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Please address correspondence to
Banco de Portugal, Economics and Research Department
Av. Almirante Reis 71, 1150-012 Lisboa, Portugal
T +351 213 130 000 | estudos@bportugal.pt

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Content

Editorial

In the first paper of this issue of the Review of Economic Studies, Bernardino Adão and André Castro Silva reflect on the implications of the change in the quantity of money held by firms in the monetary policy effectiveness. The authors first document the surprising and substantial increase in money holdings by American firms that started in the 80s, either at the aggregate level or at the firm level. Using a monetary model with financial segmentation, the authors show that this fact is leading to an increase in the capacity of monetary policy to affect the real interest rate, relevant to investment decisions by firms. Furthermore, the monetary impulses become more persistent. Although calibrated for the US economy, this effect is general and may also be relevant to other economies, particularly for the euro area.

In the second paper the transition of workers out of temporary contracts to other types of contracts or to joblessness is analyzed. Using data for several European Countries with detailed information at the individual and firm level, Sara Serra shows that on the job training of workers with a temporary contract significantly increases the likelihood of transitioning to an open-ended contract with the same employer. However this effect disappears for more segmented labour markets, i. e. markets characterized by a larger share of temporary versus open-ended contracts. In more segmented labour markets, the educational level of the workers and the flexibility of labour regulation are the relevant characteristics for that type of virtuous transition. This, as well as other results in this article, highlight the complex interaction between training, segmentation and labour market flexibility, opening lines of debate on training policies.

We witnessed a period of strong changes in the Portuguese financial system during the last decade. After entering into the Euro area, and beginning in the middle of past decade, a set of events with a strong relevance for financial intermediation took place. Those are analyzed with detail by Matteo Crosignani, Miguel Faria-e-Castro and Luís Fonseca in the third paper of this review. In addition to the rich characterization of credit aggregates and balance sheet of monetary financial institution, they document several interesting facts. First, the evidence of increasing industry concentration in Portugal, namely in the credit market, after the sovereign debt crisis. Second, after the crisis, a reduction of the integration of Portuguese banks into the European financial system, with a declining share of international assets and liabilities in their balance sheet. Part of this effect comes from the increasing exposition to holdings of government debt throughout, a phenomenon with strong implications for the financial stability of the Portuguese financial system. The third relevant fact relates to the strong leverage process of the financial system, which increased steadily until early 2012, clearly reversed since then. Finally, the paper documents the fundamental role of ECB on providing liquidity to the Portuguese banking sector, during and after the financial crisis.

This issue of Economic Studies contains the section "Perspectives on the Portuguese Economy" aimed at promoting the debate on specific policy issues relevant for the Portuguese economy. In this issue this section includes four short notes on labor market policies written by staff that has conducted research on related topics. The debate should be open and pluralistic, even though this may naturally result in contradictory perspectives. Scientific rigour should be the only limitation. The opinions are definitely the ones of the authors. They are not the ones of the Bank of Portugal. Any errors or omissions are their sole responsibility.

Increased Strength of Monetary Policy

Bernardino Adão
Banco de Portugal

André C. Silva
Nova School of Business and Economics

July 2015

Abstract
Firms cash holdings distribution changed substantially from 1980 to 2013. We study the effects of this change in the formulation of monetary policy using a model with financial segmentation. We find that the interest rate channel of the transmission mechanism of monetary policy has become more powerful, as the impact of monetary policy over the real interest rate increased. Now, with the increase in firm cash holdings, the real interest rate takes 3.4 months more to return to its initial value after a shock to the nominal interest rate. (JEL: E40, E50, G12, G31)

Keywords: firm cash holdings, interest rates, financial frictions, market segmentation, liquidity effect, monetary policy.

Introduction

The U.S. corporate cash holdings changed dramatically in the last 35 years. Bates *et al.* (2009) and Bover and Watson (2005), among others, have noticed the increase in corporate cash holdings since 1980, both in real terms and as a percentage of total cash. Corporate cash holdings corrected for inflation was in 2010 about five times its value in 1980. Figure 1 shows the mean and median of cash-sales ratio for the period 1980-2013. The median cash-sales ratio increased from 3% in 1980 to 12% in 2010. The mean cash-sales ratio increased from 6% to 23% during the same period. [1]

Acknowledgements: We thank Rui Albuquerque, Heitor Almeida, Dean Corbae, Igor Cunha, Miguel Ferreira, Francesco Lippi, Ana Marques, and participants at various seminars for valuable comments and discussions. Silva thanks the hospitality of the Banco de Portugal, where he wrote part of this paper, and acknowledges financial support from Banco de Portugal, NOVA Research Center, NOVA FORUM, and FCT.

E-mail: badao@bportugal.pt; andre.silva@novasbe.pt

1. Throughout this paper, cash corresponds to the Compustat definition of cash and equivalents. Here we restrict our sample to firms with positive cash, positive assets, assets greater than cash, and sales greater than 10 million (CPI adjusted with base 1982-1984). We also truncated the firms at the 1 and 99 percentiles of the cash-sales ratio. With the less stringent constraint of sales greater than zero, the increase in the median cash-sales ratio is from 3.5%

