

# The Portuguese Banking System during the Sovereign Debt Crisis

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## Abstract

We describe the evolution of balance sheets of monetary financial institutions (MFI) in Portugal before, during, and after the sovereign debt crisis of the late 2000's. We account for several dimensions of heterogeneity including size, type, and nationality. We find that the Portuguese MFI sector rapidly expanded and increased its leverage before and during the crisis until 2012, after which it started a long deleveraging process. Many of the major aggregates, such as lending and deposits, follow this pattern. We observe a steady rise of non-traditional banking activities on both sides of the balance sheet of domestic institutions. The crisis weakened the international integration of the Portuguese financial sector, as domestic banks became less exposed to international counterparties. Finally, the Eurosystem and the Portuguese government have become relevant sources of funding as a result of the recent unprecedented monetary and fiscal interventions in the domestic financial system. (JEL: E50, E58, G20, G21, H63)

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## Introduction

The recent sovereign debt crisis in Europe has had an unprecedented impact on the macroeconomic conditions faced by several advanced economies, such as Portugal. While the sovereign debt crisis was related to the worsening of fiscal fundamentals, it was primarily triggered by the global financial crisis, which impaired the functioning of international financial markets. Dire funding conditions affected private

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financial institutions, whose stress was then transmitted to vulnerable sovereigns. The long-lasting recession that followed evidenced the importance of financial intermediation in the propagation and amplification of business cycles.

In this article, we contribute to understanding the dynamics of financial intermediation by documenting and analyzing the evolution of the Portuguese monetary financial system before, during and after the sovereign debt crisis. Using disaggregated data at the level of each monetary financial institution (MFI), we analyze the evolution of the main components of their balance sheet, industry concentration, and access to liquidity providing facilities of the Eurosystem.

Our main findings are: (i) the number of monetary financial institutions (MFI) is stable throughout the sample period, and evenly divided between domestic and foreign institutions; (ii) domestic institutions own the bulk of the assets, and their importance has grown in the recent past; (iii) there is some evidence of increased industry concentration, especially when measured in terms of total assets; (iv) the size and leverage of the monetary financial system increased steadily until early 2012, and have been decreasing since then; (v) lending comprises the bulk of assets, and seems to have been the key driver of most movements in balance sheet size; (vi) non-government security holdings have become an increasingly larger component of banks' balance sheets; (vii) there has been substantial repatriation of domestic public debt holdings both during the crisis and the deleveraging periods, consistent with the literature; (viii) most of the leveraging was undertaken by increasing debt, but the deleveraging has combined changes in debt and equity; (ix) deposit funding followed the leveraging and deleveraging trends, and has been mostly sustained by domestic counterparties, with foreign ones decreasing in importance throughout the crisis; (x) reliance on securitized funding has become increasingly relevant; (xi) the banking sector is overwhelmingly exposed to domestic counterparties, and international activities have lost importance in the crisis and post-crisis periods; (xii) public funding from the central bank and the government has become an important source of liquidity.

Driven by this last finding, we study the characteristics of the institutions that have accessed the Eurosystem's credit operations. While all institutions in our sample, with the exception of money market funds, are, in principle, eligible for accessing these operations, only a small fraction of the MFI's use them. During the crisis, opportunities to obtain Eurosystem funding increased significantly thanks both to the expansion of the offered amounts as well as of the list of assets that are eligible as collateral. For this reason, even relatively specialized institutions had the opportunity to borrow from the Eurosystem. These institutions, which tended to be smaller, may have also relied on other MFI's funding and/or payment systems, since direct access to the Eurosystem liquidity-providing operations may entail implicit costs. The expansion of the list of eligible assets was undertaken by each national

central bank independently, involving different criteria at the national level. Laxer requirements in Portugal may have led to the increase in the number of foreign institutions borrowing from the central bank.

## Description of the Data

Our primary source of data is the Monetary and Financial Statistics dataset (MFS) from Banco de Portugal (BdP). The dataset we analyze includes detailed balance sheet information for every MFI domiciled in Portugal, with the exception of the central bank. It is a monthly panel, and we focus on the period ranging from January 2005 to May 2014.<sup>1</sup>

The MFS is a multi-dimensional dataset. For both the asset and liability sides, an observation consists of the book value held by an institution  $i \in N$  in a given month  $t \in T$  of an asset or liability in category  $j \in J$  (and, for some asset and liability types, with a certain remaining maturity), vis-à-vis all counterparties in a given institutional sector  $k \in K$  and in a given geographical area  $s \in S$ . More specifically, the different dimensions for which data are available are:

1. **Asset or liability category, ( $j$ ).**
  - (a) **Assets** - banknotes and coins, loans (with repricing dates up to 1 year, 1 to 5 years, and more than 5 years), securities except equity holdings (up to 1 year, 1 to 2 years, more than 2 years), equity holdings, physical assets, and other assets (including derivatives).
  - (b) **Liabilities** - overnight deposits, demand deposits (with a notice period of less than 90 days, and more than 90 days), other deposits (with maturity less than 1 year, 1 to 5 years, and more than 5 years), repurchase agreements, securities (up to 1 year, more than 1 year), other liabilities, and capital and reserves.
2. **Counterparty's institutional sector, ( $k$ ).** Monetary financial institutions,<sup>2</sup> social security administration, central government, regional government, local government, insurance and pension funds, households, other financial intermediaries, non-financial firms, and other sectors/non-classified.
3. **Counterparty's geographical area, ( $s$ ).** Portugal, Germany, Austria, Belgium, Cyprus, Slovenia, Spain, Estonia, Finland, France, Greece, the Netherlands, Ireland, Italy, Latvia, Luxembourg, Malta, Slovakia,

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1. The population of institutions coincides with the list of MFI's published by the European Central Bank in its website. The only exceptions are the central bank (BdP), and certain mutual agricultural banks that are consolidated at the parent level in our dataset - see Appendix A for details.

2. We can separately identify the central bank as a counterparty for liabilities but not for assets.

Economic and Monetary Union (EMU) excluding Portugal,<sup>3</sup> non-EMU Countries, and the European Central Bank (ECB).

The MFS dataset allows us, for example, to determine the book value of all non-equity securities whose issuer was the German central government that were held by bank  $i$  in month  $t$ .

Finally, entities in the MFS are subject to a functional classification. The categories are:

1. Banks
2. Savings banks (*caixas económicas*)
3. Mutual agricultural credit banks
4. Money market funds

A full list of the institutions that are present in the dataset, along with their classification and entry/exit dates may be found in Appendix B. The vast majority of the institutions are banks. The second and third categories encompass institutions that are legally restricted to practice traditional banking activities only, but have largely become obsolete and, with one exception, contain mostly small regional institutions. Finally, and as with other European countries, since the Portuguese financial system is mostly bank-based, the money market mutual fund sector is relatively undeveloped and these institutions are few and small.

In addition to this functional classification, we manually collect information regarding other institutional-level variables, which we use to complement and extend the MFS. Since our dataset contains the universe of MFI's in Portugal, it necessarily includes some institutions that are subsidiaries or branches of other institutions that are also present in the sample. For the remainder of the article, we refer to these institutions as subsidiaries. We manually classify and match each subsidiary with its parent company. In addition, we classify each institution according to its country of origin (or that of its parent institution), extending the nationality criterion to any subsidiaries that may also be present in the sample.

### *Subsample Classification*

We divide the available sample into three periods: (i) the pre-crisis period from January 2005 to April 2009, when government bond yields were close to the German 10-year benchmark; (ii) the crisis period from May 2009 to November 2011, when Portuguese sovereign spreads increased from 4% to 14% and the share of government debt held by domestic banks also increased from 4% to

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3. The dataset treats countries that joined the EMU after the beginning of the sample as if they were part of the Union throughout the entire sample, thus avoiding series breaks.

around 10%;<sup>4</sup> (iii) the deleveraging period that starts in December 2011, which also coincides with the announcement by the ECB of the three-year Long-Term Refinancing Operations.

## Number and size of MFI's

We begin our descriptive analysis by looking at the evolution of the number, size and concentration of MFI's over the period in our sample.

### *Number of Institutions*

The left panel of Figure 1 plots the number of institutions in our sample, classified according to their functional type. The overall number of institutions is relatively stable at around 76, slightly declining in the crisis and deleveraging periods. The number of savings and agricultural banks is small and stable (4 and 6, respectively). The number of money market funds increases from around 4 in the early sample to 10 starting in early 2012. Overall, the decline in the total number of institutions is explained by a decrease in the number of banks in the sample: from a peak number of 70 in late 2008 to 56 in May 2014.<sup>5</sup>

The main explanation for this fluctuation in the number of institutions seems to be related to entry and exit of foreign institutions. The right panel of Figure 1 discriminates domestic from foreign institutions. The number of domestic institutions is stable and slightly increasing towards the latter part of the sample: it reaches a peak of 44 at the end. Regarding foreign institutions, they reach a peak of 42 in late 2008, but only 35 are left by May 2014 (the lowest value in the sample). In spite of these movements, the sector seems to be relatively evenly divided in terms of the number of domestic and foreign institutions. The same cannot be said of size, as illustrated in the following subsection.

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4. May 2009 is also the month when concerns regarding the capitalization of domestic banks first arise, and the government creates a €4 bn recapitalization fund.

5. This decline in the number of institutions does not seem to be explained by mergers. In an unreported analysis, we study the number of institutions by functional classification, but excluding subsidiaries. The number of independent MFI's is relatively stable at around 59, with a small increase right before the beginning of the crisis (2008-2009) that is then reversed in the following years. It is also clear that the majority of the money market fund sector consists of subsidiaries of other MFI's. There are very few money market funds that are not subsidiaries of other MFI's in our sample (never more than 3 at any point in the sample).

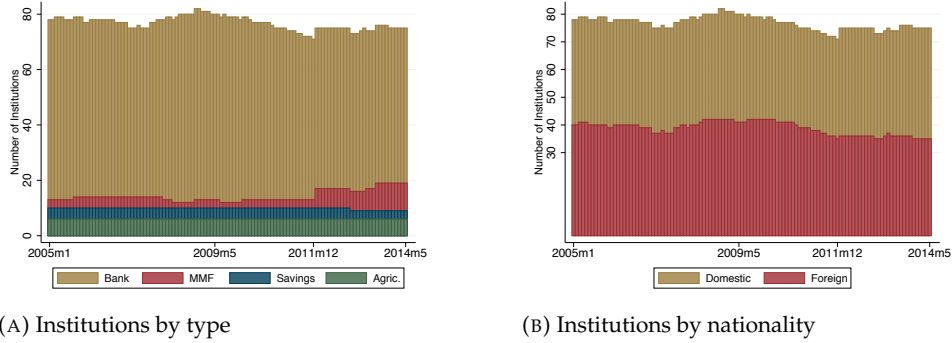


FIGURE 1: Number of institutions in the MFS according to their functional classification (left panel) and nationality (right panel).

### *Size of the MFI's*

The left panel of Figure 2 attests to the dominance of banks in the Portuguese monetary financial system. The total size of assets in the system peaks at 583.3 bn euros in February 2012, and starts declining thereafter. Non-bank institutions have, on average, assets equal to 18 bn euros, or 3.8% of total assets in the system. Most of these assets are owned by agricultural banks: the presence of savings banks and money market funds is negligible (averaging 0.06% and 0.14% of total assets throughout the sample, respectively). The right panel repeats the analysis, but using the nationality criterion instead. The majority of the assets in the Portuguese monetary financial system are controlled by domestic banks, with their share growing slightly throughout the sample (75.2% of total assets in January 2005 vs. 79.2% in May 2014).

