disadvantages of this source for the Portuguese balance of payments, together with the available variables, will also be explored in chapter three. The fourth chapter is devoted to the presentation of practical examples of payment cards data, focusing on Portuguese Travel exports, which will illustrate their wide potential as data source. Finally, conclusions will be drawn, not only on what is presently used by the compilers, but also on what can be further explored in payment cards data, with its strengths and weaknesses, to increase the quality of Travel statistics.

## ***2. Concepts and methodology***

In the balance of payments (b.o.p.) framework, Travel is included in the current account, as it is a standard component of the bop, namely in the services account. According to the fifth edition of the International Monetary Fund (IMF) Balance of Payments Manual (IMF, 1993, §.242): “travel covers primarily the goods and services acquired from an economy by travellers<sup>4</sup> during visits of less than one year in that economy”. The Manual also states that Travel (IMF, 1993, §.243) “differs from other components of international services in that it is a demand-oriented activity”. For the registration under Travel item it is necessary that the traveller goes outside its own country. So, for this type of services, it is the consumer who moves to the location of the providers, and not the opposite. In other words, Travel credits (or exports) in the Portuguese balance of payments equal the amount of money spent by foreign visitors on goods and services in Portugal while travel debits (or imports) correspond to the amount of money spent abroad on goods and services by residents in Portugal. Therefore, Travel is not a specific type of service but an assortment of goods<sup>5</sup> and services consumed by travellers, including accommodation, food and beverages, transportation inside the visited economy and, gifts and other objects bought there. A common misinterpretation involving Travel respects to the coverage of passenger fares: international transportation is actually not recorded under Travel, but in transportation services. Only the money spent by visitors on its internal mobility is recorded under Travel, like in train and bus tickets or in rent-a-car services.

The compilation of Travel statistics is not a simple task for statisticians. Regarding the fact that it is a demand-oriented activity, whose expenses might be done by any person, it becomes a challenging mission. In fact, there are a broad number of sources that may be used in the compilation of this component of the balance of payments, for example, surveys, settlements data, models, etc. Conventionally there have been two main methodologies considered for compiling international Travel estimates of the expenditure by non resident travellers during their visits to the reporting country and the expenditure of resident travellers during their journeys abroad. The first relies on the financial flows arising from their international transactions. This is based primarily on the reports from banks, debit and credit card issuers and exchange bureaus on purchases and sales of foreign currency, on payment cards, traveller cheques, bank transfers to operators and other settlements. The second method is based on sample surveys, either on the frontier or border surveys (which can collect data

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<sup>4</sup> According to the Manual (IMF, 1993, §.243 and §.244), a traveller is “an individual staying, for less than one year, in an economy of which he is not a resident” but, “the one-year rule does not apply to students and medical patients, who remain residents of their economies of origin even if the length of stay in another economy is one year or more”, and “all the expenditures made by students and patients are recorded under Travel”.

<sup>5</sup> According to the sixth edition of the IMF Manual, which will entry into force in 2014, the “acquisition of valuables (such as jewellery and expensive art), consumer durable goods (such as cars and electronic goods) and other consumer purchases for own use, which are in excess of customs thresholds, are excluded. These goods are included in general merchandise.”

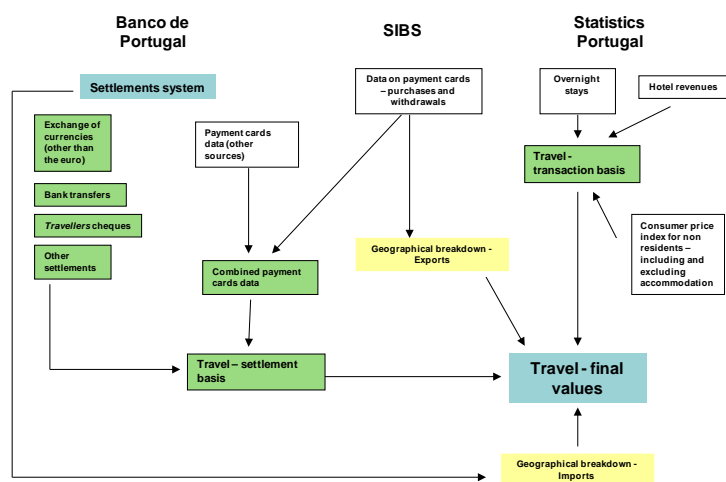
both on credits and debits) or household expenditure surveys (that only collect debits or expenses). Both methods have their own advantages and disadvantages<sup>6</sup>. The compilation of Travel in the Portuguese balance of payments relies mainly on the first-mentioned methodology, using data based on settlements, which is complemented by data on non-financial flows. Therefore, the following information is used:

1. Data on purchases/sales of foreign currency at banks and exchange offices' counters;
2. Payments with traveller's cheques;
3. International transfers related to payments for accommodation and other Travel expenses;
4. Cash withdrawals and purchases with payment cards;
5. Data on overnight stays in hotels (only for exports);
6. Total income from hotel activity (only for exports).

The first three sets of data are part of the reporting framework set up for the balance of payments statistics, by banks and other entities, which is registered under the proper item according to the type of transaction. The data on retail purchases using debit or credit cards and cash withdrawals are obtained, via *Banco de Portugal Payment Systems Department*, from *SIBS – Forward Payment Solutions* – the company responsible for processing payments and managing the network of ATM - Automated Teller Machine terminals (used by travellers to withdrawal cash), and POS - Point-of-sale terminals (used by travellers pay directly to the merchant), in Portugal (*MULTIBANCO*). Finally, the last two sets of data are provided by Statistics Portugal (the Portuguese national statistical office; INE) and are used only for the exports side (i.e. the revenues obtained from non-residents visiting Portugal), namely with the purpose of providing the geographical breakdown. These data are also used to adjust for the accrual principle defined in the balance of payments manual, i.e. to register Travel revenues in the moment the transaction occurs, instead of the moment the payment or settlement occurs.

On a monthly basis, the year-on-year growth rate is estimated according to the variation of the different payment instruments. A concise diagram of the compilation process is presented in Figure 2.

Figure 2 – Compilation process



<sup>6</sup> The main advantage of this first method is the degree of coverage obtained. The dissimilarity of some concepts from these different sources can be viewed as a weakness of this method. Regarding sample surveys detailed information (e.g. possibility to distinguish tourism expenditures by reasons of health, education or personal reasons) is a relevant advantage. The non-response and coverage are the main difficulties caused by this method.