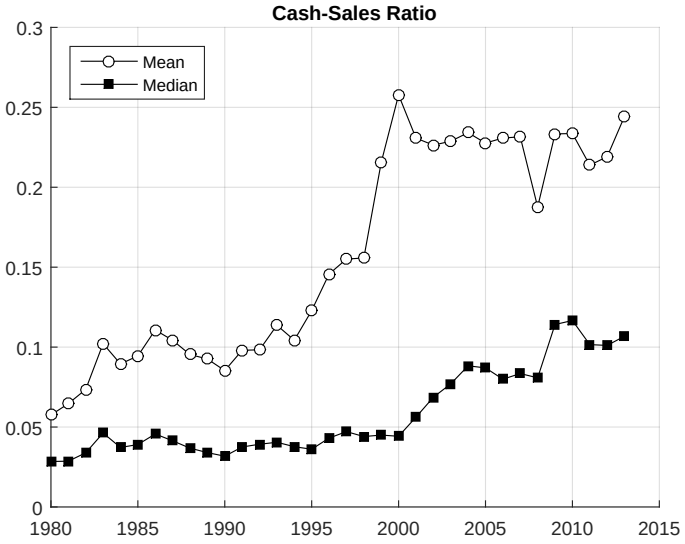

FIGURE 1: Mean and median of the cash-sales ratio across firms for each year. The cash-sales ratio state how much firms maintain of their sales in cash. A cash-sales ratio of 0.1, for example, means that firms maintain 10 percent of their yearly sales, or 1.2 months of sales, in cash.

Source: Authors' calculations with Compustat data. See note 6 for details.

In addition to the increase in the cash-sales ratio, firms cash holdings correspond to a large fraction of the monetary aggregates and this fraction has increased substantially. From 1980 to 2010, the ratio between corporate cash holdings, measured as cash and equivalents of the U.S. nonfinancial firms listed in Compustat, and M1, according with the FED of St. Louis data increased from 0.27 to 0.83. This fraction decreased to 0.65 percent in 2013, still more than two times the ratio in 1980.[2] For the same year, the cash component of the item cash and equivalents, which includes mainly currency and demand

to 13.4%, i.e. a 3.8 times increase. There are different measures of cash holdings such as the cash-assets and the cash-net assets ratio. We use the cash-sales ratio because it has a better data counterpart to the variables in the model.

2. M1 is defined as currency plus traveler checks plus checkable deposits. In January 2014, currency corresponds to 43.6% of M1 and checkable deposits to 56.3%. The definition of cash and equivalents in Compustat includes the components of M1 and "securities readily transferable to cash," which includes short term commercial paper, short term government securities, and money market funds. In our sample, 1980-2013, the Compustat cash portion of cash and equivalents, which includes mainly currency and demand deposits, corresponds on average to 70% of the cash and equivalents item.

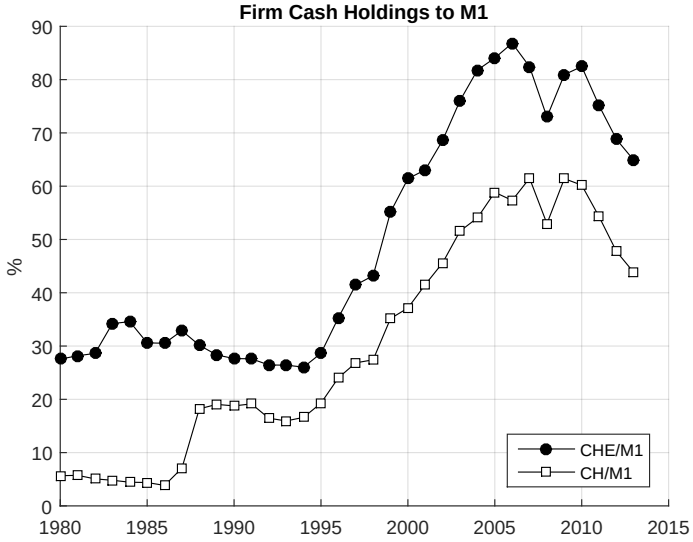

FIGURE 2: M1 is the ratio between cash and equivalents and M1, and CH/M1 is the ratio between the cash portion of cash and equivalents and M1. Both series increase during the period considered.

Source: Compustat and Federal Reserve Bank of St. Louis.

deposits, was 60% of M1. Figure 2 shows the evolution of these two series for the period 1980-2013. [3]

The distribution of cash across firms is not uniform and it has changed during the period 1980-2013. Figure 3 shows the median of the cash-sales ratio over the same period for firms grouped in percentiles of sales. We see that the cash ratio increased for all groups. Moreover, while the cash ratio increased 3 times for all firms as a whole, it increased 5 times for firms in the smaller percentiles. Bates *et al.* (2009) show a similar evolution for the cash-assets ratio.

There is a large literature on the determinants of firm cash holdings. Among the explanations for firm cash holdings, a partial list includes the transactions role of cash (Baumol (1952) and Tobin (1956)), financial constraints (Almeida *et al.* (2004)), tax purposes (Foley *et al.* (2007)), and corporate governance (Jensen (1986), and Blanchard *et al.* (1994)). Empirically, the different determinants of firm cash holdings are analyzed by, among others, Opler *et al.* (1999), and Ozkan and Ozkan (2004).

3. Firms in Portugal, for the period 2005-2013, mantained substantially smaller cash balances. The ratio between the total of currency and bank deposits for nonfinancial firms, according to the data base "Informação Empresarial Simplificada", and M1, according with Banco de Portugal, from 2005 until 2013 was above 0.28 and below 0.36.