Even though our sample is short – spanning less than 10 years – it is characterized by a strong growth of the Portuguese monetary financial system. In January 2005, our first data point, total assets of MFI's were 2.24 times GDP. After peaking in February 2012 at 3.46 times, they were still equal to 3.04 times GDP in the beginning of 2014. These numbers, as well as the predominance of banks, seem to be in line with average European values, following Pagano and ESRB Advisory Scientific Committee (2014).

### *Size Distribution*

As with many industries, the monetary financial system tends to present a distribution of firm size that is highly skewed to the right, featuring many small firms and a few very large ones. There is a large literature on the size distribution of banks in several countries: Kashyap and Stein (2000), Ennis (2001) and Janicki and Prescott (2006) conduct this sort of analysis for the United States; Koetter (2013) for Germany; Wilson and Williams (2000) for

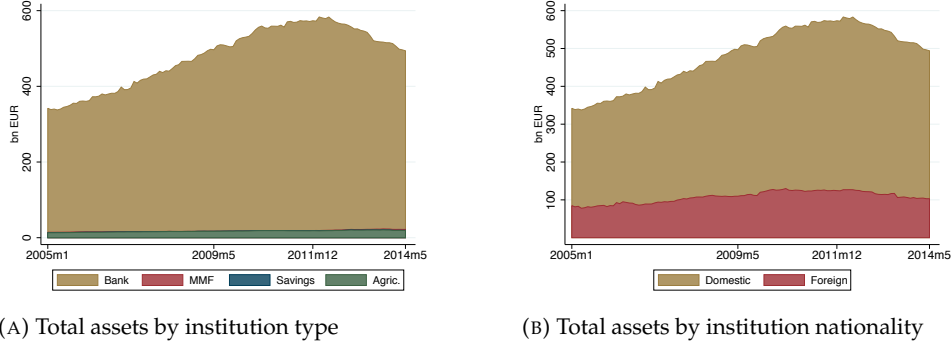


FIGURE 2: Balance sheet size of the institutions in the MFS according to their functional classification (left panel) and nationality (right panel).

France, Germany, Italy and the UK, among many others. The banking industry seems to invariably display very high concentration, and secular trends in the last few decades seem to point towards further increases in concentration and reduction in the number of smaller players.

We analyze the evolution of the size distribution of Portuguese MFI's using two nonparametric methods.<sup>6</sup> The first consists of estimating the kernel density for (the natural logarithm of) assets. The kernel density can be interpreted as a smoothed histogram. Letting each entity be indexed by  $i \in N$ , our sample of log (total) assets in a given month  $t$  can be expressed as the collection  $\{\log A_{it}\}_{i=1}^N$ . Then, the kernel density estimator of the density  $f(\log A_{it})$  is given by

$$\hat{f}(x) = \frac{1}{Nh} \sum_{i=1}^N K\left(\frac{x - \log A_{it}}{h}\right) \quad (1)$$

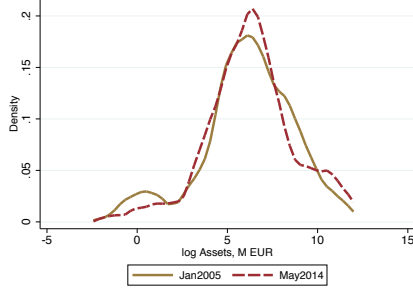
where  $K(\cdot)$  is a kernel (a non-negative function that has mean zero and integrates to 1), and  $h > 0$  is the bandwidth, a smoothing parameter.<sup>7</sup> We compute the kernel densities for the starting and ending periods of our sample, January 2005 and May 2014, and plot the results in the left panel

6. We do not seek to explain the causes of changes in concentration. In this spirit, our analysis is purely statistical, not structural.

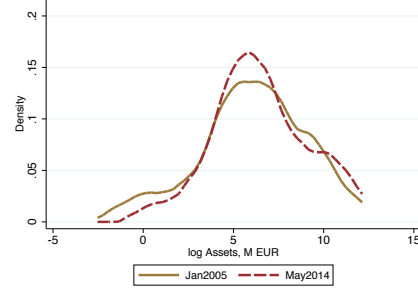
7. We use the Epanechnikov kernel function, given by

$$K(z) = \frac{3}{4}(1 - z^2)\mathbb{1}[|z| \leq 1]$$

The bandwidth is chosen to minimize mean squared error. The bandwidth that we use is an "optimal" one, in the sense that it would minimize the mean (integrated) squared error assuming that the data followed a Normal distribution. This is a conventional approach when the empirical distribution of the data is unimodal and the histogram is approximately bell-shaped, as in our case.



(A) Kernel density for MFI size



(B) Kernel density for MFI size, consolidated

FIGURE 3: Estimated kernel densities for the distribution of the log of assets; full sample (left panel) and consolidated at the parent level (right panel).

of Figure 3. The distribution seems to be relatively stable between the two periods, and approximately Gaussian. This is consistent with the results in the literature.<sup>8</sup> In spite of its stability, there is some evidence of lower dispersion at the end of the sample. In the right panel, we consolidate all subsidiaries at the parent level and show that the results are similar: the tails are flattened, but the stability and shape of the distributions remain mostly unchanged.<sup>9</sup>

The second nonparametric method we employ to study the size distribution is the Herfindahl-Hirschman (HH) index, which is better suited to study the evolution of concentration in the banking sector over time. The HH index can be computed for a given industry and a given point in time. Given a sequence of market shares  $\{s_{it}\}_{i=1}^N$ , it is computed as

$$H_t = \sum_{i=1}^N s_{it}^2 \quad (2)$$

That is, the index equals the sum of squared market shares at a given point in time. We can apply the concept of market share to several variables and compute this index over the sample period. Figure 4 plots the evolution of HH indices for three variables: total assets, lending to non-MFI's<sup>10</sup> and deposits.

8. Janicki and Prescott (2006) find, however, that the lognormal distribution is unable to capture the thick right tail in the size distribution of banks for the United States. Instead, they fit a Pareto distribution, which has similar shape to a lognormal distribution but has a thicker right tail and is often used to characterize highly skewed data.

9. It is worth noting that this process is likely to overstate the size of the consolidated banks since we do not observe and therefore cannot control for intra-group cross exposures.

10. We exclude lending to MFI's since we cannot separate lending to the central bank - the category under which reserves appear - and it includes credit resulting from regular banking activities.



The solid line considers the universe of institutions, while the dashed line consolidates institutions at the parent level. The HH index is increasing in concentration: a perfectly concentrated industry, with a single firm, has a HH equal to one. A perfectly competitive industry with  $N$  players of equal sizes has a HH index equal to  $1/N$ . As a benchmark, since the average number of institutions over the sample is 76, the HH index for a perfectly competitive market would be roughly equal to  $1/76 \simeq 0.013$ . The values in Figure 4 suggest that the Portuguese banking market is relatively concentrated in terms of the three variables we analyze, with the HH indices one order of magnitude larger than the perfectly competitive benchmark. Indeed, there are five large banks that own an average of 67% of all the assets of the banking system over the sample period.<sup>11</sup> Lending concentration seems to be stable. Deposit concentration is initially declining, but then stabilizes during the crisis. More interestingly, asset concentration seems to have increased during the crisis, and then stabilized after 2011.

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11. These are: Caixa Geral de Depósitos, Banco Comercial Português, Banco Espírito Santo, Banco Santander Totta and Banco BPI.

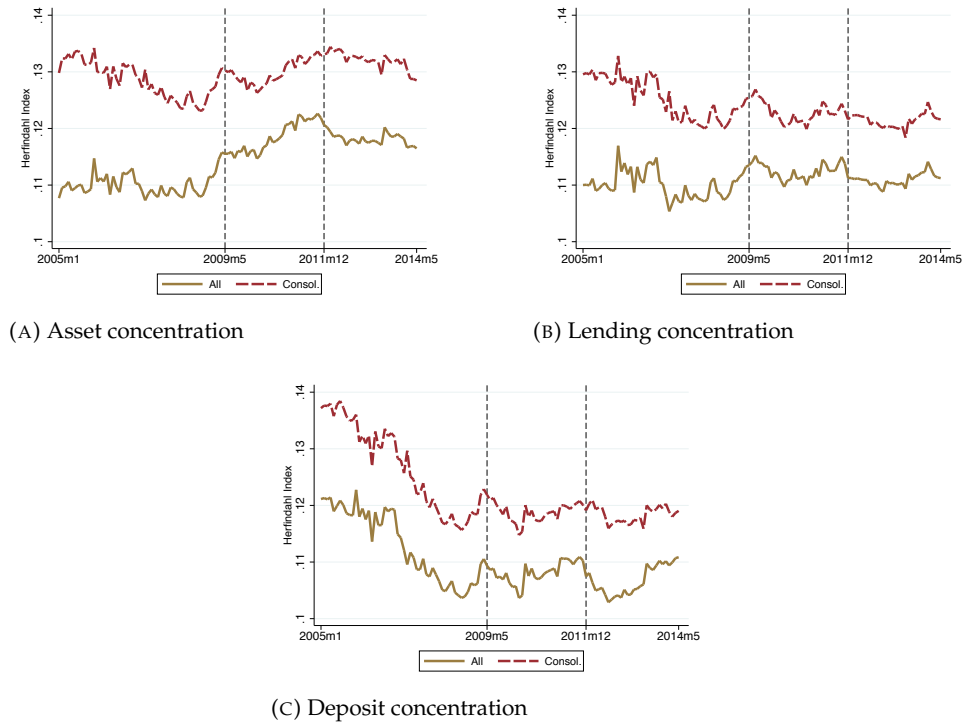


FIGURE 4: Herfindahl-Hirschman indices for total assets, lending excluding MFI's and deposits. Solid line includes the entire sample, including subsidiaries; dashed line consolidates entities at the parent level.

## Assets

We now turn to analyze the behavior of the main components of the asset side of the balance sheet. We focus on the distinction between domestic and foreign institutions, and compare the respective evolution of the different components of the balance sheet. As shown in the previous section, this seems to be the most relevant dimension of heterogeneity, along with size. We opt not to focus on the functional classification due to the dominance of banks in the MFI sector. Because of this, we use the terms MFI and “bank” interchangeably. The evolution of total assets for domestic and foreign institutions has been presented in the right panel of Figure 2. The size of the system seems to follow an inverse U-shaped pattern: it is strictly increasing until February 2012, when it reaches 583.3 bn euros, and strictly decreasing thereafter.

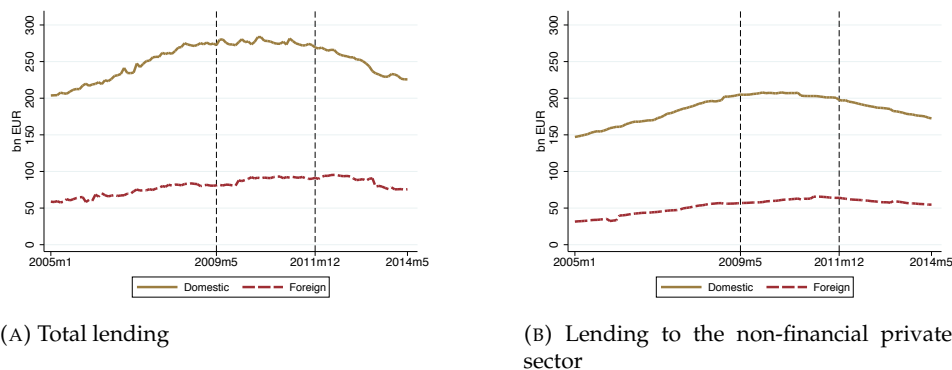


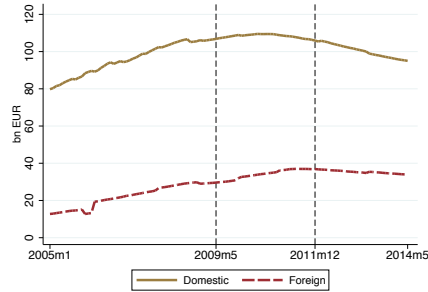
FIGURE 5: Total lending (left panel) and lending to the non-financial private sector (right panel). The latter is defined as lending to non-financial firms and households. Solid line are domestic institutions; dashed line are foreign MFI's.