The introduction of the euro brought new challenges to the estimation of travel in euro area countries, since no cash exchange is necessary to Travel within the region. In fact, it is more difficult to compile Travel than it was in the past, because it is not possible, based on traditional bank settlements data, to account for expenses made with euro banknotes brought by visitors in their pockets<sup>7</sup>.

### ***3. Payment Cards data: a valuable source***

The majority of origins and destinations of Portuguese Travel are euro area countries and, in this context, payment cards data are a very valuable source of information. Presently, in the Portuguese balance of payments around 50% of the year-on-year growth rate of Travel is explained by payment cards data.

In Portugal there is a very peculiar institutional framework, which probably explains the high importance of cards in national and international transactions. In effect, there is only one large company involved in processing payment cards data – SIBS – Forward Payment Solutions, which represents a single platform for retail payments<sup>8</sup>. This company was founded in Portugal in 1983 and nowadays is one of the major payment processors in Europe. Its shareholders are almost all banks operating in retail banking in Portugal. SIBS handles transactions originating across various channels ranging from ATM and POS networks, Internet and mobile phones, contactless payments, as well as the interbank clearing of cheques, credit transfers and direct debits. The history of SIBS and MULTIBANCO (MB) card is interconnected. In 1985, when MB card was launched, banks started to provide their clients the access, at ATM terminals, to a set of operations until then only available at bank agencies: withdrawals, account balance, statement enquiries and even cheque book requests. In 1987, MB card has started to provide electronic payments at the POS terminals, strengthening the card's functionality to its owners and providing merchants with an alternative solution to accept electronic payments safely and efficiently. Along the years ATMs have enlarged their services, nowadays providing around 60 different operations.

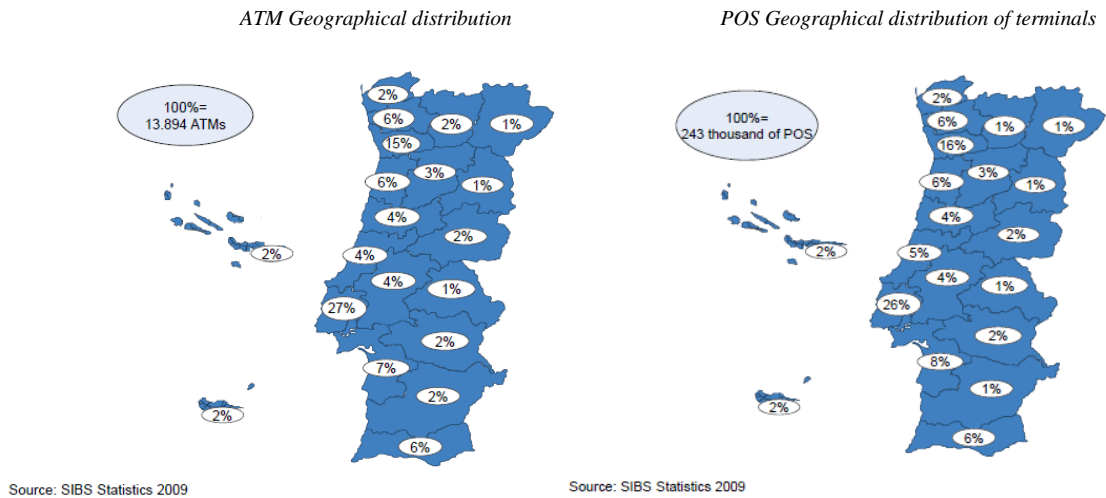
In 2009 there were more than 19 million MB cards, of which, 98% are co-branded with international systems, such as Visa, MasterCard or American Express. For instance, in Portugal payment cards can be used in more than 13 thousand ATM terminals and in more than 240 thousand POS terminals. One can assume that payment card data constitute an accurate source for Travel in terms of coverage of transactions and accuracy of the detail produced as regards the geographical breakdown. In effect, these terminals are spread by the territory taking into account the geographic distribution of the population and of the economic activity, with the highest number of terminals near the coastline and big cities.

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<sup>7</sup> In the Portuguese balance of payments this component is estimated based on historical data, combining the year-on-year rate of change of payment cards data and the year-on-year rate of change of banknotes data other than the euro, weighted according to the structure of payments.

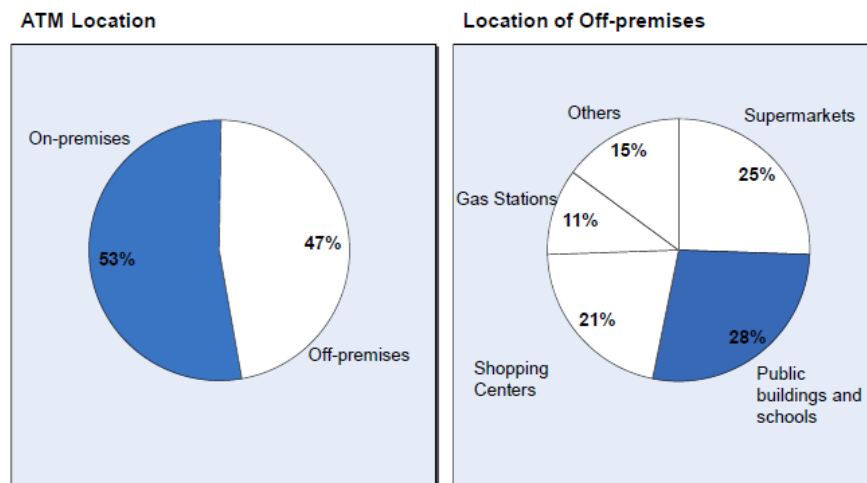
<sup>8</sup> There may be companies using their own payment platform, but they still represent a very small fraction of all transactions with payment cards.

**Figure 3 – Geographical distribution of terminals - 2009**



The ATM and POS network is distributed by activity, as shown in the figures below. ATMs are available not only in banks (on-premises) but also in airports, gas stations, supermarkets, shopping centres and restaurants, allowing for a full national coverage of the economic activity.