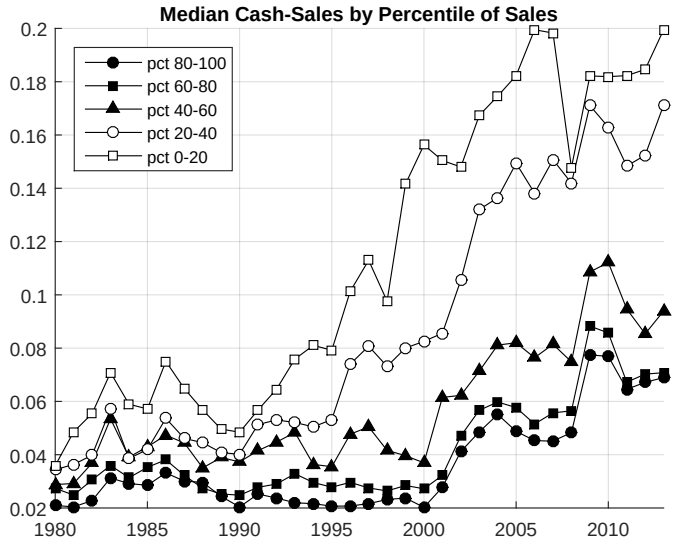

FIGURE 3: Median of the cash-sales ratio for different percentiles of sales. Source: Compustat; see note 6 for details.

Source: Authors' calculations with Compustat data. See note 6 for details.

The increase in cash holdings is surprising, as the evolution of the technology of financial transactions allows firms to sell, frequently and at a low cost, illiquid assets for cash and to maintain their operations with little cash. It is also surprising to find that firms hold more than half of M1. It would be expected that households would have more difficulty than firms to manage cash, as households face higher transactions costs and have more difficulty in using credit. We do not aim at explaining the cash holdings or their secular trend.[4] Our objective is to analyze the implications of the secular increase in corporate cash holdings on the effects of monetary policy. As firms hold a large portion of the monetary aggregates, it is important to study the effects of the increase in cash holdings on macroeconomic variables. To the best of our knowledge, we are the first to study the consequences of corporate cash management decisions for monetary policy.

As we are interested in the effects of the distribution of money holdings, we use a model in which the distribution of money holdings plays an active role. For instance, in the first generation cash-in-advance models, such as Lucas Jr. and Stokey (1987), the distribution of money holdings is degenerate. All participants in the economy behave as a representative agent and they

4. Bates *et al.* (2009) identify four causes for the increase: an increase in R&D expenditures, a fall in inventories, a fall in capital expenditures, and an increase in cash flow risk.

have the same demand for money. It is not possible to evaluate the impact of the distribution of money with these models because they do not allow any role for the distribution of money.

More recently, the real effects of monetary policy have been studied in new Keynesian models (for example, Clarida *et al.* (2000) and Michael Woodford (2003)). These models contain frictions usually in the form of price rigidities. There is a distribution of prices across firms, but the distribution of money is again degenerate. A representative agent uses all money carried from the last period to buy products in the current period. As in the first generation cash-in-advance models, the distribution of money holdings in these models does not affect monetary policy.

Here, to take into account the effects of changes in the distribution of cash holdings in monetary policy, we use a model with market segmentation.[5] The friction is the separation of markets for liquid and illiquid assets. Liquid assets are used for transactions while illiquid assets receive higher interest yields and are kept mainly as a reserve of value. These markets are separated in the sense that firms cannot exchange illiquid assets for cash with a high frequency. The higher the level of cash holdings relatively to the transactions conducted by the firm, the lower is the frequency with which the firm makes transactions in the assets market.

In this model a nominal interest rate shock has real effects because firms behavior with respect to the use of cash depends on their cash holdings at the time of the shock. Firms with little cash adapt faster to the shock, as they trade in the assets market soon after the shock, while firms with large cash holdings take longer to adapt, as they trade in the assets market relatively late after the shock. If the market segmentation friction is removed, the real interest rate does not move after the shock and the real effects vanish. As we want to isolate the effects of the change in cash holdings, we eliminate other mechanisms besides market segmentation that could generate additional real effects. In particular, there are no sticky prices, output is constant, and the only change in the economy during the period is in the distribution of cash holdings.

For each year from 1980 to 2013 the cross-sectional distribution of cash in the data is used to calibrate the size of the type and the frequency with which each type of firm in the model trades in the financial market. Once the model is calibrated, it can deliver closed-form solutions for all macro variables of interest. In particular, the response of the real interest rate to a nominal interest rate shock. The shock follows the interest rate dynamics in Christiano

5. The model is described in detail in Adão and Silva (2015). Is a modified version of the models in Alvarez *et al.* (2004) and Silva (2012), which only allow for one type of economic agent. The modified model, by allowing many types of firms, each type exchanging illiquid assets at a different frequency, permits a better correspondence between the cross-sectional distribution of cash in the data and the model.

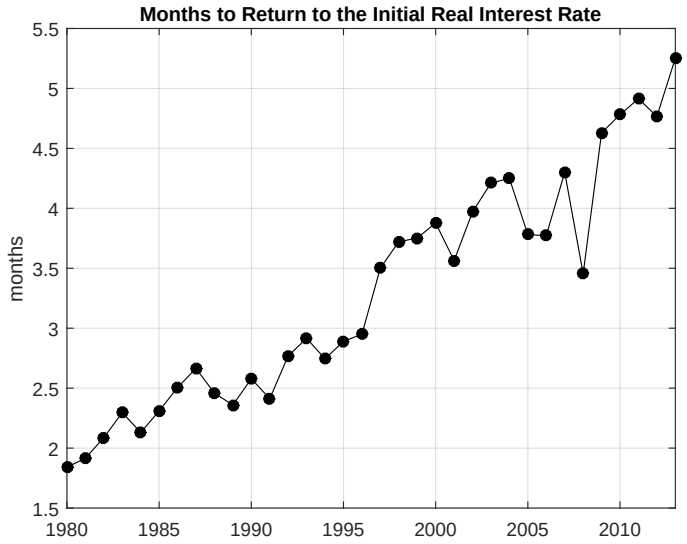

FIGURE 4: Simulations for a given a nominal interest rate shock. The simulations take into account the distribution of cash-sales ratio for each year.