### *Lending*

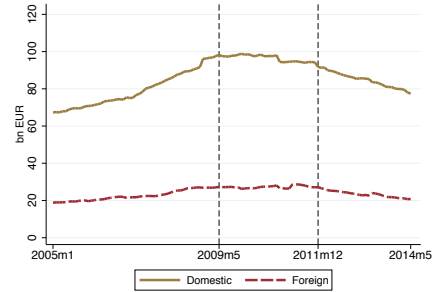
Figure 5 plots total lending in the left panel, and lending to the private non-financial sector in the right panel. The latter refers to lending whose counterparties are either non-financial firms or households. Lending is by far the largest component of assets, accounting, on average, for 70% of the balance sheet, even though this share is decreasing over time for domestic banks (starting at 79% and reaching 57% by the end of the sample). For this reason, its behavior is very similar to that of total assets, displaying inverse U-shaped dynamics. For domestic banks, lending peaks on July 2010 (283.5 bn), while for foreign banks the peak is in June 2012 (95.3 bn). The share of lending to private non-financial sector as a percentage of total lending is increasing over time for both domestic and foreign institutions, going from 72% and 54%, respectively, in the early sample, to 77% and 72%, respectively, in May 2014.

In Figure 6, we disaggregate lending by counterparty. Lending to households and non-financial firms is relatively similar in magnitudes, each accounting for slightly more than one third of total lending. Their dynamics are also inverse U-shaped, even though lending to households seems to have declined by less than lending to firms. Lending to households by foreign banks seems to have experienced a smaller and delayed decline. Lending to the financial sector (MFI's and other financial counterparties, such as pension funds and life insurers)<sup>12</sup> is stable throughout the crisis, with a slight decline in the latter part of the sample. Other counterparties for lending are less relevant.

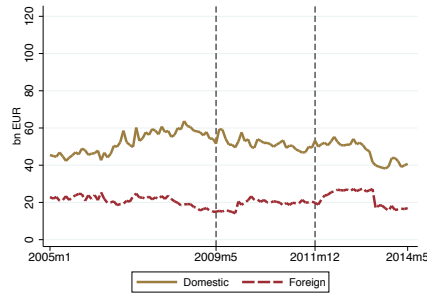
12. We are not able to separate the central bank from other MFI's on the asset side and so this category may include bank reserves.



(A) Lending to households



(B) Lending to firms



(C) Lending to the financial sector

FIGURE 6: Lending to households (top left), non-financial firms (top right), and financial firms (bottom). Solid line are domestic institutions; dashed line are foreign MFI's.

In particular, lending to the Portuguese government (central, regional and local) is relatively small.<sup>13</sup>

### *Security Holdings*

The other large component of the asset side of balance sheets is holdings of securities. We focus on securities whose counterparties are not government entities (public securities will be analyzed separately). Figure 7 plots the evolution of non-public non-equity security holdings in the left panel and of equity holdings in the right panel. The Figure illustrates the steady increase in importance of securitization for domestic institutions, with non-public security holdings displaying a clear positive trend in the pre-crisis period. They start at roughly the same level as holdings by foreign entities, in spite of significant differences in balance sheet sizes. Holdings of securities

13. Lending to non-financial firms may include lending to public firms. We do not adjust for reclassifications.

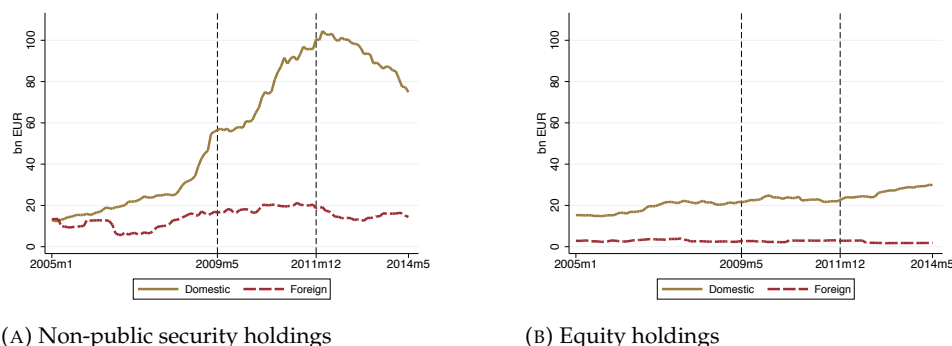


FIGURE 7: Non-equity, non-public security holdings (left panel) and equity holdings (right panel). Solid line are domestic institutions; dashed line are foreign MFI's.

increase steadily throughout the crisis period, peaking in early 2012 right after the 3-year LTRO's. From then onwards, the path follows the downward trend of assets and lending, reflecting the generalized deleveraging process experienced by the Portuguese banking system.

Interestingly enough, equity holdings rise during this period, in spite of much smaller magnitudes. Overall, these two panels illustrate a significant increase in the importance of non-traditional banking activities by domestic institutions. The share of security and equity holdings on assets for domestic banks rises from around 11% to 27% throughout the sample, while for foreign institutions it oscillates between 10% and 20%, with no clear trend.

### Public Debt Holdings

Given that our sample includes the European sovereign debt crisis, we devote a separate section to analyzing the public debt holdings of MFI's. It is well known that domestic public debt was subject to intense repatriation in the periphery countries that were hit the hardest by the crisis.<sup>14</sup>

Figure 8 plots the evolution of total holdings of public debt in the left panel. Both domestic and foreign banks experience a very significant increase of their holdings starting in early 2009. However, foreign banks peak at 8.8 bn in April 2010, on the eve of the Greek bailout request, and reduce their holdings thereafter. Domestic banks keep increasing their holdings of government debt throughout, even after they start deleveraging. The right panel plots the evolution of Portuguese government debt, and reveals that

14. There is a vast literature trying to explain the causes behind the sharp increase in domestic holdings of sovereign debt during the crisis. Several authors have proposed different explanations for this phenomenon, among them Acharya and Steffen (2015), Gennaioli *et al.* (2014), Brutti and Sauré (2014), Becker and Ivashina (2014) and Crosignani (2015).

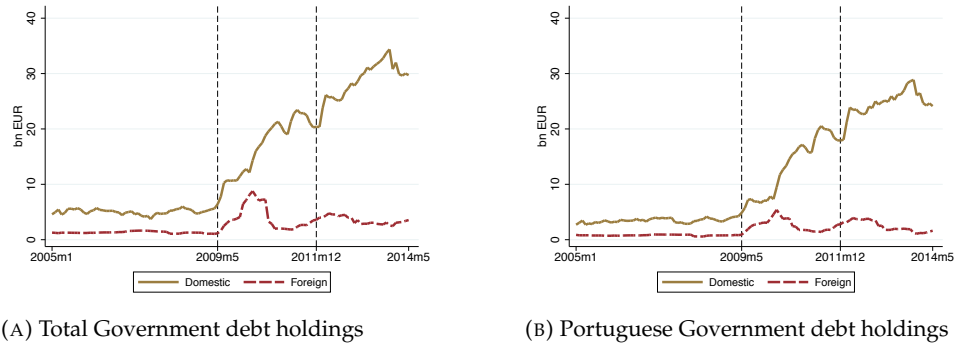


FIGURE 8: Public debt holdings (left panel) and Portuguese public debt holdings (right panel). Solid line are domestic institutions; dashed line are foreign MFI's.

most of the increase in total holdings is related to domestic debt, consistent with the repatriation phenomenon. In fact, in the early parts of the sample, domestic banks devote around 60% of their government debt portfolio to domestic debt. This share increases steadily during the crisis period, peaking at 91% in early 2012 and then stabilizing around 82%. Foreign banks hold much smaller portfolios of both total and Portuguese government debt. The difference in exposures is reported in the left panel of Figure 9, which plots total holdings of Portuguese government debt as a percentage of assets. It peaks in 2010 for foreign banks at around 4% of their balance sheets, while it steadily increases to around 7% for domestic banks.<sup>15</sup>

To further illustrate the repatriation phenomenon, we also plot total domestic bond holdings as a percentage of total outstanding public debt issued by the Portuguese government in the right panel of Figure 9.<sup>16</sup> This confirms that a substantial part of total outstanding public debt was repatriated during both the crisis and deleveraging periods. Before the crisis, the shares held by both domestic and foreign banks were very stable, at

15. In an unreported analysis, we analyze the evolution of exposures of domestic and foreign institutions to other euro area countries that experienced stress in sovereign debt markets: Italy, Ireland, Greece and Spain. We note that the magnitudes are extremely small, especially compared with those that correspond to holdings of Portuguese government debt. While holdings increase rapidly after the onset of the crisis, they actually decrease throughout most of the crisis period, only to rapidly increase again in 2012, after most sovereign debt markets had experienced some relative stabilization due to the ECB's policy responses.

16. This should be read as an underestimate of the total shares owned by the institutions in our sample, since we are comparing book values (numerator) to face values (denominator). As long as yields are positive – and particularly when yields are high as in the period under analysis – book values will underestimate total exposures of entities to the sovereign. While we could had applied some correction, such as adjusting outstanding face values by a weighted average of contemporary yields across different maturities, this would nevertheless be an imperfect adjustment. For that reason we simply present this raw measure.

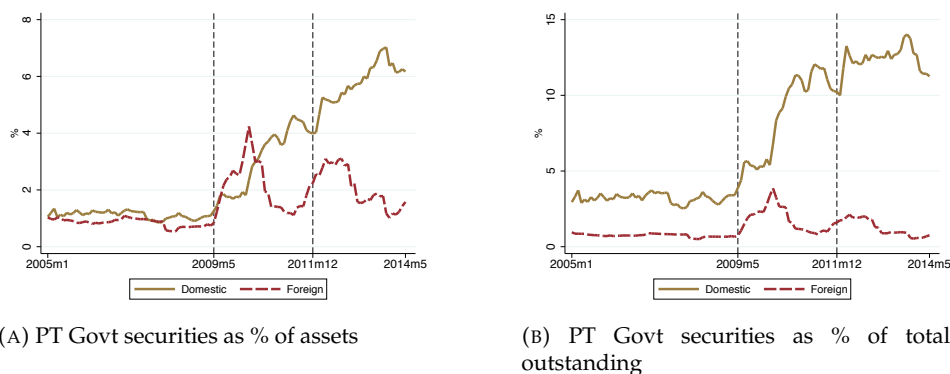


FIGURE 9: Portuguese government debt holdings divided by total MFI assets (left panel) and by total amount of public debt outstanding (right panel; source: IGCP). Solid line are domestic institutions; dashed line are foreign MFI's.

around 3% and 0.7% of total outstanding debt, respectively. After the first signs of sovereign stress, both domestic and foreign banks started to increase their exposures. The latter peak in mid-2010, at 3.8%, decreasing thereafter. Domestic banks kept increasing their exposures, holding between 10% and 14% of total debt outstanding in the latter part of the crisis.

## Funding and Liabilities

### *Equity and Leverage*

The evolution of book leverage, defined as book assets divided by book equity is illustrated in Figure 10. We compute aggregate leverage as the sum of all assets divided by the sum of all equity. Leverage seems to display a countercyclical pattern: it rises before the crisis, peaking in early 2009. After a small decline, it again rises during the crisis period, peaking in late 2011 for both domestic and foreign banks. From there onwards, it displays a persistent downwards trend that is consistent with the behavior of assets. Domestic banks seem to be less levered across the board than foreign banks. This may, however, reflect accounting effects since virtually all foreign banks are subsidiaries or branches of larger international banks, and may therefore afford to keep equity at the minimum regulatory levels. By the end of the sample in May 2014, domestic bank leverage was at a minimum of 8.4.