**Figure 4 – ATM network per type and location in Portugal**

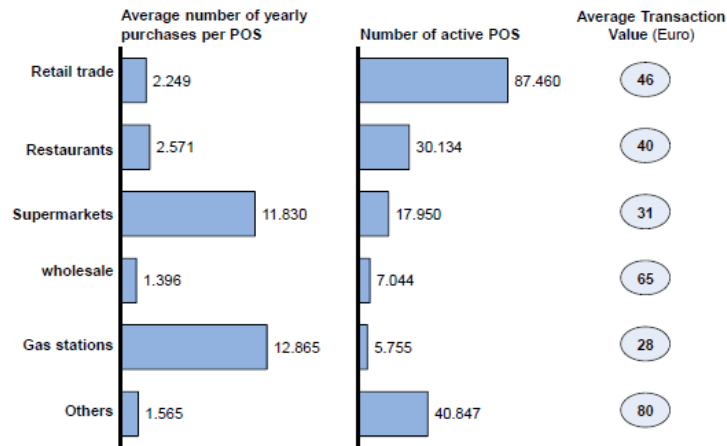


Source: SIBS Statistics2009

Gas station POS terminals are the most used, with over 12 thousand operations per terminal in 2009, closely followed by Supermarkets. The item “Others”, showing the highest average value of purchases, includes terminals such as those at financial institutions and insurance companies, tourism and recreational facilities and public administration, which due to their characteristics represent a high average transaction value.



Figure 5 – POS terminals profile

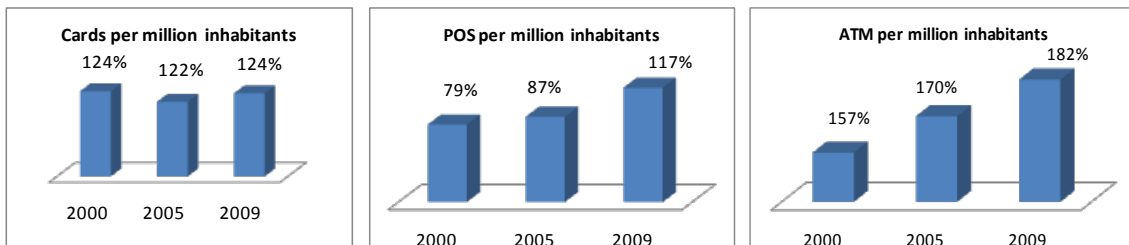


Source: SIBS Statistics 2009

Portugal presents coverage indicators superior to the European average (Figure 6), which resulted from the efforts made in the universality and coverage of the network, as well as in the diversity of services provided. For instance, in 2009, Portugal is above the euro average in 24 percent concerning cards per million inhabitants; 17 percent in POS terminals per million inhabitants and 82 percent if the indicator is ATM terminals per million inhabitants. This framework probably explains the fact that payment cards have been growing its importance in Portuguese payments systems, which is superior, compared to the rest of the euro area.

Figure 6 - Portugal compared to Euro Area average

(Euro-16 average = 100%)



Source: ECB - Payments and Settlement Systems Statistics

Bearing in mind the data reported by SIBS to *Banco de Portugal*, the next table presents the main variables available, despite the fact that not all of them are effectively used in the compilation of Travel or have been analysed with that purpose.

*Table 1 – Variables available in payment cards data*

<i>Variables</i>	<i>Description/observation</i>	<i>Availability for statistical</i>
Type of terminal	ATM, POS, etc	Monthly
Brand	Multibanco, Mastercard, Visa, Amex, etc	Monthly
Issuer bank	Only available for Portuguese cards	Monthly
Type of operation	International payment, national payment, international withdrawal, national withdrawal, etc	Monthly
Country	The country where the card was issued and the country where the card was used by its owner	Monthly
Region	Based on the geographic location of the terminal in the Portuguese territory	Monthly
Activity sector	Based on the activity of the merchant or of the premises where the POS terminal is located	Upon request and still under analysis
Mode of transaction	Either face-to-face or at distance transactions	Annual
Number and amount of transactions	On a monthly basis	Monthly

Using this dataset is possible to obtain the number and value of operations performed in Portugal with cards issued abroad, and transactions with national cards operated outside the country. This provides, on a monthly basis, an important measure for the exports and imports of services related to Travel. SIBS also provides periodically (on an annual basis) the distinction between payments that are and are not performed with the presence of the card (those related with e-commerce that should be considered under exports or imports of goods). This is of extreme importance since online payments through the internet are growing very rapidly. Nowadays, a project for improving the payment cards' data available for the balance of payment compilers is being launched, in which the former variable is probably going to be provided on a monthly basis. Moreover, it is expected that the merchant activity of the owner of the POS terminal also becomes available on a regular basis. This would represent a good improvement for the data quality, because it would allow some additional knowledge about the type of expenses that are performed with cards. For example, it would allow for the precise identification of those payments related to international transportation, which might be mistakenly included on Travel data. Even the split between goods and services (accommodation, food and beverage, internal transportation, etc) would be possible to obtain and would allow the compliance with new standards defined by the international organisations, namely those included in the sixth edition of the balance of payments manual.

The advantages of using payment cards data as source for Travel may be summarised as follows:

### ***Coverage***

It is assumed that a substantial number of international payment card transactions are Travel-related. Furthermore, the share of payment cards on total Travel is relatively high and tends to increase over time. In effect, it covers almost all transactions made by payment cards, as the data are collected by the company responsible for processing payments and managing the network.

### ***Geographical allocation***

The geographical breakdown is available in the dataset. It is based on the country where the issuer bank is located, which is assumed to be the country of residence of the visitor. Although there may be travellers using payment cards issued in other countries other than their country of residence, this assumption is considered to be a good proxy to determine the geographical breakdown of Travel.

### ***Timeliness***

Data are available with a very short delay, 10 to 15 days after the end of the reference period. It is one of the timeliest sources of the current balance of payments framework.

### ***Frequency***

Payment cards data have a very high frequency, since data are available on an operation-by-operation basis (on its source) and is available for compilers on a monthly basis.

### ***Detail***

It can provide detailed information on the characteristics of both the travellers (cardholders) and the providers, namely the type of services or goods acquired, the activity of the merchant, the geographic location, the mode of supply, etc.

### ***Cost***

The cost of collecting and obtaining the data is incredibly reduced for compilers and respondents, representing a very low statistical burden. In effect, the data are primarily collected and classified by the company responsible for processing payments and managing the network, and due to its characteristics (operational data, resident in the processors' system) its cost is very low.

Some disadvantages of using payment cards data may also be appointed. They are the following:

### ***Inaccuracy***

Non-tourist related transactions may be included in Travel e.g. purchases of valuables or consumer durable goods or purchases of non-tourist goods/services while they are in their home country (books, video cameras, etc).

### ***Dissimilarity***

Breakdowns used by payment card processors are not necessarily equal to those used by statistical compilers. This constitutes a challenge, since efforts should be made to obtain harmonised nomenclatures, compatible with statistical references.

### ***Multiplicity***

The development of the financial and payments systems may lead to the appearance of more international brands and processors, which will bring complexity to the system. Nowadays, this aspect is more of a challenge than a disadvantage.