Source: Authors' calculations.

et al. (1999) and Uhlig (2005). For each year, we recalibrate the model to the distribution of cash holdings of that year. As the distribution of cash holdings changes, the response of the real interest rate changes too.

Figure 4 shows, for the period 1980-2013, how long the real interest rate would take to return to its initial value after a monetary shock, according to the model. We find that the real interest rate takes 3.4 more months in 2013 than in 1980 to revert to its initial value after a nominal interest rate shock. For the 1980 distribution of money holdings the real interest rate took 1.84 months to revert to its initial value, while with the 2013 distribution of money holdings, the real interest rate took 5.25 months to revert to its initial value.

Due to the substantial increase in the cash holdings by firms, monetary policy has become more powerful, as the effects of monetary policy over the real interest rate are now more persistent than in 1980. Consistent with this idea, Clarida *et al.* (2000) state that monetary policy has been more effective after 1980.

The Distribution of Cash Holdings over Time

Figure 1 shows the median and the mean of the cash-sales ratio from 1980 to 2013. In the literature different measures of cash have been used to analyze firms cash holdings, such as the cash-net assets ratio (used, for example,

by Opler *et al.* (1999)) and the cash-assets ratio (by Bates *et al.* (2009)). The cash-sales ratio has been used, among others, by Harford (1999) and Bover and Watson (2005). Both, the cash-assets ratio and the cash-sales ratio, have increased substantially over time. The cash-assets ratio indicates the relative weight of cash in the firm's portfolio. The cash-sales ratio indicates how much cash a firm holds with respect to the flow of resources obtained with its operations. It has a more direct relation with the use of cash for transactions. We use the cash-sales ratio because its interpretation—cash relative to the flow of resources obtained—allows a better connection between the model parameters and the data. The conclusions of this paper are robust if instead the cash-assets ratio is used.[6]

As cash is measured in dollars and sales are measured in dollars per unit of time, the cash-sales ratio is a variable given in units of time. For example a median cash-sales ratio of 0.12 in year 2010, means that firms maintained about 1.4 months of their sales in the form of cash. In 1980, this same ratio was only 0.03, or 11 days. The mean cash-sales ratio in the same period increased from 0.06 in 1980 to 0.23 in 2010. The distribution of the cash-sales ratio across firms is highly asymmetric as it can be inferred by the difference between its mean and median. The mean was more than two times the median during the whole period and it reached 5.8 times the median in 2000.

If there was no benefit of maintaining cash, firms would choose a cash-sales ratio approximately equal to zero, as holding cash implies an opportunity cost in interest foregone. As the cash-sales ratio is sizeable in economic terms, the data indicate the existence of costs in the management of money. These costs may be in the form of transaction costs or in the form of management costs. A portfolio manager, for example, may schedule sales of long term bonds to coincide with cash needs, but this and other more elaborate schedules of payments are costly. For our purposes it does not matter the nature of the costs of managing cash holdings. What is important is that firm cash holdings are positive and considerable.

Usually, firms maintain cash-sales ratios smaller than one. The 95th percentile of the distribution of the cash-sales ratio reached a maximum of 1.3 in 2000 and it was about 1 during 2002-2007. If a firm maintains a cash-sales ratio above one, it means that the firm keeps more than one year of sales

6. Our measure of cash is cash and equivalents from Compustat, "cash and short-term investments," CHE, U.S. nonfinancial firms. CHE is not available for utilities, so the dataset removes this sector. To avoid anomalies, we remove observations with cash or assets equal to zero, and observations with cash greater than assets. To avoid extreme cash-sales ratios, we remove observations with sales smaller than 10 million and observations with cash/sales below the 1st and above the 99th percentiles of cash/sales. We later report results without this truncation, which barely changes results. We correct for inflation with the CPI from the FED St. Louis, CPIAUCSL, base 1982-84. For sales, we use SALE in Compustat. Our procedure implies 140,435 firm-years or about 4,130 firms per year.

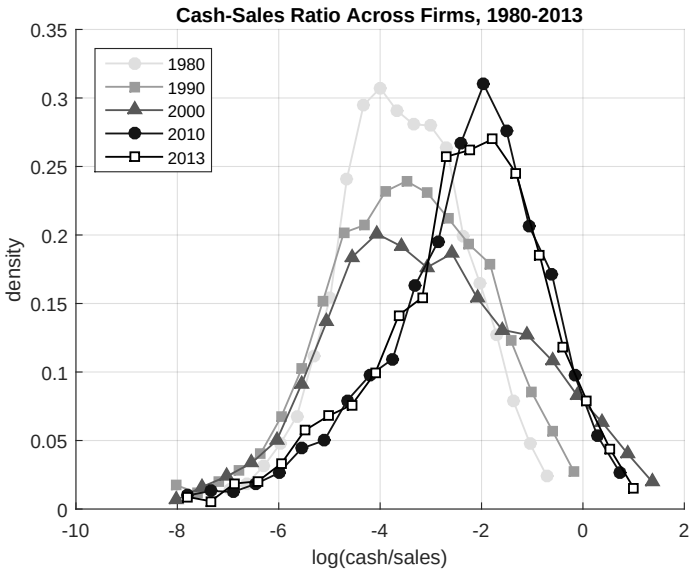

FIGURE 5: Distribution of the cash-sale ratio across firms from 1980 to 2013 for selected years. Each curve has the distribution for one year (density histograms with 20 groups). The curves are approximately symmetric because it shows the logs of the cash-sales ratio; the actual distribution is highly asymmetric. Over the years, the support and the median of the cash-sales ratio increased.