The similarity between the aggregate behavior of leverage and balance sheet size leads us to further investigation. Figure 11 decomposes changes in asset size into changes in equity and changes in debt (non-equity liabilities), for the pre-2012 (leveraging) and post-2012 (deleveraging) periods. The horizontal axis measures changes in assets, while the vertical axis measures

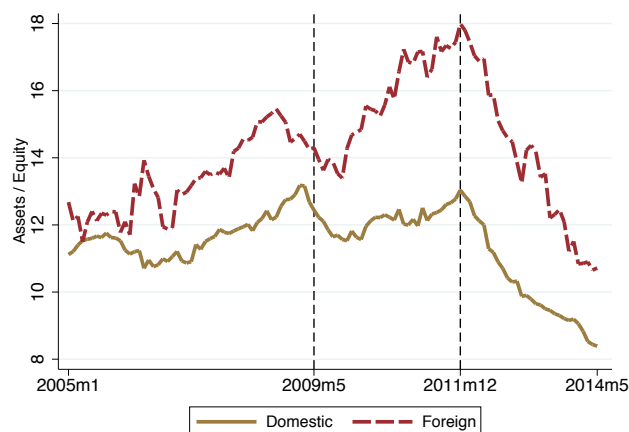


FIGURE 10: Book leverage, defined as total assets divided by total equity. Solid line are domestic institutions; dashed line are foreign MFI's.

changes both in debt and in equity. Each bank is associated with two dots, one for debt and one for equity. The left panel shows that: (i) most banks increased their balance sheet size prior to 2012; (ii) most of this increase in size was financed with debt. From the right panel, we observe that the deleveraging in the post-LTRO period was also undertaken mostly through changes in debt, but we also see more equity movements in this stage. In fact, the fitted line for changes in equity has a negative slope, illustrating the fact that banks decided not only to decrease their levels of debt, but also increased their equity levels. This behavior, as well as the broader trends in leverage that we observe, is intrinsically linked with the impositions of the Economic and Financial Assistance Programme established by national authorities and international institutions, which we analyze further in the last section.

### *Deposits*

As with any system based on commercial banks, the dominant source of funding for Portuguese MFI's are deposits: on average, 72% of assets for domestic and 78% of assets for foreign institutions. Figure 12 plots the evolution of total deposits. The path of leveraging and deleveraging is again evident, with deposits rising until attaining a peak of 308.7 bn for domestic banks in early 2011, and 106.4 bn for foreign banks in late 2010. Interestingly, deposits seem to peak before the deleveraging process starts in early 2012.

Figure 13 decomposes the evolution of deposits by counterparty: MFI's (excluding central banks), non-financial privates (non-financial firms and households), and domestic government entities. Deposits by MFI's on domestic banks start declining at the onset of the crisis, consistent with the



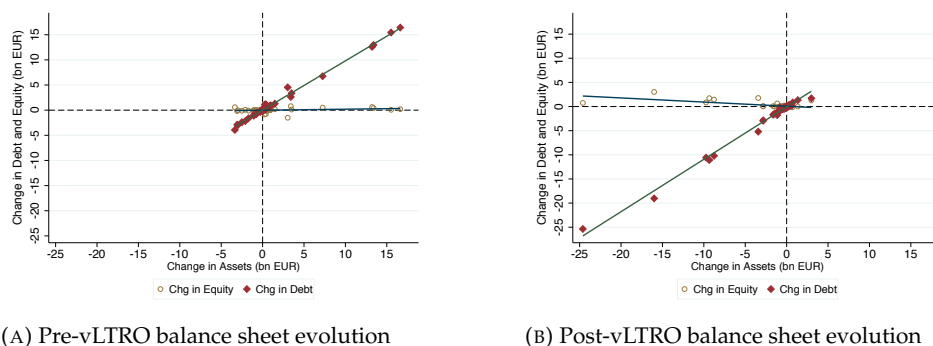


FIGURE 11: Changes in asset size (horizontal axis) vs. changes in equity and non-equity liabilities (vertical axis) between July 2009 and December 2011 (left panel) and December 2011 and May 2014 (right panel). Circles are changes in equity, diamonds are changes in non-equity liabilities.

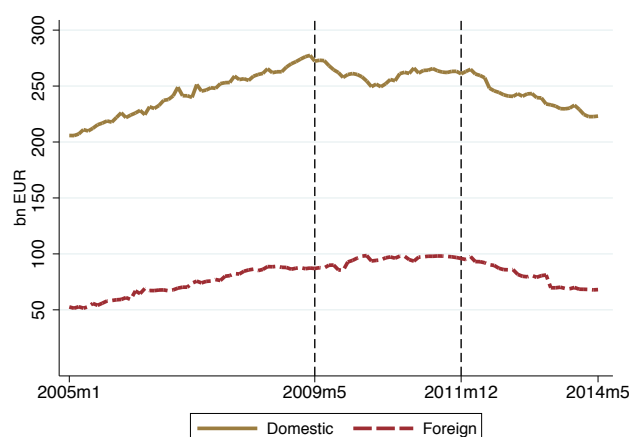


FIGURE 12: Deposits, all maturities and counterparties (excluding ECB). Solid line are domestic institutions; dashed line are foreign MFI's.

claim that domestic institutions were shut from international money and funding markets at the first signs of sovereign stress. They keep declining even after early 2012, at which stage it is not clear if the decline is driven by persistence of exclusion from money markets, or by intentional deleveraging. Evidence for the exclusion hypothesis is strengthened by observing that deposits by private non-financial agents were increasing, and then stable throughout the crisis and latter parts of the sample. If intentional deleveraging were the explanation, we would expect to see declines in deposits by both MFI's and non-MFI's after 2012, which is not the case.

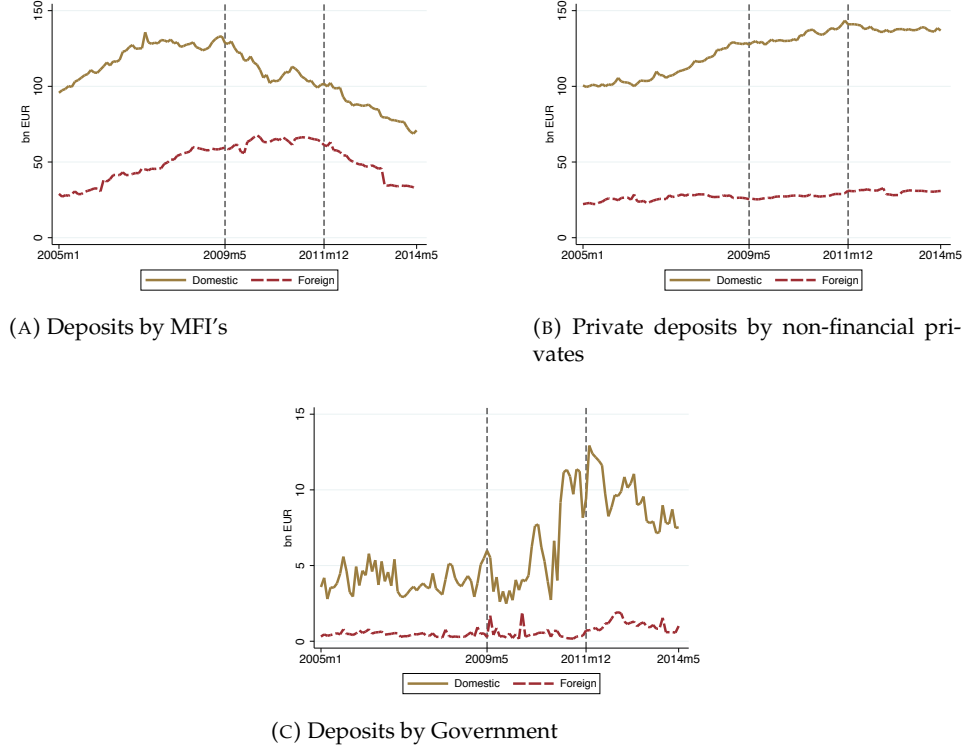
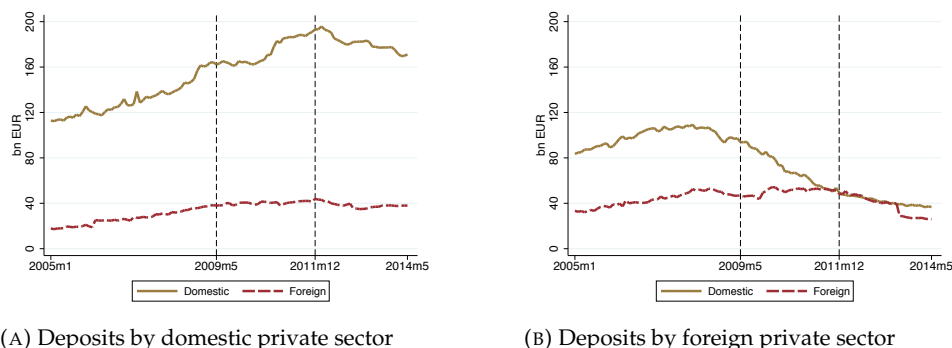


FIGURE 13: Deposits (at all maturities) whose counterparties are MFI's (excluding central banks, top left), private non-financial agents (non-financial firms and households, top right), and the Portuguese government (bottom). Solid line are domestic institutions; dashed line are foreign MFI's.

For foreign banks, deposits by MFI's kept increasing and peaked in the midst of the crisis. This suggests that due to their subsidiary status of large international banks, they were still able to access international money markets while domestic entities were excluded.

We further decompose private sector deposits by nationality of the counterparty in Figure 14. The left panel plots deposits owned by the domestic private sector (including financials), and the path is very similar to that of assets. The right panel shows deposits owned by foreign private agents (including financials), and illustrates the slow-moving capital flight that took place starting in early 2009: in the early part of the sample, foreign counterparties accounted for 43% of total deposits in domestic institutions, but this figure was equal to 14% by the end of the sample. The decline was also substantial for foreign entities, from 63% to 34%. This is consistent with the broader trend of slow-moving capital flight dynamics that were experienced by other countries under sovereign stress.



(A) Deposits by domestic private sector

(B) Deposits by foreign private sector

FIGURE 14: Deposits owned by the domestic private sector (left panel) and the foreign private sector (right panel). The private sector includes financial firms, non-financial firms and households. Solid line are domestic institutions; dashed line are foreign MFI's.

### *Securitized Funding*

We also analyze other sources of funding, namely those that rely on security and capital markets. Figure 15 plots securities issued and non-central bank repurchase agreements,<sup>17</sup> and presents further evidence of increasing securitization. Domestic banks started to increasingly rely on non-deposit sources of funding starting in mid-2007: the share of funding obtained from security issuance goes from 6% in the early sample to a peak 24% around early 2012 for domestic banks. It is visible that after rapid growth, issuance of securities stabilizes during the financial crisis, and then declines during the deleveraging period. Securitized funding oscillates between 6%-18% with no clear trend for foreign banks. These firms can finance themselves indirectly through their parent companies, but since they can either receive loans (deposits) or issue securities that are purchased by the parents, it is not clear if we should expect them to display higher or lower average shares of non-deposit funding.