#### 4. Payment cards: brief illustration

Through the following charts and tables we will try to illustrate the wide potential of payment cards as data source for Travel, exploring its different dimensions and drawing some conclusions, not only on what is presently used, but also on what and how it can be used to enlarge Travel and tourism statistics. The following two tables summarise the volume, value and average transactions for cash withdrawals and purchases, for both transactions in Portugal with payment cards issued abroad and transactions abroad with payment cards issued in Portugal.

*Table 2 – Transactions in Portugal with payment cards issued abroad*

	Cash Withdrawals			Purchases		
	Volume (thousands)	Value (millions)	Average transaction	Volume (thousands)	Value (millions)	Average transaction
2001	5 935	708	119	11 598	948	82
2002	5 825	740	127	10 083	940	93
2003	6 167	797	129	10 308	949	92
2004	6 896	895	130	11 606	1 084	93
2005	7 471	965	129	12 350	1 114	90
2006	7 572	1 027	136	12 298	1 233	100
2007	8 471	1 149	136	13 871	1 436	103
2008	9 048	1 215	134	14 205	1 420	100
2009	9 145	1 201	131	14 482	1 317	91
<b>Average</b>	<b>5.6</b>	<b>6.8</b>	<b>1.2</b>	<b>2.8</b>	<b>4.2</b>	<b>1.3</b>
<b>Growth rate</b>						

Source: Banco de Portugal, SIBS

Unit: euro

*Table 3 – Transactions abroad with payment cards issued in Portugal*

	Cash Withdrawals			Purchases		
	Volume (thousands)	Value (millions)	Average transaction	Volume (thousands)	Value (millions)	Average transaction
2001	2 166	188	86.8	2 602	222	85.2
2002	2 311	217	94.0	3 484	321	92.1
2003	2 603	242	92.8	3 968	345	87.0
2004	2 926	276	94	4 704	392	83
2005	3 465	343	99	6 032	493	82
2006	3 835	387	101	7 099	570	80
2007	4 327	437	101	8 308	668	80
2008	4 222	441	104	9 454	755	80
2009	3 779	395	105	10 366	799	77
<b>Average</b>	<b>7.2</b>	<b>9.7</b>	<b>2.3</b>	<b>18.9</b>	<b>17.4</b>	<b>-1.2</b>
<b>Growth rate</b>						

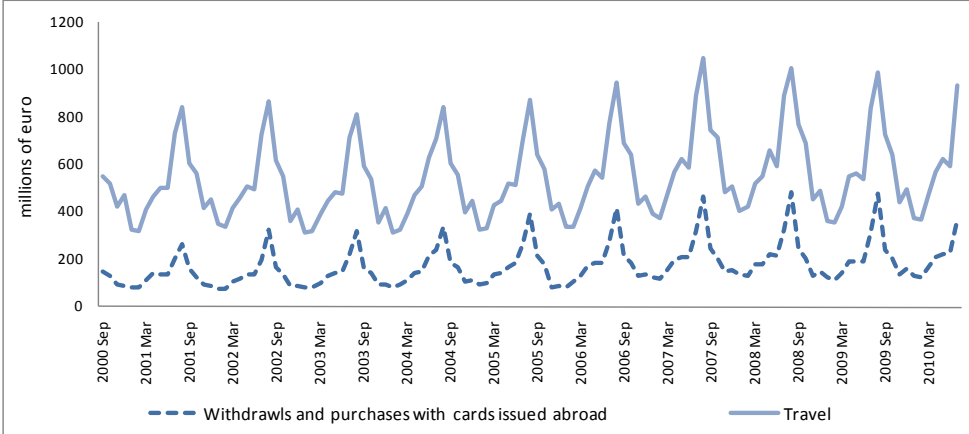
Source: Banco de Portugal, SIBS

Unit: euro

Both the average transaction on cash withdrawals and purchases made with cards issued in Portugal is lower than those performed by foreign visitors in Portugal. Except for the average transaction with payment cards issued in Portugal, all other transactions exhibit a positive average growth rate between 2001 and 2009.

As expected, from Figure 7 it is possible to observe the resemblance between the seasonality of the transactions with payment cards issued abroad and of Travel exports from the balance of payments.

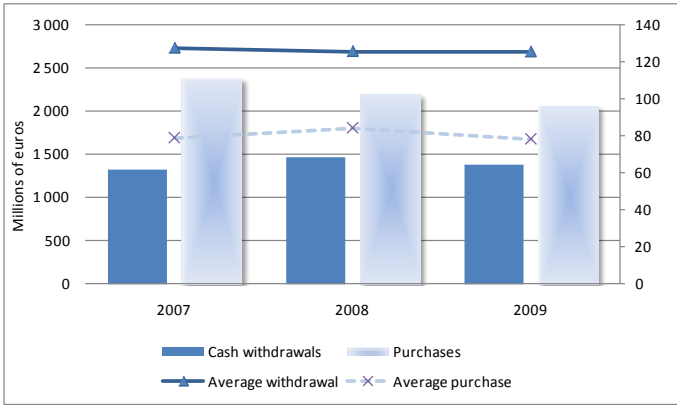
**Figure 7 – Travel exports and transactions with payment cards issued abroad**



Source: Banco de Portugal, SIBS

The following figure illustrates the average of annual cash withdrawals and purchases with cards issued abroad. Although cash withdrawals are lower in value, the average transaction is higher than the average purchase.

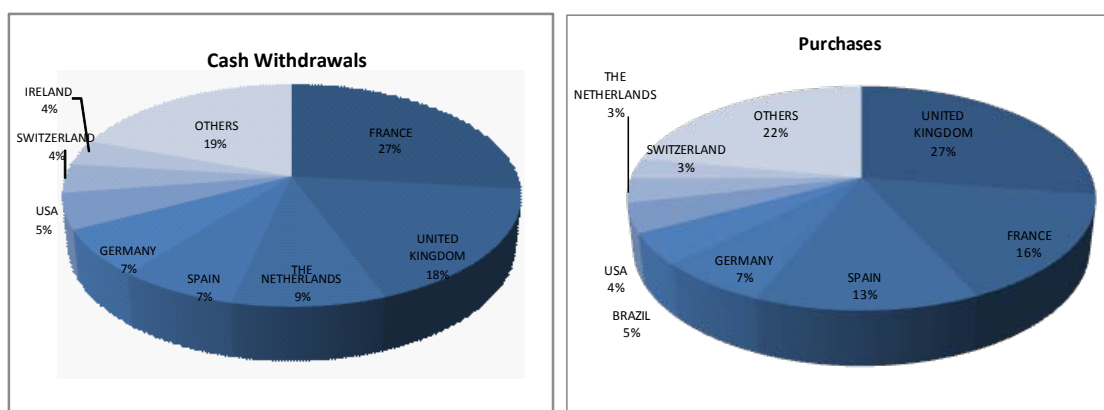
**Figure 8 – Cash withdrawals and purchases (with cards issued abroad)**