Source: Authors' calculations with Compustat data. See note 6 for details.

in the form of cash. Firms that maintain high cash-sales ratios tend to be small firms in terms of sales; the same is true for the cash-assets ratio.

Figure (5) shows the distribution of the cash-sales ratio for each year. The distributions look symmetric because the figure shows the logs of the cash-sales ratio. The support and the median of the distribution of the cash-sales ratio increased over time. The support of the distribution increased first and later the median increased. In 1980, the maximum cash-sales ratio was equal to 7 months, i.e., below one year. The maximum cash-sales ratio was above 1 after 1983. In 2000, the maximum cash-sales ratio was 5 years (the 95th percentile was 1.3). Figure 1 shows that the increase in the median of the cash-sales ratio accelerated after 2000 and figure 5 shows that the distribution of cash holdings changed substantially after this date. The two figures complement each other as they show that firm cash holdings changed especially after 2000.

It is important that the model can take into account that the distribution of cash holdings across firms is not uniform and that it has changed over time. Changes in the heterogeneity of the cash holdings change the speed and the size of the adjustment to the shock. This property is not unique to our model, the new Keynesian Phillips curve model shares this property.

Carvalho and Nechio (2011) shows that when the heterogeneity in the firms price setting behavior is taken explicitly into account the aggregate dynamics are substantially different from the case when all firms have the same price setting behavior.

The Model

The economy is composed by firms with different amounts of liquid assets, that we call money, and illiquid assets, that we call bonds. There is market segmentation in the financial market, in the sense that firms only trade occasionally in the assets market. Firms trade bonds for money, in the assets market and goods for money in the goods market. Because bonds pay interest while money does not, firms accumulate bonds and periodically trade them for cash to do transactions in the goods market. As firms do not do this at the same time there will be a non degenerate distribution of cash and bonds across firms in the economy.

The groups of firms are indexed by $i = 1, ..., I$ and the fraction of firms in each group by v_i, where $\sum_{i=1}^{I} v_i = 1$. Each firm has a bank account and a brokerage account. A firm in group i, s_i, is identified by its pair of initial values of cash and bond holdings, (M_{0i}, B_{0i}). The bank account is used to hold cash for transactions in the good and inputs market. The brokerage account is used to trade bonds in the asset market. The time interval between transfers of money from the asset market to the good market, the holding period, is the same for all firms that belong to the same group and is denoted by N_i. Different holding periods express different forms of portfolio management by the firms in the economy, which we do not address in the paper.

Time is continuous, $t \geq 0$. Firms produce goods at time t, which they sell instantaneously. The proceeds of sales are deposited directly to the brokerage account and converted into bonds. The portfolio choice across different bonds in the brokerage account is not important for our results. For this reason, we simplify the model by having just one positive and deterministic nominal rate of return $r(t)$. This rate of return on assets in the brokerage account is the opportunity cost of money, and the firms manage cash over the holding period according with the path of $r(t)$.

Let $T_{ji}(s_i)$, $j = 1, 2, ...$, denote the times of the transfers of firm s_i, $i = 1, ..., I$. At $T_{ji}(s_i)$, firm s_i sells bonds for money and transfers the proceeds to the good market. The holding period of firm s_i is $[T_{j,i}(s_i), T_{j+1,i}(s_i))$, for $i = 1, ..., I$. We have $T_{j+1,i}(s_i) - T_{j,i}(s_i) = N_i$ for $j = 1, 2, ...$ for all s_i firms. Cash holdings are denoted by $M_i(t, s_i)$. Cash holdings in the brokerage account are zero, as cash does not receive interest and it is not possible to do transactions with the cash in the brokerage account. The optimal policy is to keep the resources in bonds in the brokerage account and make periodical transfers to the bank account to do transactions.

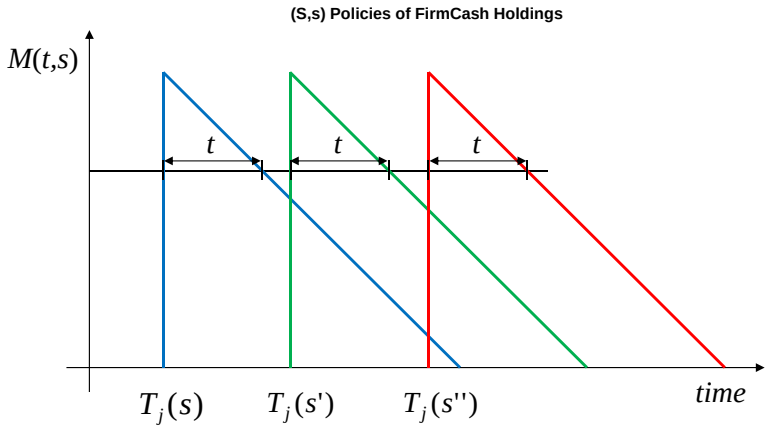

FIGURE 6: Along the holding periods the pattern of the cash stock evolution is similar across the firms in the same group. The firms cash money balances follow a sawtooth pattern. However, at any point in time different firms in the same group will have different levels of cash.

