Tailoring national financial accounts to the users' needs using administrative and other large granular datasets[1,2]

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Economic and financial reality is increasingly more complex and portraying it in a precise and timely fashion challenges the statistical function of central banks. Furthermore, users have been requesting ever more comprehensive and detailed information. In this context, it is crucial to develop tools that allow users to see the details without losing sight of the big picture. National financial accounts are of particular interest when dealing with these challenges, as they provide an overall view of the financial interlinkages between institutional sectors helping in the identification of sector vulnerabilities, imbalances and potential over-exposures to certain financial instruments. *Banco de Portugal* places a strong emphasis on the compilation of national financial accounts, namely, by making extensive use of administrative and other large granular databases. In this paper we show how these databases – which include, among other sources, the Central Balance Sheet Database, the Securities Statistics Integrated System and the Central Credit Register –, are being used to tailor the national financial accounts statistics to the specific users' needs. Additional insights brought by the Household Finance and Consumption Survey are also illustrated.

Keywords: sector accounts; micro-data; indebtedness; flow of funds; Household Finance and Consumption Survey

1. Introduction

Recommendation 15 of the G-20 Data Gaps Initiative calls for a strategy to promote the compilation and dissemination of the balance sheet approach, flow of funds, and sectoral data more generally. The use of an integrated approach for the compilation of financial flows and positions on a from-whom-to-whom basis is a key element of this strategy. There is, concomitantly, a growing trend for looking beyond aggregate data. As mentioned by of Lautenschläger (2016), central banking statistics are currently undergoing a paradigm shift: "the move from macro to micro statistics, or from aggregate to granular statistics.", which is justifiable since she believes that , beyond the aggregates lies a whole world of observations that reveal the underlying distribution and "driving forces". The combined use of aggregate and granular data are key to understand the evolution of these developments over time, particularly when economies are hit by crisis: are all economic agents affected similarly? How representative is the mean/median economic agent?

The economic and financial developments in Portugal in the years since the global financial crisis provide, we believe, interesting case-studies in support of the importance of this "paradigm shift". In addition to the effects of the global financial crisis of 2007-08, throughout 2010 and early 2011, Portugal was severely struck by the increase in risk aversion associated with the European sovereign debt crisis. The access to the international financial markets became significantly difficult and costly and in May

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2011 the country requested an Economic and Financial Assistance Programme (EFAP) which lasted until June 2014. The agents financing conditions deteriorated in a context where banks faced financing difficulties and the need to restructure their balance sheets, together with increased risk perception. One question that arises is then whether all agents were similarly affected in terms of access to bank loans; by having granular credit data, we are able to assess, for example, the "driving forces" behind any credit aggregate development, and distinguish the agents who continue to be financed from those who have been excluded from the banking loans' market.

The remainder of the paper is organised as follows: in section 2 we describe the approach followed by *Banco de Portugal* (hereinafter referred as "the Bank") in the compilation of national financial accounts; in section 3 we assess the financial interlinkages between sectors in Portugal, and in section 4 we provide additional insights to some variables for households, namely looking beyond the aggregates by using granular data. We conclude in section 5 with some final remarks.

2. Innovative solutions to compile national financial accounts

The compilation of national financial accounts in the Bank hinges on multiple data sources: monetary and financial institutions balance sheets, balance of payments and international investment position, non-financial corporations' statistics, among others. Since national financial accounts draw on information from other primary statistics, their compilation should, in principle, benefit from the input of experts in other statistical fields. The Bank has been gradually pursuing a move towards micro-data – this approach has been twofold: first, to manage highly detailed and granular databases; and second, to build a fully integrated data infrastructure[3]. Some examples of the micro-databases managed by the Statistics Department are the Securities Statistics Integrated System – which is a security-by-security and investor-by-investor system of both securities holdings and issues –, the Central Credit Register (CCR)[4] – which contains granular credit information on a debtor-by-debtor basis – and the Central Balance Sheet Database[5] – which holds accounting and financial information covering (almost) exhaustively the population of non-financial corporations. In broad terms, the long-standing aim of this approach is to have a fully-fledged integrated system, encompassing granular data of all institutional sectors and financial instruments, which can then serve the purposes of the different statistical domains. These, in turn, feed the information they produce into the system, while at the same time tapping the system for the information they need. Micro-databases provide an unquestionable valuable input to ascertain counterparts and to construct from-whom-to-whom matrixes and the flow of funds, allowing the Bank to go beyond its statistical reporting obligations.