Source: Banco de Portugal, SIBS

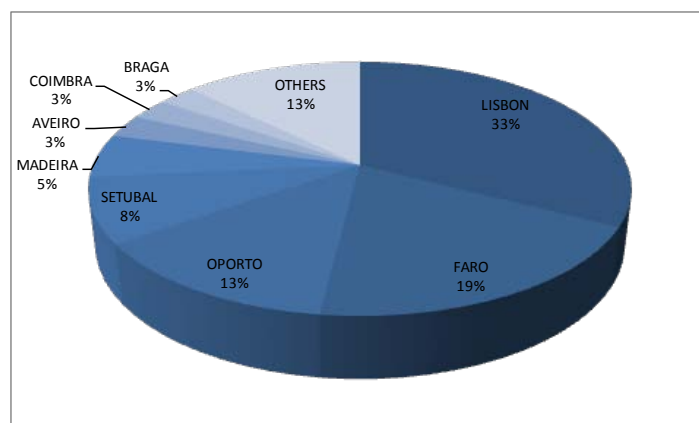
The following two figures give the geographical breakdown for transactions with payment cards. While the first one relates to the country where the cards was issued, the second one regards the region where the purchase was made, based on the merchant location.

**Figure 9 – Geographical breakdown of the visitor**  
(with cards issued abroad - 2009)



Source: Banco de Portugal, SIBS

**Figure 10 – Geographical breakdown of the merchant**  
(purchases with cards issued abroad - 2009)

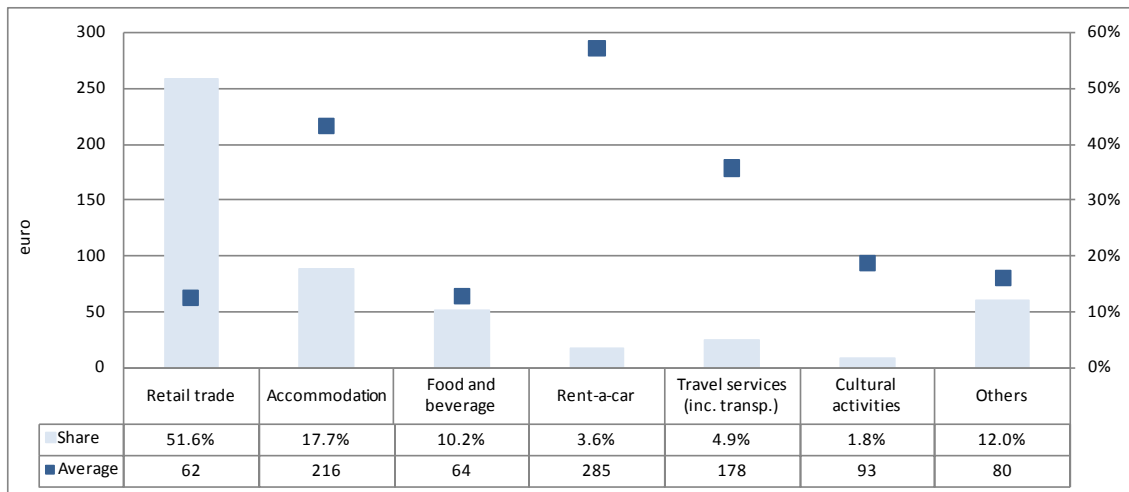


Source: Banco de Portugal, SIBS

Finally, Figure 11 illustrates the sector of activity of the merchant, based on the location of the POS terminal<sup>9</sup>. More than 50 percent of all purchases in July 2010 using payment cards were made in retail establishments (supermarkets, shopping centres, gas stations, etc), followed by accommodation (18 percent) and restaurants (10 percent). It is still possible to observe that the two most expensive average purchases were made in rent-a-car and accommodation services, with 285 and 216 euro, respectively.

<sup>9</sup> The data on the activity sector presented in Figure 11 are preliminary, since they were made available very recently to the Banco de Portugal and are still subject to feasibility tests prior to their use for the compilation of Travel statistics.

**Figure 11 – Activity sector of the merchant**  
(purchases with cards issued abroad – July 2010)



Source: SIBS

## 5. Conclusions

The objective of this paper was to present a description about the merits of one of the most promising sources to compile the item Travel in the balance of payments. The data source and its dimensions were described and the advantages and disadvantages were also discussed. A brief illustration of the data was also given using the Portuguese case. We concluded that payment cards data are a very valuable source, since, among other advantages: they represent a rather comprehensive coverage of travel-related transactions; rely on a limited number of respondents; are timely available; can provide detailed information on the characteristics of both the travellers and the providers; and, finally, represent a very low-cost solution, imposing a reduced statistical burden.

Some disadvantages of using payment cards data were also appointed, namely the possible inaccuracies arising from the difficulty of excluding some non-tourist related transactions. Taking into account that the classifications used by payment card processors are not necessarily equal to those used by statistical compilers, efforts should be made to obtain standardised nomenclatures, compatible with the statistical taxonomy. Also the development of the financial and payments systems may lead to the appearance of more international brands and processors, which may bring complexity to the system.

Some improvements to the actual compilation process of the item Travel have also been discussed, since not all payment cards data either are available to the compiler (although available at source) or have been intensively explored. For instance, the use of data on the merchant activity could represent a good enhancement since it would allow the identification of those payments related to goods and services (accommodation, food and beverage, etc). This particular breakdown will permit the compliance with new standards defined by the sixth edition of the Balance of Payments Manual. Another example would be the breakdown of Travel revenues by region, even though this split is not foreseen in international reference manuals, it might be of interest to national users.

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# Assessing securitisation activity in Portugal - compilation and measurement issues<sup>1</sup>

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## 1. Legal framework

Securitisation operations by Portuguese monetary financial institutions (MFIs) made their first appearance in 1997, despite of the non-existing specific regulation applicable. At first, the securitisations deals made use of offshore structures and the range of asset classes to be sold by the originators was restricted to, e.g. consumers' credit areas, cars acquisitions, leasing agreements and long-term rentals.

The legal framework for securitisation transactions carried out in Portugal (hereafter referred as the "Securitisation Law"), setting up the legal requirements applicable to loan securitisation and regulating the constitution and functioning of securitisation vehicles, was put in place by Decree-Law No. 453/99 of 5 November.