Source: Authors' calculations.

The government executes monetary policy through open market operations, that is, by exchanging bonds for money with the firms in the assets market.

The Distribution of Cash Holdings in the Steady State

The firms engage in (S, s) policies for cash. The opportunity cost of holding cash implies that it is optimal to start a holding period with more cash than in the rest of the holding period and spend this cash gradually until the next transfer, which initiates a new holding period. As the times of the transfers $T_{ji}(s_i)$, $j = 1, 2, ...$, are not the same across firms, at any point in time some firms will have little cash while others will have a lot of cash.

In a steady state with constant inflation rate, π, and nominal interest rate, r, the (S, s) policies concerning the cash of the different firms in each group i, $M_i(t, s_i)$ for $i = 1, ..., I$, have the same pattern. This is highlighted in figures 5 and 6. The paths for cash and bonds have the same pattern across firms in the same group.

The aggregate cash holdings at time t, $M(t)$, are obtained by the aggregation of the cash holdings of each firm at t. At t most firms will have different levels of cash, but the aggregate money demand will grow at the steady state inflation rate.

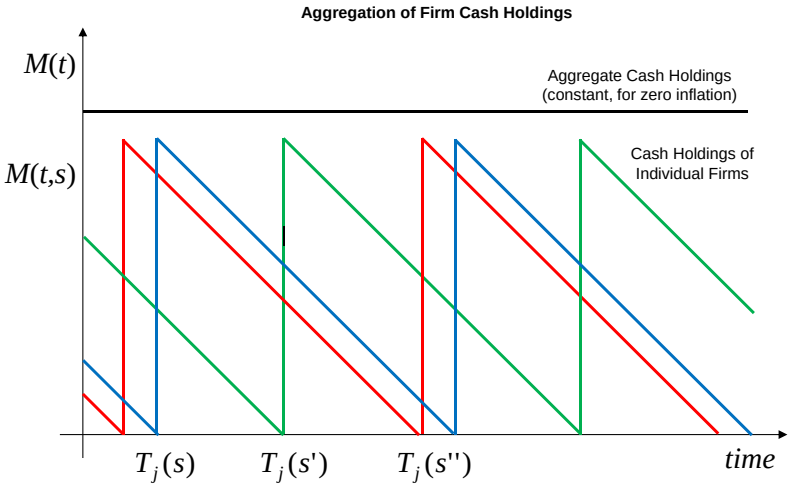

FIGURE 7: Inside each group and at each moment different firms have different cash balances but the aggregate cash holdings is constant if inflation is zero.

Source: Authors' calculations.

A relevant variable for a firm is its position in the holding period. Let $n_i \in [0, N_i)$ denote how long ago a firm of the group i made a transfer. It can be shown that the optimal transactions during the holding periods of firms in group i are a decreasing function of time the last transfer occurred and of the nominal interest rate. Given the transactions of each firm s_i in group i it is possible to compute the value of cash holdings of each firm s_i, as well as the cash holdings of group i and the aggregate cash holdings.

Instead of working with cash we focused on the variable cash-sales ratio of the firms. The cash-sales ratio gives how much of their sales firms maintain in cash, it is the inverse of the money velocity. For instance, according to the Compustat data, the median cash-sales ratio in 2012 was equal to 10%. Therefore, the median firm in 2012 held $0.1 \times 360 = 36$ days of sales in cash.

From the cash holdings of the firms and the sales of firms we get the density $f_i(m_i)$ of firms cash-sale ratios, m_i. The group i firms cash-sale ratios are distributed along $[0, m_{H_i})$, where $m_{H_i} = \lim_{n_i \to N_i} m(n_i)$. For the aggregate firms in the economy, the density function is $f(m) = \sum_i v_i f_i(m)$, where v_i is the fraction of firms distributed along $[0, N_i)$, which ensures that $\int f(m)\, dm = 1$.

For each year the nominal interest rate, r, is the commercial paper interest rate, and the values of m_{H_i} and v_i are set so that the model distribution of the cash-sales ratio approximates the actual distribution of the cash-sales ratios, available in the Compustat data. Figure (8) shows an example with $I = 4$.

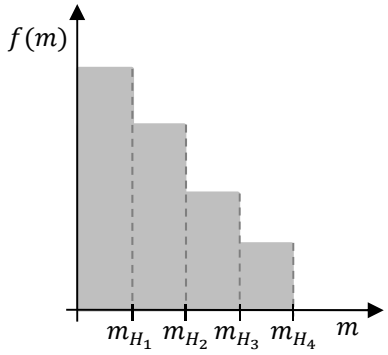

FIGURE 8: The parameterization is made by finding the values of m_{H_i} and v_i, $i = 1, ..., I$, so that the model distribution of cash-sales ratios approximates the distribution in the data. In the simulations $I = 50$.

Source: Authors' calculations.