3. Assessing sectoral financial interlinkages

The flow of funds representation gives a picture of the inter-sectorial patterns of an economy. In this type of charts, the diameter of the circle is proportional to the net flow of each sector, usually filled in green when positive and in red if negative. Moreover, the direction of the arrows goes from net creditors to net debtors, their respective widths being proportional to the significance of the inter-sector relations. Figure 1 shows the flow of funds for the Portuguese economy in four years of the last decade. There one can see important variations in the profile of the financial flows over time, with changes in the direction and magnitude of the transactions observed between the various sectors.

In 2007, the Portuguese economy as a whole was financed by the rest of the world (relatively large green circle), which is compatible with an external deficit in the balance of payments. However, the situation was heterogeneous across sectors. The rest of the world (RoW) financed essentially the general government (GG) and financial corporations (FC), which, in turn, were essentially financing the non-financial corporations (NFC) and households (HH). The financing needs of the general government were financed by households and the rest of the world.
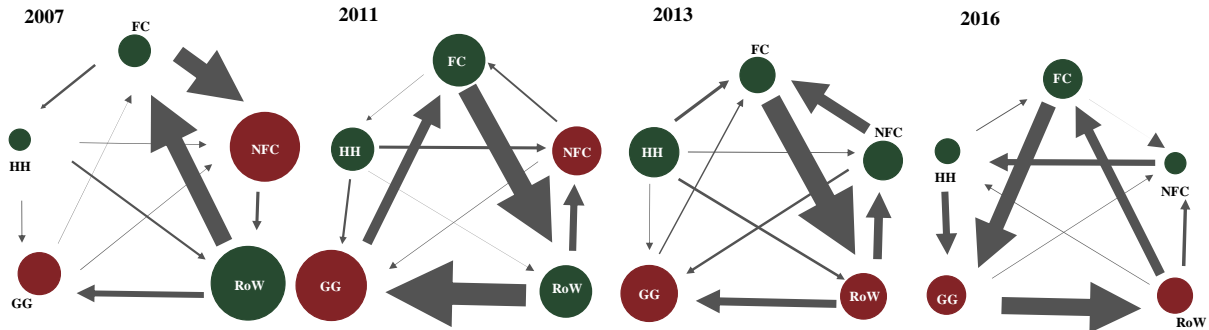
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[3] For more information on the strategy based on the integrated management of micro-databases and examples of its successful applications, please see Cadete de Matos (2016a) and Drumond & Lima (2016), respectively.
[4] See Cadete de Matos (2016b).
[5] See Cadete de Matos (2016c).

Figure 1 – Flow of funds – Portuguese Economy

With the beginning of the EFAP, in 2011, the financing needs of the Portuguese economy decreased (smaller green circle for the rest of the world), since the reduction of the non-financial corporations funding requirements and the increase of the funding capacity of financial corporations and households more than offset the rise of the financing needs of the general government. In addition to these changes in the net lending/net borrowing balances, it is worth mentioning the differences in terms of direction and width of the arrows, which reveal deep changes in the interlinkages between sectors. The depictions for 2013 and 2015 differ from the one for 2011: Portugal became a net lender (red circle for the rest of the world) – compatible with an external surplus in the balance of payments – and in both years the general government deficit decreased and the non-financial corporations became net lenders. Regarding the financial corporations, in 2013, there is a noticeable deleveraging *vis-à-vis* the rest of the world and in 2016 the financial corporations are largely financing the general government. As for households, they show a more stable pattern, with some fluctuations in their funding capacity, linked to the savings rate, but without deep variations in the inter-sectorial financial relations. When looking at the exposure to the different counterpart sectors[6], the importance of the financial corporations is very clear for both sides of the balance sheet. However, by decomposing the net flows between households and financial corporations into gross flows of assets and liabilities, including financial instrument detail, it becomes clear that the apparent stability hides important changes, since the positive net flow (financial assets - liabilities) for the recent years (since 2011) is achieved by reduction of liabilities (net repayment of debts), that are partly offset, for some of the years, by negative flows in the financial assets (i.e. households disinvesting in assets vis-à-vis the financial sector).