The Securitisation Law offers issuers two kinds of such entities: FTCs (*Fundos de Titularização de Créditos* or securitisation funds) and STCs (*Sociedades de Titularização de Créditos* or securitisation companies). These two types of financial vehicles corporations (FVCs)<sup>3</sup> are subject to the same supervisory body: the *Comissão de Mercado de Valores Mobiliários* (CMVM) — the Portuguese securities market commission — which is responsible for granting activity permission, as well as for regulating the securitisation activities.

However, few securitisations were carried out under that legal environment, partly due to the minimum capital requirements applicable to the financial vehicles engaged in securitisations and to the

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<sup>2</sup> The authors acknowledge the valuable comments from Luís D'Aguiar and Pedro Tomás.

<sup>3</sup> Following the terminology adopted in Regulation (EC) No 24/2009 of the European Central Bank of 19 December 2008 concerning statistics on the assets and liabilities of financial vehicle corporations engaged in securitisation transactions (ECB/2008/30).

lack of a clear (and attractive) tax legal framework. To address these issues, the Portuguese Government enacted Decree-Law No. 219/2001 of 4 August (the “Securitisation Tax Law”), setting up the tax regime applicable to the Portuguese securitisation transactions, and introducing several amendments to the Securitisation Law. In particular, the law explicitly removed withholding tax from Portuguese obligors’ payments to securitisation vehicles, and from the interest on paper issued by FTCs and STCs. As a result of these revisions, there was a significant increase in securitisations carried out through Portuguese financial vehicles.

By the end of 2003, the Government passed new legislation, through Decree-Law No. 303/2003 of 5 December, which introduced further amendments to the securitisations’ legal environment, mainly by setting out the framework for securitising receivables held by the Portuguese State and other public entities and broadening the scope of securitisable assets.

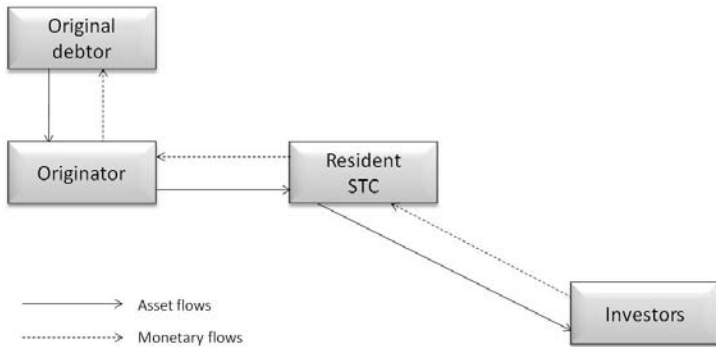
Despite the significant improvements that have been introduced in the Securitisation Law since its enactment, there are still a number of possible amendments under consideration — such as, the widening of the scope of the assets eligible for securitisation (currently only loans can be securitised), and the possibility of expanding the range of loans suitable for securitisation by all sorts of originators to loans subject to conditions or litigation (at present, only the State and the Social Security are allowed to securitise this sort of loans).

**2. The securitisation sector in Portugal**

The two types of Portuguese FVCs are distinct not only in the legal sense but also in view of the different ways in which the related securitisation processes are structured. At the outset, the FTC structures had capital prerequisites that were lower than the ones of STCs, which might help to explain the greater attractiveness of the former. However the difference in capital requirements has been losing importance along the way leading to an increased use of the latter.

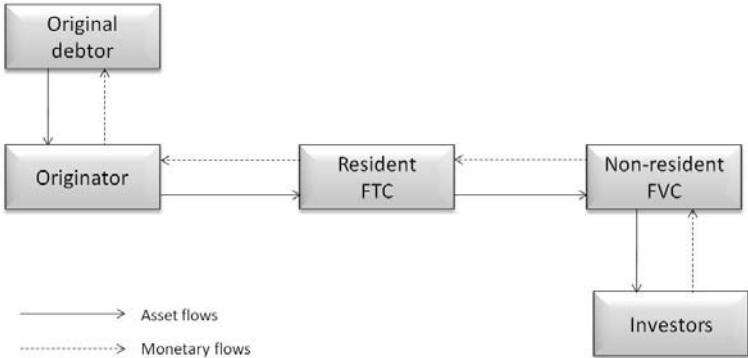
STCs are single purpose companies that take the legal form of a limited liability company. In order to finance their activities, STCs issue equity and securitisation bonds. The issue of securitisation bonds, collateralised by securitised loans, is made by private or public placement in domestic and/or in foreign markets (Figure 1).

*Figure 1 – Simplified scheme for a typical securitisation involving a resident STC*



FTCs have a structure very similar to that of an investment fund — they issue securitisation units to finance the acquisition of loans. In Portugal, the units issued by resident FTCs are typically acquired by non-resident financial vehicles. In turn, the non-resident financial vehicles issue bonds in foreign securities markets (Figure 2).

Figure 2 - Simplified scheme for a typical securitisation involving a resident FTC and a non-resident FVC



Another distinct feature of FTCs is the fact that they act as closed entities, while STCs carry out several securitisation transactions over time.

In the early days, off-balance sheet securitisations were the most widespread type of securitisation deals. However, following the adoption of the revised versions of International Accounting Standards (IAS) 32 and 39, back in 2005, this situation started to change in favour of on-balance sheet securitisation. In fact, under IAS 39, originators in a securitisation transaction are not always able to derecognise asset transfers in their accounts, given that, in a typically structured securitisation transaction, they would normally retain some of the risks/rewards of the ownership of the asset. In such cases, IAS 39 provides for two different treatments depending upon whether the originator has retained control of the financial asset following transfer. Where control is retained (as will be the case in most securitisation transactions), the financial asset must be recognised to the extent of the reporting entity’s “continuing involvement”.

Conditional on the loans being derecognised or non-derecognised in the originator’s balance sheet, and to avoid double-counting, securitisation transactions are recorded as follows:

- If the securitised loans are derecognised, the amount of “loans” outstanding in the assets side of the originator balance sheet is decreased, together with a matching increase in e.g. “cash” (Figure 3). In the FVC’s balance sheet loans are recorded *vis-à-vis* the original debtor sector.

Figure 3 – Statistical treatment of off-balance sheet securitisations in the originator’s balance sheet

<i>Originator</i>	
<i>Assets</i>	<i>Liabilities</i>
<i>Cash</i>	
<i>Loans</i>	

- If the securitised loans are not derecognised, the amount of “loans” outstanding is kept unchanged; to balance out the increase in “cash” on the assets side of the balance sheet, an additional liability to the FVC is recorded (Figure 4). In order to avoid affecting the money aggregates, the entry on the liabilities side is allocated, by convention, to the category “deposit-like instruments, *vis-à-vis* OFIs, over two years”. In the FVC’s balance sheet, the loans are recorded *vis-à-vis* the originator’s sector to circumvent double-counting.