17. Non-central bank repurchase agreements is a very minor component.

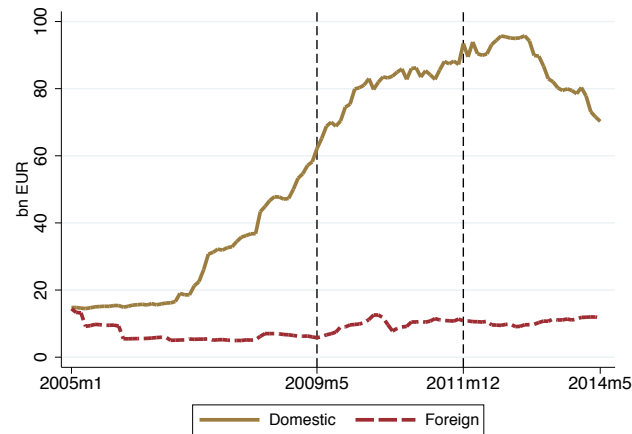


FIGURE 15: Total securities issued plus repurchase agreements whose counterparty is not a central bank. Solid line are domestic institutions; dashed line are foreign MFI's.

### Domestic and Foreign Exposures

As mentioned, our dataset contains information on the nationality of the counterparties for each asset category and each bank. In this section, we study the evolution of exposures of domestic and foreign banks to different geographical areas. To maintain the analysis parsimonious, we focus on three categories for counterparties' nationalities: domestic (Portugal), non-domestic Economic and Monetary Union (EMU) and non-EMU.

#### *Assets*

Total asset exposures are presented in Figure 16. The vast majority of exposures are towards domestic counterparties, and this fact did not change much throughout the sample. On average, 81% of the total value of assets of domestic banks consists of exposures to domestic counterparties, and this share experiences a slight upward trend towards the end of the sample (almost 86% in May 2014). This pattern is even stronger for foreign banks: 62% of total assets had domestic counterparties in the beginning of the sample, and this share had grown to 77% by the end.

For domestic banks, EMU (non-domestic) and non-EMU counterparties present roughly equal shares. For foreign banks, there is virtually no exposure to non-EMU counterparties in the early stages of the sample, but they become progressively more important. Exposures to non-domestic EMU counterparties are naturally high, since many of these banks are subsidiaries of large banks headquartered within the euro area.

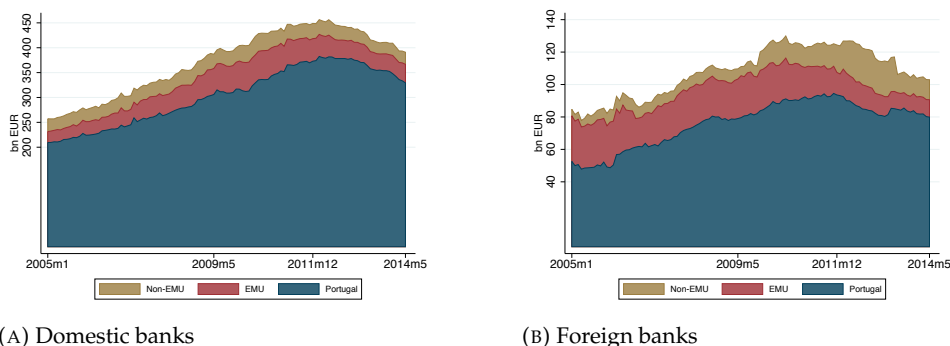
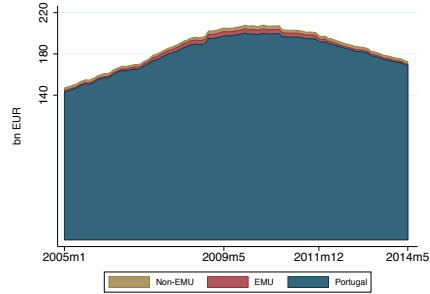


FIGURE 16: Total asset exposures by geographical area for domestic banks (left panel) and foreign banks (right panel).

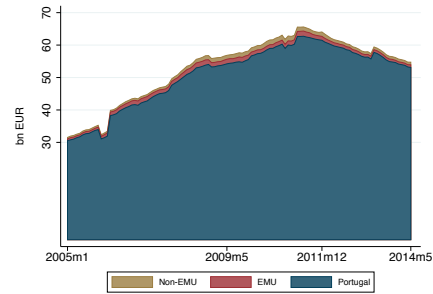
Figures 17 and 18 plot lending exposures to the private sector. The first set of panels account for domestic and foreign exposures to the non-financial private sector (lending to firms and households), while Figure 18 present lending to MFI's. Lending to the non-financial private sector is overwhelmingly domestic: on average 97% for domestic banks and 96% for foreign banks. Lending to the monetary financial sector is, as we would expect, more diversified in terms of counterparty nationalities: for domestic banks, the shares of lending to domestic, EMU and non-EMU are roughly equal in the early sample. EMU lending gains some relevance which is then lost for the latter parts of the sample, as domestic banks lose access to European funding markets.<sup>18</sup> Regarding foreign institutions, most of the lending is overwhelmingly undertaken towards EMU counterparties in the early sample, but this changes substantially as non-EMU counterparties become large recipients of lending in the latter sample. The role of lending to domestic MFI's is limited. Most of this lending seems to be directed towards the country of the parent bank. The overall trends and magnitudes seem to suggest that there is very little integration in terms of financial lending between domestic and foreign institutions.

Finally, we look at securities and equity holdings in Figure 19. While exposures are again overwhelmingly domestic, EMU counterparties are substantially more relevant than non-EMU, unlike the previous asset categories. Domestic banks' exposure to EMU security and equity holdings increased both before and during the crisis period. Foreign banks decrease substantially their exposure to EMU counterparties, and increased their exposures to domestic ones.

18. See Saldanha (2014) for a detailed analysis on the interbank money market for the Portuguese banking system.

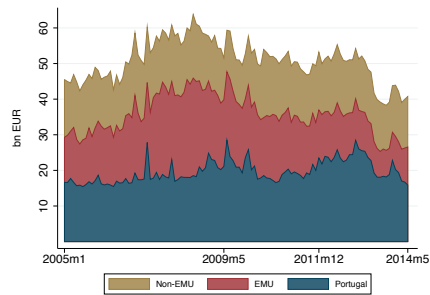


(A) Domestic banks

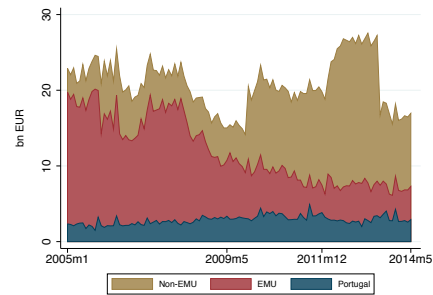


(B) Foreign banks

FIGURE 17: Lending to the non-financial private sector exposures by geographical area for domestic banks (left panel) and foreign banks (right panel).

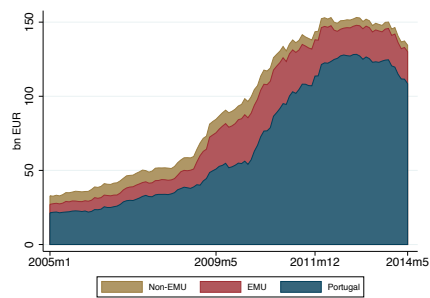


(A) Domestic banks

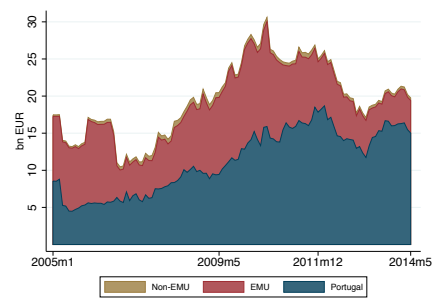


(B) Foreign banks

FIGURE 18: MFI lending exposures by geographical area for domestic banks (left panel) and foreign banks (right panel).



(A) Domestic banks



(B) Foreign banks

FIGURE 19: Securities and equities exposures by geographical area for domestic banks (left panel) and foreign banks (right panel).

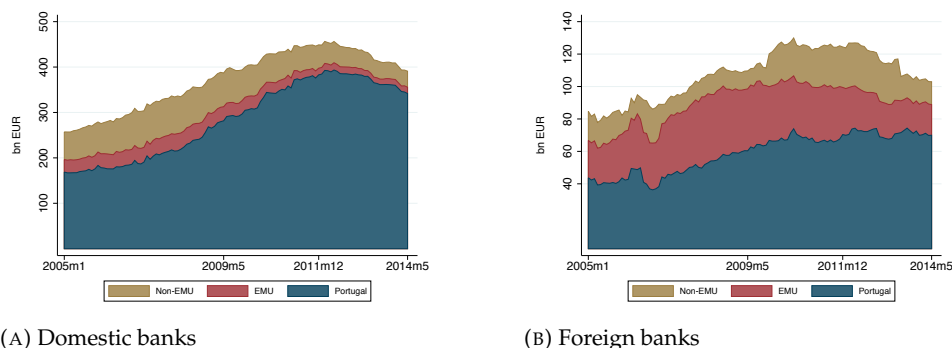


FIGURE 20: Total liability (including capital) exposures by geographical area for domestic banks (left panel) and foreign banks (right panel).

### *Liabilities*

Figure 20 plots total exposures for MFI liabilities (including capital). The general patterns mirror those of assets: domestic banks have predominantly domestic exposures, and there is a trend towards repatriation of their funding in the latter part of the sample. Funding by foreign banks is also mostly domestic but less so than their asset exposure, evidencing a “nationality mismatch” in their balance sheet. This may reflect not only foreign ownership, but also easier access to international funding markets through their parents.

In Figures 21 and 22 we plot the exposure of banks to different counterparties in terms of their deposit liabilities. The first set of figures plots non-financial private deposits (non-financial firms and households), while the second set plots MFI deposits (excluding central bank). As with lending, non-MFI deposits exposure of domestic banks is predominantly domestic, and this does not change over the sample. The same is not true for foreign banks, who have a substantial share of deposits by EMU private agents in the early sample, but which collapses at the onset of the crisis. Regarding MFI deposits, as with lending, there is much more diversification. Consistent with the evidence that domestic and foreign institutions do not seem to participate in the same interbank market, exposure to domestic counterparties is greater for domestic banks. The largest share of MFI funding for domestic banks belongs, however, to non-EMU countries. This, as well as reliance on EMU MFI funding, drops significantly during the crisis, and does not recover during the deleveraging period. Thus the funding base for MFI deposits in domestic banks changes from being predominantly international to predominantly domestic. Foreign banks are primarily exposed to deposits from non-domestic EMU MFI’s. The importance of both domestic and non-EMU counterparties also increases throughout the sample period.

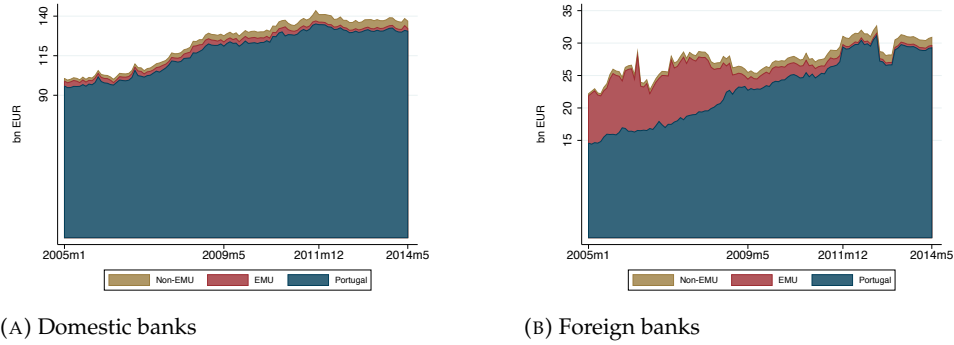


FIGURE 21: Non-financial deposit exposures by geographical area for domestic banks (left panel) and foreign banks (right panel).