Figure 2 – Households transactions *vis-à-vis* financial corporations

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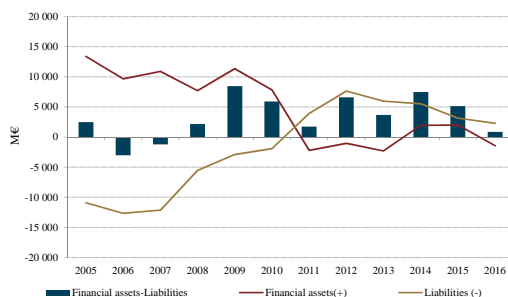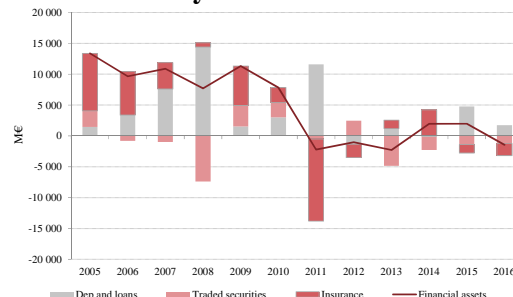
[6] Data by counterpart sector is not publicly available for all the financial instruments.

4. Tailoring national financial accounts to the user's need – the case of households

In this section we explore how the aggregate changes for households vary according to some characteristics of the individuals. We use data from the CCR and the Household Finance and Consumption Survey (HFCS). The results of the 2013 HFCS for Portugal are presented by Costa (2016), which is our main reference in this section. The HFCS data enables the analysis of the distributions of variables that affect the financial situation of households across different groups of households. As the recent financial crisis illustrated, information on the heterogeneity of the financial situation of households and, in particular, on the degree of indebtedness, is essential to assess the extent to which debt accumulation in aggregate terms originates risks to financial stability and ultimately to the growth of economic activity. The comparison of the aggregated HFCS data with the macroeconomic data from National Accounts should be done with caution given the conceptual differences between the two sources and the measurement errors associated with both sets of information. From a purely statistical point of view, this type of data is useful to infer the distribution of the variables in the population but does not substitute macroeconomic data to obtain the levels for the different economic aggregates.

a. Looking beyond households' aggregate liabilities

We start with the evolution of liabilities, namely loans granted by financial corporations, based on CCR data. The annual rate of change of these loans dropped from 1.6% in December 2010, just before the start of the EFAP in 2011, to -4.3% in mid-2013, and is currently at -1.2% (February 2017). One question that naturally arises is "who is behind these movements"? Figure 3 shows the breakdown by credit amount of loans granted to households by financial corporations for 2010, 2013 and 2016 (end of period stocks). From the nearly 30 EUR billions (mM€) reduction in the stock of loans between 2010 and 2016, almost 80% was concentrated in the most indebted classes (above 100 EUR thousands), whose representativeness decreased from 58% in 2010 to 52% in 2016. Interestingly, between 2013 and 2016 we can already observe an increase in the least indebted classes (below 50 EUR thousands). This analysis can be complemented with information on overdue loans. According to Figure 4, the increase in the overdue loans ratio from 3.3% in 2010 to 4.9% in 2016 is mainly explained by the most indebted class (above 250 EUR thousands), where the overdue loans ratio increased from 3.6% in 2010 to 9.1% in 2016. The least indebted class (below 5 EUR thousands) continues to exhibit the highest overdue loans ratio, 15.8% in 2016.