*Figure 4 – Statistical treatment of on-balance sheet securitisations in the originator’s balance sheet*

<i>Originator</i>	
<i>Assets</i>	<i>Liabilities</i>
<i>Cash</i> ➔	<i>Deposits and deposit - like instruments vis-à-vis</i> ➔
<i>Loans</i> =	<i>OFIs</i>

### **3. Data flow: from raw data to statistical information**

The Portuguese FVCs are supervised by the CMVM, not by *Banco de Portugal*; as such, there is no direct reporting of statistical information to the central bank. Instead, *Banco de Portugal* has a formal agreement with CMVM for the regular remittance of (accounting) data reported by FVCs for prudential supervision purposes. These data have different periodicities, depending on the type of FVC: STCs submit their audited balance sheets annually or semi-annually if they issue securities through public subscription or have quoted securities; FTCs report monthly data.

Another important source of information on securitisations concerns data collected from the originators. Credit institutions and other financial institutions (excluding investment funds, insurance companies and pension funds) have to report data to *Banco de Portugal* for prudential supervision purposes. Therefore, whenever these institutions act as originators in a securitisation deal, *Banco de Portugal* has the means to identify the nature of the securitisations being carried out. In the particular case of resident MFIs, institutions that are also subject to direct reporting obligations for statistical purposes, their balance sheets provide additional statistical information on the securitisation deals.

Where the originators are non-financial entities, *Banco de Portugal* has to make use of alternative sources of information, such as issuance prospectus, rating agencies’ pre-sales information and FTC’s management rules and regulations.

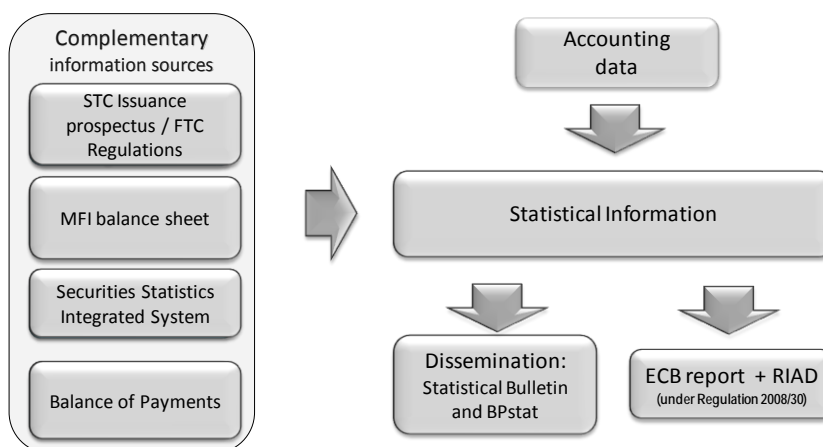
At any rate, the available statistical information on securitisations is, to a great extent, derived from accounting data, which fall short of the required standard for high quality statistics (*inter alia*, for lack of detail). To cope with this issue, complementary statistical data sources are used that allow for breaking down the accounting data into the envisaged categories and for checking the quality of primary data.

Balance of payments data, for instance, offer helpful information for the STC structures, allowing for the identification of possible anticipated amortisations of the securities issued and placed abroad.

Another key internal source of information is the Securities Statistics Integrated System (SSIS), a security-by-security and investor-by-investor database. SSIS has the advantage of gathering, in a single database, all the information concerning securities issued by residents in Portugal and securities held by Portuguese or foreign investors that are kept in custody with resident financial institutions. Therefore, the SSIS makes it feasible, to a large extent, the identification of the holders of the debt securities and other equity issued by the Portuguese FVCs.

All these data sources combined allow for the compilation and dissemination of high quality securitisation statistics, including those reported to the European Central Bank (ECB) (Figure 5).

**Figure 5 – Sources and dissemination**



#### **4. Portuguese securitisation in numbers**

Table 1 shows the FVCs’ aggregate balance sheet, broken down by financial instrument. Total assets amounted to about 50 billion euros, by end-2009, as compared to 20 billion euros in 2004. In the assets side, “Loans” are, by far, the most significant entry, averaging about 95% of total assets in the period concerned. Liabilities are basically split between “Securities other than shares” and “Shares and other equity”, accounting for the paper issued by STCs (30%) and FTCs (70%), respectively.

The first Portuguese FTC started its activity in December 2001, by securitising a pool of mortgage loans amounting to 1,000 million euros. By the end of 2009, forty eight FTCs were in activity. The total outstanding amount of loans securitised by this type of FVCs was of 34,239 million euros. About 79% of the loans securitised by FTCs correspond to mortgages originated by MFIs, and 11% to non-financial corporation’s loans.

As regards STCs, the first one started its activity in December 2003, by securitising fiscal credits of the Central Government. As of December 2009, there were four STCs in activity, with securitised assets amounting to 14,133 million euros, 79% of which were mortgages originated by MFIs, and 16% corresponded to commercial loans originated by non-financial corporations.

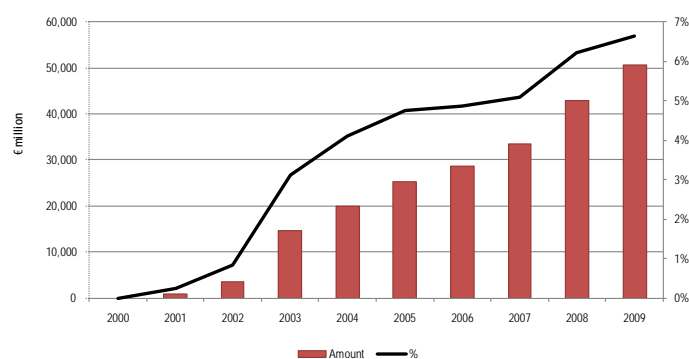
**Table 1 – Aggregate balance sheet of Portuguese FVCs**

*End of year figures 10<sup>6</sup> Euros*

	2004	2005	2006	2007	2008	2009
<b>ASSETS</b>	19,972	25,234	28,771	33,426	42,974	50,522
Currency and deposits	770	884	910	1,491	2,156	1,759
Securities other than shares	0	0	0	4	4	4
Loans	19,118	24,278	27,685	31,580	40,437	48,385
Shares and other equity	0	0	0	0	0	0
Financial derivatives	0	0	0	0	0	0
Other assets	84	73	177	351	376	374
<b>LIABILITIES</b>	19,972	25,234	28,772	33,426	42,974	50,522
Deposits	0	0	0	0	0	0
Securities other than shares	1,943	3,700	5,677	7,485	8,883	14,221
Loans	0	0	0	0	0	0
Shares and other equity	16,788	20,772	22,333	25,099	33,224	35,539
Financial derivatives	0	0	0	0	0	1
Other liabilities	1,240	763	762	842	867	761

Figure 6 illustrates the growing visibility of FVCs in the financial sector as a whole, representing about 7% of the sector's total assets by the end of 2009.