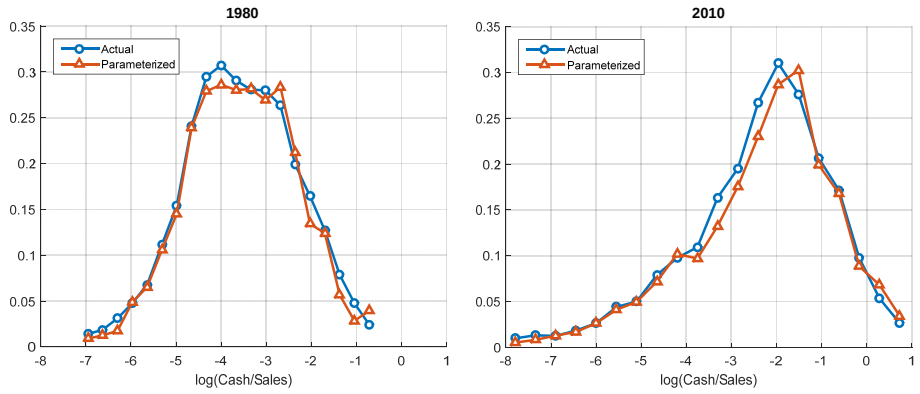

FIGURE 9: Actual and parameterized distributions of the cash-sales ratio for 1980 and for 2010.

Source: Authors' calculations.

The actual distributions of the cash-sales ratio are shown in figure (5). Figure (9) shows the actual distribution and the parameterized distributions for the years 1980 and 2010. As the distributions are highly asymmetric toward small values of the cash-sales ratio, figures (5) and (9) show the distributions of the logs of the cash-sales ratio.

Firm Cash Holdings and Monetary Policy Shocks

In the model monetary policy is summarized by a nominal interest rate path $r(t)$, $t \geq 0$. The central bank sets the interest rate path, and then changes the money supply accordingly. A change in the interest rate path $r(t)$ affects firms' cash holdings but the central bank adjusts the supply of cash, $M(t)$, to satisfy the money market clearing condition. It is equivalent to set $M(t)$ and obtain the equilibrium $r(t)$ or to set $r(t)$ and obtain the equilibrium $M(t)$. However, it is computationally simpler to set $r(t)$ and obtain the other equilibrium variables. Moreover, the evidence suggests that the practice of central banks is to set monetary policy in terms of interest rates. By focusing on $r(t)$ as the target for the monetary policy, we follow the literature, for example, Michael Woodford (2003).

When an unexpected increase in the interest rate hits the economy, firms have different cash holdings $M_{0i}(n)$. Firms with little cash are about to make a transfer. These firms adapt faster to the shock because they will make a transfer soon after the shock. With the bond trade and subsequent transfer, they adjust cash holdings taking into account the new interest rate path. Firms with large cash holdings take longer to make their first transfer and thus adjust more gradually. Until they make a transfer, they can only adjust transactions.

The different adjustments of transactions and assets affect the real interest rate. If the holding periods N_i's are small, firms adjust quicker and the real interest rate changes little. In the limit, if $N_i \to 0$, we are back to the standard cash-in-advance model with a representative firm and the real interest rate doesn't move. Conversely, if the values of N_i are large, there is a large degree of heterogeneity across firms and a large portion of the firms adjust slowly to the shock. The gradual adjustment to the shock implies larger and more persistent changes in the real interest rate.

Longer holding periods imply different and longer adjustments in transactions that bring about slower and smaller changes in the price level after an increase in the nominal interest rate. As the real interest rate is equal to the difference between the nominal interest rate and the rate of inflation, the real interest rate increases together with the nominal interest rate after the shock. Market segmentation, therefore, explains the real effects of monetary policy through the different cash holdings of the firms at the time of the shock and the subsequent diverse reactions of the firms.[7]

The price level changes less after a shock in the economy if the holding periods are larger. In this sense increasing the dimension of the holding periods in this segmentation model is similar to decreasing the probability that the firm can reset its price in the Calvo price setting mechanism. The

7. A slow response of prices and an increase in the real interest rate after an increase in the nominal interest rate is found in many empirical studies.

price stickiness property arises endogenously in this segmentation model and the degree of the price stickiness increases with the increase in the holding periods. Thus, longer holding periods imply larger and more persistent effects in the real variables after a shock.

According to the Fisher relation the real interest rate changes after a nominal interest rate shock only if inflation moves slowly after the shock. In a standard cash-in-advance model, inflation changes instantaneously after a shock to nominal interest rate and the real interest rate remains constant. Here, inflation remains constant just after the shock because of the market segmentation. Therefore, the real interest rate increases with the nominal interest rate shock.

Consider now a monetary policy shock as the one described in Uhlig (2005). Figure (10) reproduces figure 2, plot 6, in Uhlig (2005), which shows the possible range of impulse response functions for the federal funds rate to a monetary policy shock. On average, on impact the interest rate increases 0.3 percentage points and gradually decreases towards its initial value in about 2 years, and stays below its initial value, for some time, until it returns to zero. We approximate this shock with the process for the interest rate given by $r(t) = r_1 + (r_2 - r_1 + Bt)\, e^{-\eta t}$, also depicted in figure 10, where $r_2 - r_1 = 0.3$ percentage points per year. We set B and η so that $r(t)$ approximates the average impulse response of the federal funds rate in Uhlig (2005). [8]

From 1980 to 2013, we parameterize the economy by determing the values of v_{Y_i} and N_i so that the distribution of the cash-sales ratio from the model replicates as close as possible the actual distribution of the cash-sales ratio from the Compustat data. In each year, given the parameterizations, we hit the economy with the shock to $r(t)$ and obtain the real interest rate path.