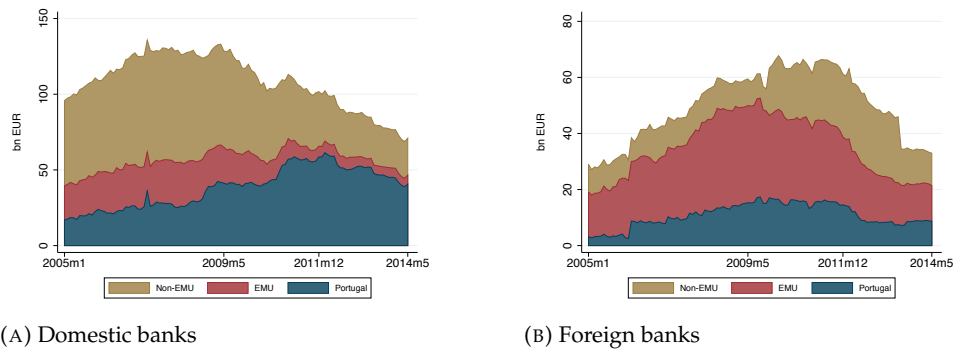


FIGURE 22: MFI deposit exposures by geographical area for domestic banks (left panel) and foreign banks (right panel).

Finally, we look at other measures of wholesale funding in Figure 23: securities issued. For domestic banks, foreign exposures are negligible. This may suggest that the rise in securitization and financial sophistication of funding instruments was a structural process, and not driven by foreign demand. For foreign banks, the exposure is also mostly domestic, and the magnitudes are relatively small. This is consistent with the notion that larger banks tend to employ this sort of alternative non-deposit instruments for funding purposes, and most foreign banks in our sample are relatively small and have alternative funding sources.



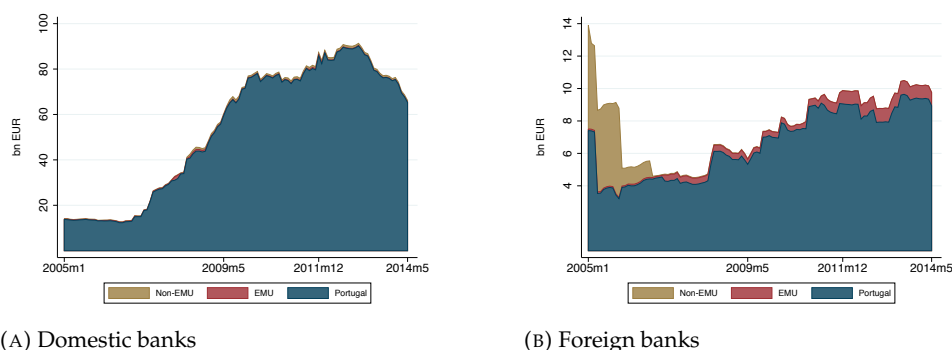


FIGURE 23: Funding security exposures by geographical area for domestic banks (left panel) and foreign banks (right panel).

## Policy during the Crisis

In this section, we describe the main policy initiatives taken during the crisis, and comment on their impact on the balance sheets of Portuguese intermediaries.

### *Monetary Policy*

*Description of Liquidity Providing Operations.* The main instrument of monetary policy of the ECB are the main refinancing operations (MRO), which consist of collateralized lending to MFI's, typically at a weekly maturity. The ECB supplements the MRO's with longer-term refinancing operations (LTRO's), which have a typical maturity of three months. In response to the global financial and European sovereign debt crises, the ECB adopted several unconventional monetary policies which we will discuss briefly and which are described in more detail in Banco de Portugal (2015b). We focus on liquidity providing operations to banks and do not analyze the impact of the asset purchase programmes, which involved direct participation in capital markets.

*Evolution of Central Bank Funding.* The importance of Eurosystem funding for the Portuguese monetary financial system increased significantly during the sovereign debt crisis. Figure 24 plots total borrowing from the Eurosystem in the left panel. In the beginning of the sample, borrowing from the Eurosystem was virtually zero for domestic institutions. During the first half of 2007, the total banking system had a monthly average of 288 million euros borrowed at the central bank. Borrowing then significantly increased upon the first signs of global financial stress in the summer of 2007.

In April 2008, the ECB launched LTRO's at a 6-month maturity, and these became monthly operations after November of that year. Additional LTRO's

with 1-year maturities were announced in the following year. Intensification of financial stress in the summer of 2008 led to another increase in borrowing. In October 2008, the ECB changed its approach towards liquidity provision in all of its operations, switching from a system based on variable rate tenders to a fixed rate full allotment procedure (FRFA). Under variable rate tenders, the ECB would typically offer a certain amount of liquidity, and the combination of central bank supply and bank demand (through a bidding process) would determine the interest rate. Under a FRFA system, the ECB sets an interest rate beforehand and offers to provide all liquidity demanded by banks as long as they post sufficient collateral. Collateral eligibility rules were also expanded to encompass additional classes of assets.

The combination of these policy changes with the financial events led not only to an increase in total borrowing, but also to a significant jump in the number of borrowers. Figure 26 plots the number of banks borrowing from the Eurosystem, classified according to the nationality criterion. Until mid-2008, no more than 10 institutions were borrowing. By late 2008, as funding markets tightened, the number of borrowers increased significantly: from 10 in September to 15 in October, as more banks were now able to access funding at a given price and the only effective constraint they faced was their own pool of collateral. Borrowing increased gradually until early 2010, when Portuguese institutions started facing serious difficulties in accessing international funding markets and Greece's economic situation deteriorated. In April 2010, the Greek government formally requested international financial assistance, and the impact on the Portuguese financial sector was substantial. Portuguese MFI's were essentially excluded from international funding markets, and in just the three months between April and July 2010, total Eurosystem borrowing increased from about 17.7 bn to 49.2 bn euros. For foreign institutions, this increase in borrowing was temporary. The right panel of Figure 24 plots Eurosystem borrowing as a percentage of total funding: during this short period of time, funding jumped from less 5% to around 10% of total funding for domestic banks.

In December 2011, the ECB announced that it would undertake two allotments of LTRO's at the unprecedented maturity of 3 years, the so-called very long-term refinancing operations (vLTRO).<sup>19</sup> Both foreign and domestic banks took advantage of this long-term Eurosystem funding. In Figure 25 we plot short-term (less than 2 years, left panel) and long-term (more than 2 years, right panel) borrowing from the Eurosystem. These 3-year LTRO's were the only instances in our sample when the Eurosystem lent at maturities longer than 2 years.<sup>20</sup> At the time of these interventions, short-term funding

19. The vLTRO interventions, as well as their impact on bank portfolio choice, are described in detail in Crosignani *et al.* (2015).

20. After the end of our sample, the ECB launched Targeted LTRO's with maturities up to 4 years.

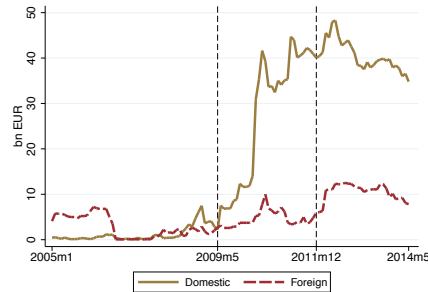
collapsed and was replaced with longer-term borrowing. Together with Figure 24, this provides evidence that the December 2011 allotment was composed mostly of rollover of short-term funding, while the second allotment, in February 2012 involved both rollover and some new net borrowing. Several reasons can explain the increase in net borrowing at the second allotment, including the accumulation of more collateral in the form of marketable assets during the two allotments, and the introduction of the additional credit claims (ACC) framework. This consisted in a temporary expansion of the classes of assets that were eligible as collateral for Eurosystem credit operations, and the specific criteria were under the discretion of national central banks.<sup>21</sup> These ACCs were initially announced at the same time as the vLTRO's in December 2011, but the specific rules detailing their usage were only published by the BdP on 9 February 2012 (Banco de Portugal 2012). Portfolios of mortgage-backed loans and other loans to households, as well as of loans to non-financial corporations became increasingly pledgeable as collateral. The ACCs consisted of a positive shock to the collateral pools of banks, helping them increase their total borrowing at the time of the second allotment. Additionally, foreign banks who might have previously borrowed indirectly through their EMU-based parent entities abroad were now endowed with a competitive advantage in terms of Eurosystem borrowing, as they could post collateral that was perhaps not eligible under the rules set by the national central banks in their parents' countries of origin. Indeed, while the number of domestic borrowers remains constant through the second allotment, the number of foreign borrowers increases. After this period, Eurosystem borrowing remained relatively stable at around 10% of assets.

*Who doesn't borrow from the Eurosystem?* Our sample of MFI's includes the universe of institutions subject to minimum reserve requirements by the Eurosystem.<sup>22</sup> Only institutions that are subject to these requirements are eligible to become counterparties of the Eurosystem's monetary policy operations.<sup>23</sup> Although every institution in our sample with the exception of money market funds is, in principle, eligible for borrowing from the Eurosystem, not many entities actually access the liquidity providing operations. Figure 26 shows that the number of borrowers at any moment in time is relatively small. Until mid-2008, no more than 10 institutions were borrowing. As mentioned previously, the number of institutions borrowing

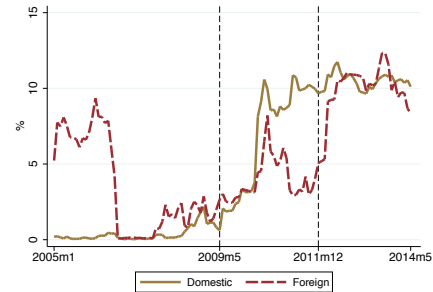
21. This framework allowed for riskier non-marketable assets to be posted as collateral, provided that the collateral risk was assumed by the national central banks. The BdP also introduced stricter risk control measures.

22. It also includes money market funds, which are not subject to these requirements. In addition, the full list of MFI's includes the central bank, whose balance sheet we do not analyze in this article.

23. There are also other criteria that are mostly operational, as well as criteria that are related to the national supervisor's assessment of the financial soundness of the MFI. See ECB (2011).

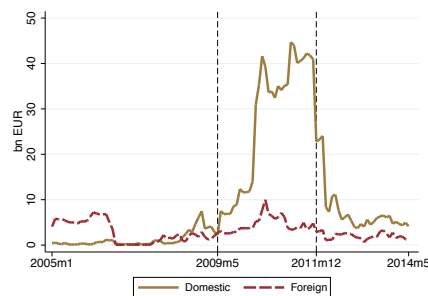


(A) Central Bank funding

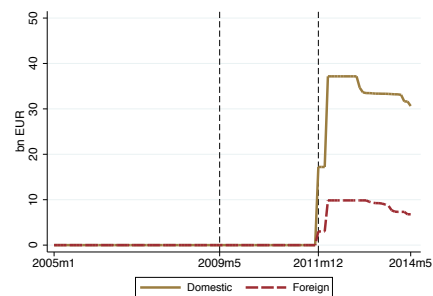


(B) Central Bank funding as a % of total funding

FIGURE 24: Total Eurosystem funding (left panel) and as a percentage of total funding (excluding equity, right panel). Solid line are domestic institutions; dashed line are foreign MFI's.



(A) Short-Term CB funding



(B) Long-Term CB funding

FIGURE 25: Eurosystem funding at short maturity (<2 years, left panel) and at long maturity (>2 years, right panel). Solid line are domestic institutions; dashed line are foreign MFI's.

first increases to 15 in October 2008 and then to 23 after the vLTROs. By the end of the sample, 25 out of 65 potentially eligible institutions access central bank funding.