**Figure 6 – Proportion of total assets of FVCs on the financial sector**



In Table 2, the sharp increases in loans *vis-à-vis* MFIs in the last four years reflect the growing importance of non-derecognised securitisations since 2005.

**Table 2 – Loans' counterparts, by institutional sector**

*End of year figures 10<sup>6</sup> Euros*

	2004	2005	2006	2007	2008	2009
<b>LOANS</b>	19,118	24,278	27,685	31,580	40,437	48,385
MFIs	128	4,366	10,828	14,611	23,181	30,802
OFIs	128	124	143	356	592	1,874
Non-Financial Corporations	2,945	2,127	2,166	2,366	1,882	3,425
General Government	0	150	150	150	150	150
Households	15,901	17,478	14,384	14,088	14,623	12,125
o/w: Mortgage loans	14,122	16,391	13,414	13,399	14,197	11,777
Rest of the World	16	33	14	9	9	9

As seen in Table 3, in 2009 the MFI sector substituted the Rest of the world sector as the main holder of securities issued by Portuguese FVCs.

**Table 3 – Holders of securities issued by FVCs, by institutional sector**

*End of year figures 10<sup>6</sup> Euros*

	2004	2005	2006	2007	2008	2009
<b>SECURITIES OTHER THAN SHARES</b>	1,943	3,700	5,677	7,485	8,883	14,221
MFIs	8	51	100	259	2,735	9,414
OFIs	120	284	132	205	233	411
Non-Financial Corporations	0	0	0	68	165	141
General Government	0	0	0	0	0	0
Households	0	0	0	2	5	6
Rest of the World	1,815	3,465	5,445	6,951	5,744	4,248

## **5. Outputs: dissemination and institutional reporting**

*Banco de Portugal* publishes quarterly data on securitisation in its Statistical Bulletin, covering data since 2001. The presented information refers to the aggregate balance sheets of Portuguese FVCs (both STCs and FTCs), broken down by instrument.

Data are also available on “BPstat | Estatísticas online”, an Internet online access to the Statistical Interactive Database of *Banco de Portugal*. BPstat offers several features, including time series analyses, multidimensional exploration crossing several variables, dynamic comparison with other financial sub-sectors, saving *ad hoc* analyses to registered users’ Favourites folder, and receiving alerts when new information is released. Moreover, users are able to build their own tables, using the available multidimensional tools (e.g. drill-up, drill-down, expand, and collapse).

As regards the fulfilment of the reporting requirements set forth in Regulation ECB/2008/30, *Banco de Portugal* has been submitting to the European Central Bank, since February 2010, harmonised data on the FVCs’ balance sheets. Based on these statistical data, aggregated results are compiled for the following three sub-categories: (i) FVCs engaged in traditional securitisation; (ii) FVCs engaged in synthetic securitisation; and (iii) other FVCs. Data refer to end-of-quarter outstanding amounts and financial transactions are provided on a quarterly basis.

A restructuring of the data layout disseminated by *Banco de Portugal* is planned for the near future, in line with the breakdown reported to the ECB. This is expected to bring forth some additional breakdowns to the data that are actually published.

## *Supplements to the Statistical Bulletin*

- 1/98 Informação estatística sobre Instituições Financeiras Não Monetárias, Dezembro de 1998 /  
Statistical information on non-monetary financial institutions, December 1998
- 2/98 Investimento directo do exterior em Portugal: estatísticas de fluxos e stocks para o ano de 1996 e estimativas de stocks para 1997, Dezembro de 1998 /  
Foreign direct investment in Portugal: flows and stocks statistics for 1996 and stocks estimates for 1997, December 1998
- 1/99 Nova apresentação das estatísticas da balança de pagamentos, Fevereiro/Março de 1999 /  
New presentation of the Balance of Payments Statistics, February/March 1999
- 2/99 Informação estatística sobre fundos de investimento mobiliário (FIM), Dezembro de 1999 /  
Statistical information on mutual funds, December 1999
- 1/00 Investimento directo de Portugal no exterior, Dezembro de 2000 /  
Portuguese direct investment abroad, December 2000 (available only in Portuguese)
- 1/01 “Balço estatístico” e “Balço contabilístico” das Outras Instituições Financeiras Monetárias, Agosto de 2001 /  
“Statistical balance sheet” and “Accounting balance sheet” of other monetary financial institutions, August 2001
- 1/05 Utilização da Central de Responsabilidades de Crédito no Âmbito das Estatísticas Monetárias e Financeiras, Abril de 2005 /  
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National Financial Accounts for the Portuguese Economy. Methodological Notes and Statistical Results for 2000-2004, June 2005
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National Financial Accounts for the Portuguese Economy. Statistics on financial assets and liabilities for 1999 - 2004, November 2005
- 4/05 Ajustamento Sazonal de Séries Estatísticas da Balança de Pagamentos, Novembro de 2005 /  
Seasonal adjustment of Balance of Payments Statistics, November 2005
- 5/05 Estatísticas das Empresas Não Financeiras da Central de Balanços, Dezembro de 2005 /  
Statistics on Non-Financial Corporations from the Central Balance-Sheet Database, December 2005
- 1/07 Papers presented by Banco de Portugal representatives at the 56<sup>th</sup> Session of the International Statistical Institute, held in Lisbon, 22 - 29 August 2007 (English version)
- 1/08 Reporte simplificado: incorporação da Informação Empresarial Simplificada nas Estatísticas das Empresas não Financeiras da Central de Balanços, Maio de 2008 /  
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 Estatística de Títulos: Caracterização do Sistema Integrado e Apresentação de Resultados, Junho de 2008 /  
Securities Statistics: Integrated System Features and Main Results, June 2008
- 1/09 Papers presented by Banco de Portugal representatives at the 57<sup>th</sup> Session of the International Statistical Institute, held in Durban, South Africa, 16 - 22 August 2009 (English version)
- 1/11 Papers presented by the Statistics Department in national and international fora (English version)