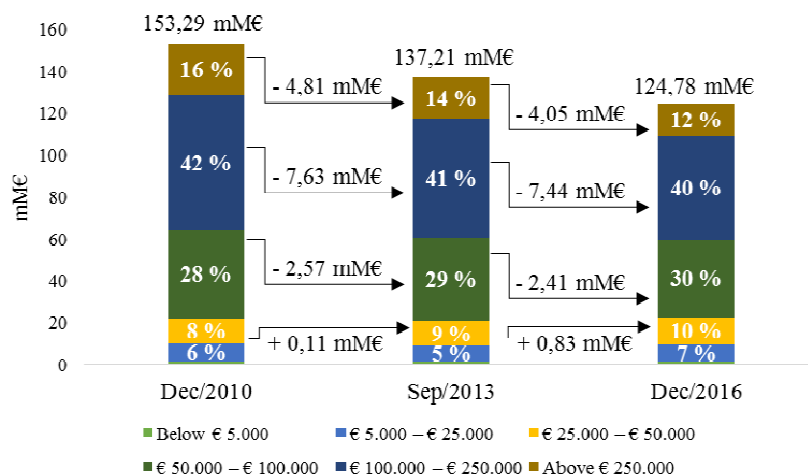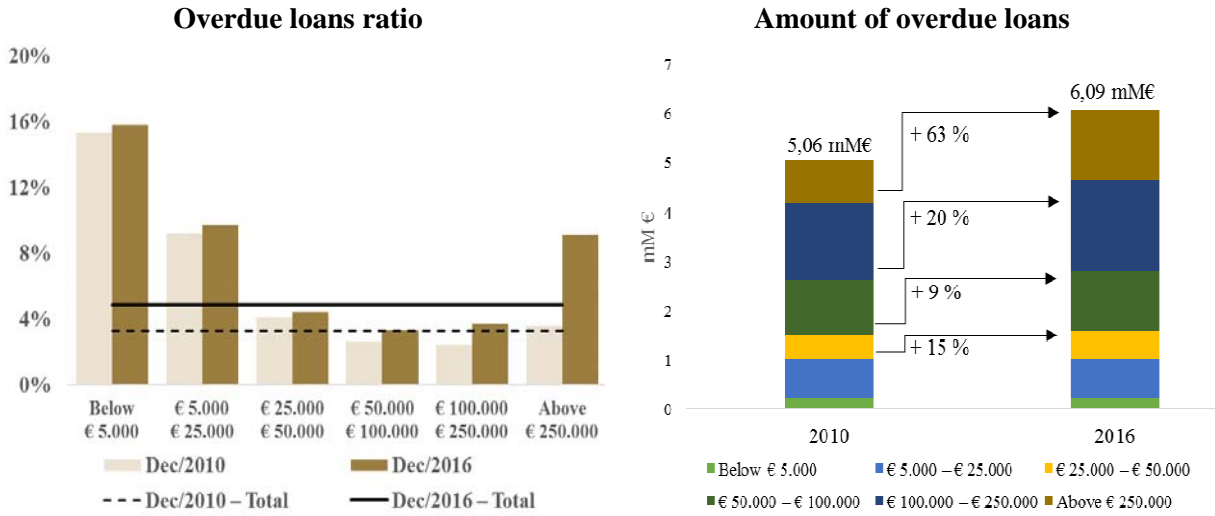**Figure 3 – Households' loans – breakdown by credit amount, 2010, 2013 and 2016**

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Figure 4 – Household's overdue loans, breakdown by credit amount, 2010 and 2016

The results of the 2013 HFCS for Portugal show that debt has a much skewed distribution, reflecting the fact that around 55 % of households in Portugal have no debt. Households in the upper net wealth classes in 2013 held less debt than households that were in these groups in 2010. The decline in the debt concentration on the wealthiest households might have resulted from a change in the composition of households that are in the top wealth classes in favour of households with lower debt levels or from the fact that households with a better financial situation have made higher total loan repayments than the remaining ones. In Figure 5 we observe that households debt peaks at the youngest ages of adult life (<35), declining steadily thereafter, and reaching its lowest levels at the end of the age distribution. Older people experienced the largest reduction in debt between 2010 and 2013. This empirical evidence is in line with the life-cycle theory, which postulates that, in the absence of credit constraints, households borrow in anticipation of future income growth, to buy housing and other durables. Typically, these events occur at younger ages, which are also characterised by lower stocks of accumulated wealth than those held later on in the life span.