Central bank funding was unprecedentedly attractive during the sovereign debt crisis, yet dozens of entities did not access the operations. In addition to the other requirements, an institution has to be registered at the BdP to actually be eligible as a counterparty. The number of registered entities is larger than the number of institutions actually borrowing from the Eurosystem, but smaller than the number of potentially eligible entities. This means that there are three groups of institutions: (i) those registered at the BdP and borrowing from the Eurosystem; (ii) registered at the BdP but not

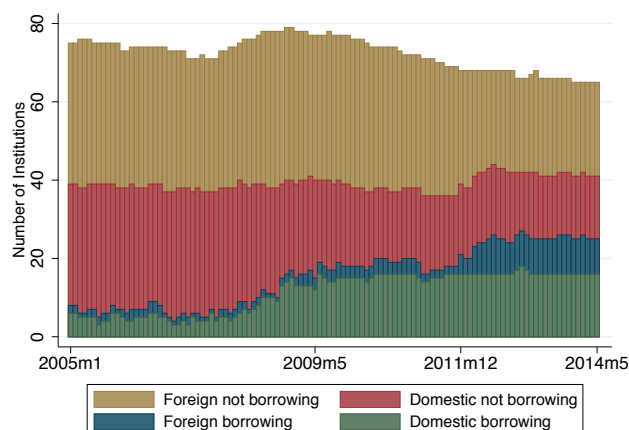


FIGURE 26: Number of MFI's (except money market funds) with liabilities whose counterparty is the Eurosystem.

accessing the operations; (iii) not registered at the BdP and thus not eligible for the operations.

The primary reason why an institution may find itself in group (ii), i.e. registered as an eligible counterparty but not accessing any operations, is related to the need of settling central bank reserve accounts at the end of every business day. If, at the end of the business day, bank A owes any money to bank B, it automatically borrows from the Eurosystem to settle this account. For this to happen, bank A needs to be registered at the BdP and to hold a collateral pool that may be pledged for this borrowing. When an institution in group (iii), not registered as an eligible counterparty at the BdP, finds itself in such situation it must either set up an account at a payment system that is never over-drafted or, alternatively, use the payment system of a larger entity (possibly its parent) for settlement. Even if accessing the operations involves relatively few direct pecuniary costs (such as fees), there are possibly other fixed costs that are related to the know-how that is required to deal with Eurosystem operations (such as having to hire specialized staff, etc.). For smaller banks in categories (ii) and (iii), these costs may exceed the penalties and premia that they pay for using other sources of funding or the infrastructure and credit of larger banks. This may explain why they do not access the operations.

Another possibility is that banks with particularly specialized business models may prefer to obtain funding from other sources due to the high opportunity cost of holding eligible collateral (such as marketable assets like government bonds). However, the BdP greatly expanded the eligibility of non-marketable assets to be used as collateral with the introduction of the ACCs in February 2012. From that date onwards, even banks with very

Borrows?	July 2010		March 2012		May 2014	
	Yes	No	Yes	No	Yes	No
No. of banks	20	54	23	45	25	40
Mean Assets	25.3	0.9	23.3	1.0	18.5	0.7
Median Assets	9.2	0.3	3.8	0.4	3.3	0.4
<b>Securities</b>	0.27	0.11	0.31	0.22	0.32	0.20
Equities	0.05	0.03	0.05	0.02	0.07	0.02
Govt	0.05	0.01	0.06	0.01	0.07	0.05
<i>Dom. Govt</i>	0.03	0.01	0.05	0.01	0.05	0.05
<b>Lending</b>	0.66	0.83	0.61	0.73	0.60	0.75
Individuals	0.26	0.23	0.25	0.17	0.27	0.21
Firms	0.22	0.28	0.20	0.22	0.20	0.26
MFI	0.12	0.25	0.12	0.23	0.11	0.23
<b>Other Assets</b>	0.07	0.06	0.08	0.05	0.08	0.05
<b>Deposits</b>	0.60	0.83	0.59	0.82	0.58	0.77
MFI	0.27	0.58	0.25	0.53	0.20	0.46
Private	0.30	0.19	0.30	0.21	0.35	0.24
<b>Eurosystem</b>	0.10	0.00	0.11	0.00	0.09	0.00
<b>Securities + Repo</b>	0.19	0.02	0.19	0.04	0.18	0.04
<b>Other Liab.</b>	0.04	0.04	0.05	0.02	0.05	0.05
<b>Equity</b>	0.08	0.11	0.07	0.11	0.11	0.14

TABLE 1. Asset-weighted average balance sheet composition for MFI's (excluding money market funds) according to whether they borrowed from the Eurosystem in that period or not for July 2010, March 2012 and May 2014. Mean and median assets are in billion euros, while all balance sheet categories are expressed as a fraction of total assets. The additional levels of disaggregation of balance sheet categories (indented) are not exhaustive.

specialized business models could use assets such as specialized forms of credit to businesses and households as eligible collateral for Eurosystem credit operations. Even in the presence of very high haircuts (exceeding 75% in some cases), this was still advantageous since this sort of non-marketable collateral would most likely not be accepted by counterparties in financial markets. The costs associated with pledging these assets as collateral and complying with the risk requirements were low. Given the expansion of central bank funding and collateral eligibility, banks that were not accessing central bank funding were likely not in need of funds, or found it more advantageous to obtain funds through larger MFI's. Table 1 shows the asset-weighted average balance sheets for Eurosystem borrowers and non-borrowers in three different months: July 2010, right after the large three-month increase in borrowing of mid-2010; March 2012, after the second allotment of the vLTRO; and May 2014, the last month of the sample. Non-borrowers are smaller, hold less securities, lend more to MFI's and to firms, borrow more from MFI's, hold less private sector deposits, issue less securities and have more equity.

### *Financial Assistance Policies*

*State Guarantees.* In October 2008, in response to the international money market freeze, the Portuguese government created a fund to provide credit guarantees to debt issuances by Portuguese depository institutions. This fund received 20 bn euros. Later, as part of the assistance programme, the value of the fund was raised to 35 bn euros.

*Recapitalization Fund.* In May 2009, the Portuguese government launched a bank recapitalization scheme aimed at helping banks implement the BdP's recommendation of establishing a Core Tier 1 ratio above 8%. Four billion euros were initially allocated to this program. The international assistance programme raised the value of the fund to 12 bn euros by April 2011; the requirement increased to 9% by the end of 2011 and to 10% by the of 2012. By mid-2012, two of the four largest banks were relying on this fund,<sup>24</sup> while Caixa Geral de Depósitos (which is state-owned) received 1.6 bn euros directly from the government (European Commission 2014). The left panel of Figure 27 plots non-deposit liabilities and capital whose counterparty is the Portuguese government.<sup>25</sup> Foreign banks never participated in the fund, while the bulk of domestic participation occurs precisely in June 2012. To give some perspective, the right panel plots funding (liabilities and capital) whose counterparty is the government as a percentage of total funding. During the deleveraging period, government funding in domestic banks accounted for around 5% of total liabilities and equity.<sup>26</sup>

*Economic and Financial Assistance Programme.* In May 2011, the Portuguese authorities along with the European Union and the International Monetary Fund agreed to a three-year Economic and Financial Assistance Programme amidst restricted access to international financial markets for both the sovereign and the banking sector. One of the three pillars to the programme was the stability of the financial system. There were three main concerns: liquidity risks, recapitalization needs and high bank leverage. Many policies were adopted during the programme.<sup>27</sup>

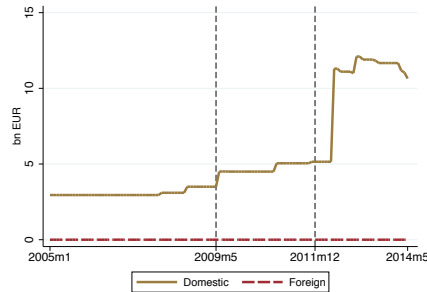
Liquidity concerns decreased thanks to Eurosystem funding and improved market sentiment, which also allowed bond issuance by banks. Bank solvency had also improved beyond the minimum levels required by the BdP that were described earlier. Solvency conditions later declined, however,

24. These were Banco Comercial Português and BPI. BANIF accessed this fund later, in 2013.

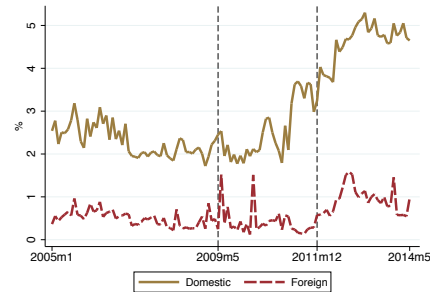
25. A large part of the recapitalization fund was employed in hybrid instruments such as convertible debt and preferred stock that could be counted as equity for regulatory purposes. This served the dual purposes of providing liquidity and allowing banks to more easily satisfy regulatory requirements such as capital ratios.

26. This understates of the total impact of the government in the Portuguese banking sector, since it is the sole owner of Caixa Geral de Depósitos, Portugal's largest bank.

27. For a comprehensive list, see Banco de Portugal (2015a).



(A) Government funding



(B) Government funding as a % of total funding

FIGURE 27: Non-deposit liabilities (incl. equity) whose counterparty is the Portuguese government (left panel) and share of total liabilities (incl. deposits and equity) whose counterparty is the Portuguese government as a fraction of assets (right panel).

due to provisioning undertaken ahead of the ECB stress tests in the late part of our sample. In addition, the eight largest banking groups were ordered to decrease their loan-to-deposits ratio from more than 160% to 120% by the end of 2014,<sup>28</sup> as well as to devise medium-term funding plans to be evaluated by the banking authorities. The evolution of the loans-to-deposits ratio for the entire system can be seen in Figure 28. We exclude lending and deposits whose counterparties are other MFI's. The loans-to-deposits ratio is always higher for foreign banks than for domestic banks. That is not surprising, since domestic banks are more likely to be financed by private deposits while foreign banks are often financed by their parent MFI abroad. Measured by this ratio, deleveraging actually began in mid-2010 and continued steadily throughout the duration of the programme. European Commission (2014) considered it successful, as the loans-to-deposits ratio for the largest groups reached 117% and the key driver behind the lower credit volumes was low demand, even if “there ha[d] been evidence of supply constraints”.

28. See Banco de Portugal (2011).



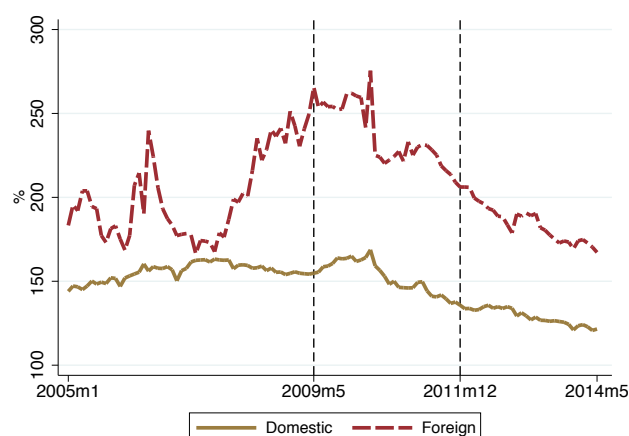


FIGURE 28: Ratio between total lending (excluding lending to MFI's) and total deposits (excluding deposits by MFI's). Solid line are domestic institutions; dashed line are foreign MFI's.

## Conclusion

In this article we employed detailed balance sheet data for Portuguese MFI's to describe some aspects of the evolution of the domestic monetary financial system during one of its most challenging periods in recent history. The broad trends point towards a rapid expansion of balance sheets and leverage in the period leading up to the crisis, after which institutions start to downsize and deleverage, likely as a result of a combination of regulatory pressure and poor economic conditions. As the largest component of balance sheets, lending has also followed this pattern – even if lending to households has been more stable than lending to firms.