Figure 5 – Conditional median[7] outstanding total debt by age of the reference person
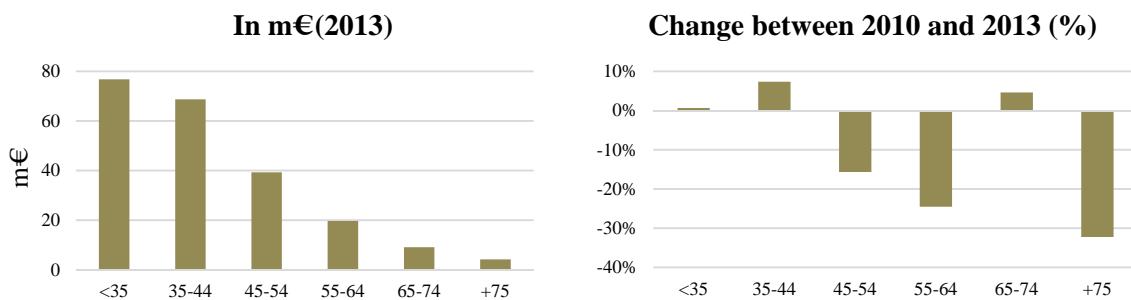
**b.   Looking beyond households' aggregate assets**

Saving deposits are the most important asset in the financial wealth for all kinds of households, except those that are in the lowest net wealth class, for which sight deposits have a dominant weight. The share of total deposits is higher for lower income and net wealth classes and for households with older and lower educated reference persons. Saving deposits are the financial asset with the highest median value

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[7] Median value of the outstanding debt conditional on participation in debt (i.e., on having a debt).

(about 11 thousand euros). Both participation rates and conditional median values of the financial assets in general increase with the level of net wealth and income. While for deposits the median value increases with age (Figure 6), for tradable assets it reaches the highest level in households with younger reference persons and in the cases of voluntary pensions and other financial assets in the age group prior to retirement. For most assets types, participation rates did not changed much in the period 2010-13. For the main asset types, with the exception of saving deposits, the median values are lower in 2013 than in 2010.

Figure 6 – Conditional median value for saving deposits by age of the reference person

In m€(2013)   **Change between 2010 and 2013 (%)**
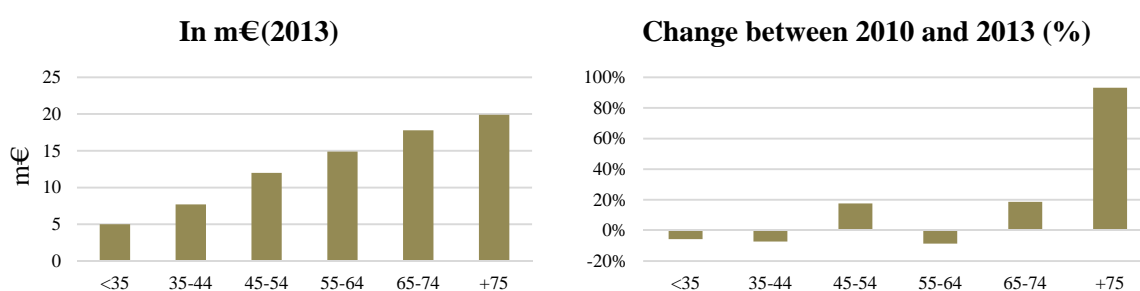
5. Final remarks

In this paper we illustrate how to tailor national financial accounts to the users' needs by means of administrative and other large granular datasets, with a focus on households, using data from the CCR and the HFCS. Both datasets contribute to a better understanding of the behaviour of macroeconomic aggregates, as they allow the identification of the groups of households where these aggregates are concentrated. As Lautenschläger (2016) puts it, beyond the aggregates lies a whole world of facts and observations that feed into granular data. The "paradigm shift" from aggregate data to granular data poses challenges that central banks must stand ready to address: (i) granular datasets need to be standardised, well integrated and multi-purpose; (ii) rules and definitions must be stable and consistent; (iii) state-of-the-art IT solutions that can process huge data volumes and ensure the necessary data confidentiality are needed.

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