One of the most striking trends that we observe is the rise of securitization and non-traditional banking activities on both sides of the balance sheet. Not only domestic banks have significantly increased their exposure to securities and equities, they have also increasingly become reliant on sources of funding other than deposits. We also document increasing exposures to Portuguese sovereign debt, consistent with the repatriation phenomenon that is described by the literature. Regarding deposits, the crisis has brought about some significant changes in composition as domestic banks were increasingly isolated from wholesale funding markets and started to rely more on retail funding, supplied by the non-financial private sector. The stability of non-financial private deposits is likely to have come as a consequence of precautionary savings triggered by the deep recession. Banks have also become increasingly dependent on the liquidity offered by the central bank, much due to their isolation from international funding markets. Also

the government, through its recapitalization programmes, has become an important source of funding for banks.

We have also analyzed the composition of the Portuguese banking sector in terms of the nationality of both its participants and counterparties. Our results point towards increasing isolation during the crisis and deleveraging periods, both with foreign institutions abandoning the country and domestic ones interacting less and less with foreign counterparties.

While this article has been mostly descriptive, we hope that it has contributed to highlight some trends and patterns that have emerged in recent years. We believe this dataset to provide researchers with an excellent laboratory in which to study several open questions related to banking, namely those related to the impact of sovereign risk on the financial system, or the impact of unconventional policies, monetary and fiscal, that were implemented during this period.

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## Appendix A: Data Transformations

- Mutual Agricultural Credit Banks that are part of SICAM (*Sistema Integrado de Crédito Agrícola Mútuo*; Integrated System of Mutual Agricultural Credit) report consolidated data as entity '9000 - Caixa Central Cred Agric Mutuo'. This explains the difference between the number of MFI's in our dataset and that in the list of institutions that are subject to minimum reserve requirements as published by the ECB. See Banco de Portugal (2009).
- We merge "0022 - BANCO DO BRASIL - SUC. UE" with "9989 - B. BRASIL", since this is a change of code for the same institution.
- We eliminate all observations of institutions with assets less than 0.1 million euros.

## Appendix B: List of Institutions

Code	Entity	Foreign	Parent	Start date	End date	Type
0003	SANPAOLO IMI BANK	X		2005/01	2011/01	Bank
0007	BANCO ESPÍRITO SANTO			2005/01	2014/05	Bank
0008	BANCO BAI EUROPA	X		2005/01	2014/05	Bank
0010	BANCO BPI			2005/01	2014/05	Bank
0012	BANCO BANIF COMERCIAL AÇORES		0038	2005/01	2008/12	Bank
0014	BANCO INVEST			2005/01	2014/05	Bank
0016	CREDIFIN BANCO			2005/01	2009/12	Bank
0018	BANCO SANTANDER TOTTA	X		2005/01	2014/05	Bank
0019	BANCO BILBAO VIZ. ARGENTARIA	X		2005/01	2014/05	Bank
0022	BANCO DO BRASIL - SUC. UE <sup>29</sup>	X		2005/01	2014/05	Bank
0023	BANCO ACTIOBANK		0033	2005/01	2014/05	Bank
0025	CAIXA - BANCO DE INVESTIMENTO		0035	2005/01	2014/05	Bank
0027	BANCO PORTUGUES INVESTIMENTO		0010	2005/01	2014/05	Bank
0029	BNP PARIBAS FORTIS - SUC. UE	X	0034	2005/01	2013/06	Bank
0031	B.INTER.CRÉDITO <sup>30</sup>		0007	2005/01	2005/11	Bank
0032	BARCLAYS BANK - SUC. UE	X		2005/01	2014/05	Bank
0033	BANCO COMERCIAL PORTUGUES			2005/01	2014/05	Bank
0034	BNP PARIBAS - SUC. UE	X		2005/01	2014/05	Bank
0035	CAIXA GERAL DE DEPOSITOS			2005/01	2014/05	Bank
0036	CAIXA ECONOMICA MONTEPIO GERAL			2005/01	2014/05	Bank
0038	BANIF - BANCO INTERN FUNCHAL			2005/01	2014/05	Bank
0040	ROYAL BANK OF SCOTLAND	X		2005/01	2010/10	Bank
0043	DEUTSCHE BANK AG - SUC. UE	X		2005/01	2014/05	Bank
0046	BANCO POPULAR PORTUGAL	X		2005/01	2014/05	Bank
0047	BANCO ESP. SANTO INVESTIMENTO		0007	2005/01	2014/05	Bank
0048	BANCO FINANTIA			2005/01	2014/05	Bank
0049	BANCO INVEST. IMOBILIARIO		0033	2005/01	2014/05	Bank
0055	C.E.EMP.COM.LIS			2005/01	2012/11	SavB <sup>31</sup>
0057	CAIXA ECONOMICA DO PORTO			2005/01	2014/05	SavB

29. Merged with 9989 - B. BRASIL.

30. Merged with Banco Espírito Santo in late 2005.

31. Legend: *SavB* - Savings bank; *MACB* - Mutual Agricultural Credit Bank; *MMF* - Money Market Fund.

Code	Entity	Foreign	Parent	Start date	End date	Type
0058	CAIXA ECONOMICA SOCIAL			2005/01	2014/05	SavB
0059	CAIXA ECON.MIS.ANGRA HEROISMO			2005/01	2014/05	SavB
0060	BANCO MADE SANT	X	0018	2005/01	2014/05	Bank
0061	BANCO INVESTIMENTO GLOBAL			2005/01	2014/05	Bank
0063	BANIF - INVESTIMENTO		0038	2005/01	2014/05	Bank
0064	BANCO PORTUGUES GESTAO			2005/01	2014/05	Bank
0065	BEST - BANCO ELECTRONICO		0007	2005/01	2014/05	Bank
0066	CAJA DE BADAJOZ, SUCURSAL	X		2005/01	2005/11	Bank
0067	BANCO RURAL EUROPA	X		2005/01	2014/05	Bank
0069	BANCO BANIF MAIS		0038	2005/01	2014/05	Bank
0070	BANQUE PSA - SUC. UE	X		2005/01	2014/05	Bank
0073	BANCO SANTANDER CONSUMER	X	0018	2005/01	2014/05	Bank
0076	MONTEPIO INVEST		0036	2005/01	2014/05	Bank
0078	BANCO MILLENNIUM BCP INVEST		0033	2005/01	2009/08	Bank
0079	BANCO BIC PORTUGUES <sup>32</sup>			2005/01	2014/05	Bank
0081	B.SANTANDER NEGÓCIOS	X	0018	2005/01	2010/04	Bank
0082	FCE BANK - SUC. UE	X		2005/01	2014/05	Bank
0085	ITAU BBA INTERNATIONAL-SUC. UE	X		2005/01	2014/05	Bank
0086	BANCO EFISA		0079	2005/01	2014/05	Bank
0089	BANCO PRIVADO			2005/01	2010/04	Bank
0090	BANKBOSTON	X		2005/01	2006/09	Bank
0092	CAIXA VIGO, OURENSE PONTEVEDRA	X		2005/01	2011/08	Bank
0097	CCAM CHAMUSCA			2005/01	2014/05	MACB
0098	CCAM BOMBARRAL			2005/01	2014/05	MACB
0099	BANCO CAJA S SORIA - SUC. UE	X		2005/01	2014/05	Bank
0156	BANCO POPULAR ESPAÑOL	X	0046	2005/01	2006/12	Bank
0158	COMMERZBANK INT - SUC FIN EXT	X		2005/01	2011/11	Bank
0160	BANCO ESPÍRITO SANTO AÇORES		0007	2005/01	2014/05	Bank
0161	GE CAPITAL BANK	X		2005/01	2007/11	Bank
0162	BANQUE ACCORD	X		2005/01	2007/03	Bank
0166	SANTANDER FINANCE	X	0018	2005/01	2007/01	Bank
0168	BANKIA	X		2005/01	2013/11	Bank
0169	CITIBANK - SUC. UE	X		2005/01	2014/05	Bank
0170	NCG BANCO - SUC. UE	X		2005/01	2014/05	Bank
0171	RCI BANQUE - SUC. UE	X		2005/01	2014/05	Bank
0172	BMW BANK - SUC. UE	X		2005/01	2014/05	Bank
0173	B. PRIVEE ROTHSCHILD - SUC. UE	X		2005/01	2014/05	Bank
0183	AS PRIVATBANK - SUC. UE	X		2007/09	2014/05	Bank
0184	ANGLO IRISH BANK, SUCURSAL	X		2007/01	2008/05	Bank
0185	DEXIA SABADELL - SUC. UE	X		2007/09	2014/05	Bank
0186	BANQUE PRIVÉE - SUCURSAL		0007	2008/01	2014/05	Bank
0188	BANCO BIC PORTUGUÊS <sup>33</sup>	X		2008/05	2013/04	Bank
0189	BANCO PRIVADO ATLANTICO EUROPA	X		2009/08	2014/05	Bank
0235	BANCO L.J. CARREGOSA			2008/11	2014/05	Bank
0240	HYPOTHEKENBANK - SUC. UE	X		2005/01	2014/05	Bank
0242	BNP PARIBAS WEALTH MANAGEMENT	X	0034	2005/01	2012/11	Bank
0243	HYPO REAL ESTATE	X		2005/01	2005/12	Bank
0244	GRUPO CAJATRES - SUC. UE	X		2005/01	2014/05	Bank
0246	BANCO PRIMUS	X		2006/02	2014/05	Bank
0254	ROYAL BANK SCOTLAND-SUCURSAL	X	0040	2007/05	2011/03	Bank
0256	UBS BANK	X		2008/02	2009/03	Bank
0258	CAJA DE AHORROS DE VALÈNCIA	X		2008/06	2011/08	Bank
0260	S.GALLER KANTONALBANK SUCURSAL	X		2008/06	2014/05	Bank
0264	VOLKSWAGEN BANK - SUC. UE	X		2013/03	2014/05	Bank
0266	BANK CHINA LUXEMBOURG- SUC. UE	X		2013/04	2014/05	Bank
0500	ING BELGIUM - SUC. UE	X		2005/01	2014/05	Bank
0848	BANCO BNP PARIBAS PER. FINANCE	X	0034	2005/01	2014/05	Bank
0916	BANCO CREDIBOM	X		2007/11	2014/05	Bank

32. Former Banco Português de Negócios (BPN). Domestic bank until acquisition by Banco BIC.

33. Banco BIC before the acquisition of BPN; after acquisition, becomes 0079.

Code	Entity	Foreign	Parent	Start date	End date	Type
5180	CCAM LEIRIA			2005/01	2014/05	MACB
5200	CCAM MAFRA			2005/01	2014/05	MACB
5340	CCAM TORRES VEDRAS			2005/01	2014/05	MACB
8194	FMM CA MONETÁRIO		9000	2008/11	2014/05	MMF
8205	FMM CAIXAGEST LIQUIDEZ		0035	2010/02	2014/05	MMF
8217	FEIA - CGD MONETÁRIO		0035	2012/01	2014/05	MMF
8218	FEIA - MONTEPIO MONETÁRIO PLUS		0036	2012/01	2014/05	MMF
8219	FEIA - BPI MONETÁRIO CP		0010	2012/01	2014/05	MMF
8220	FEIA - BBVA MONETÁRIO CP	X	0019	2012/01	2014/05	MMF
8229	Eurobox FMM			2013/05	2014/05	MMF
8231	FMM Caixagest Activos		0035	2013/08	2014/05	MMF
8232	FMM Postal Tesouraria		0035	2013/08	2014/05	MMF
9000	CAIXA CENTRAL CRED AGRIC MUTUO <sup>34</sup>			2005/01	2014/05	MACB
9006	BARCLAYS CURTO PRAZO	X	0032	2005/01	2007/12	MMF
9393	IW BANK SPA	X		2005/01	2014/05	MMF
9628	AF TESOURARIA		0033	2005/01	2008/03	MMF
9661	PEDRO ARROJA			2005/09	2009/06	MMF

34. Includes all the institutions part of SICAM (Integrated System of Mutual Agricultural Credit).