Figure 11 shows equilibrium real interest rate paths for five years in the period between 1980 and 2013. We show the difference in percentage points from the initial value of the real interest rate. For a standard cash-in-advance model, we would have a straight line at zero after the shock, as a standard cash-in-advance model implies an instantaneous reaction of prices and no change in real interest rates. However, with market segmentation, the real interest rate increases after the nominal interest rate shock and returns gradually to its initial value. The real interest rate undershoots before returning to its initial value.

We measure the effect of monetary policy by how long it takes for the real interest rate to reach its initial value. In figure (11), we have, for example, that given the cash distribution of 1980 the real interest rate reaches its initial

8. The expression of $r(t)$ is a result of the differential equation $m\ddot{r}(t) + c\dot{r}(t) + kr(t) = 0$, $\eta = c/(2m)$, which describes a dampened shock. We set $r_1 = 3\%$ p.a. and $r_2 = 3.3\%$ p.a. Figure (10) expresses the results as the difference from initial values of the nominal and real interest rates. In our simulations, t denotes one day and we divide the year in 360 days. We set $B = -0.15\%$ and $\eta = 0.30$, for $r(t)$ given in percentage per year.

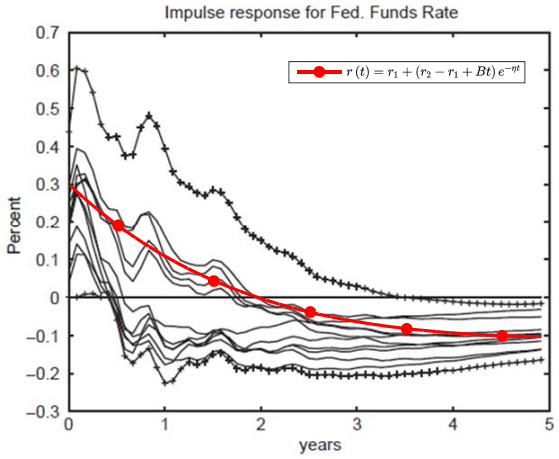

FIGURE 10: The red line corresponds to the nominal interest rate path $r(t) = r_1 + (r_2 - r_1 + Bt)\, e^{-\eta t}$, with the parameters B and η used in the simulations.

Source: Figure 2, plot 6, in Uhlig (2005).

value in 1.84 months. Given the cash distribution of 2013, the real interest rate reaches its initial value in 5.25 months. The values for all years from 1980 to 2013 are in figure (4). As the distribution of cash-sales ratio changed from 1980 to 2013, the effect on the real interest rate implied by the model has changed too. The recent distribution of cash-sales implies that the real interest rate takes longer to return to its initial value. The monetary authority, therefore, is able to affect the real interest for a longer period.

These results are qualitative robust to different calibration methods, different interest rate shocks, and different cash aggregates. For instance if the model was calibrated to the cash portion of cash and equivalents item from the Compustat data the qualitative results would be similar. Figure 12 reports the results when instead cash is used. Also in this case the time it takes for the real interest rate to return to the initial value increases substantially.

Conclusions

We show that the recent increase in cash holdings by firms has strong macroeconomic consequences, since it affects substantially the response of the real interest rate to nominal interest rate shocks. According to our predictions, the changes in the distribution of cash holdings from 1980 to 2013 imply that the real interest rates takes 3.4 months more in 2013 than in 1980 to return to its initial value after a shock.

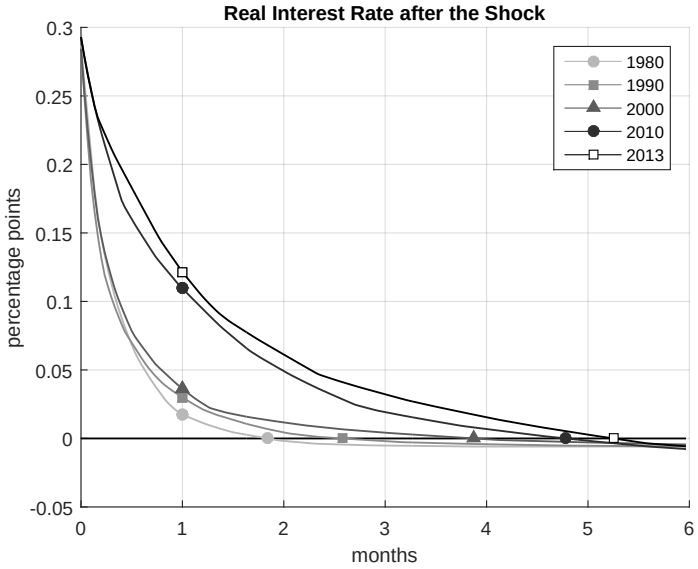

FIGURE 11: Response of the real interest rate for selected years given the nominal interest rate shock of figure (10). Results from simulations. The distribution of cash holdings is determined through the data for each year. The markers in the horizontal axis show the time for the real interest rate to return to its initial value. The values are 1.84, 2.58, 3.88, 4.78, and 5.25 months for the selected years. The values for all years are in figure (4).

Source: Authors' calculations.

It is a broad conviction that when the nominal interest rates are low monetary policy is less efective. The implication of our results is just the opposite. Given the high current values of the cash-sales distribution as compared to past values, changes in nominal interest rates will have stronger effects in the economy. A small change in the nominal interest rate today as the same real effect as a large change in the nominal interest rate some decades ago.

Our argument is not as general as we would like because it takes as given the firms' cash holdings. In future work we would like to investigate what are the determinants of corporate cash holdings and why have corporate cash holdings increased so much. Only after this work is done can we allow for firms' cash holdings to be an endogenous variable in the model.

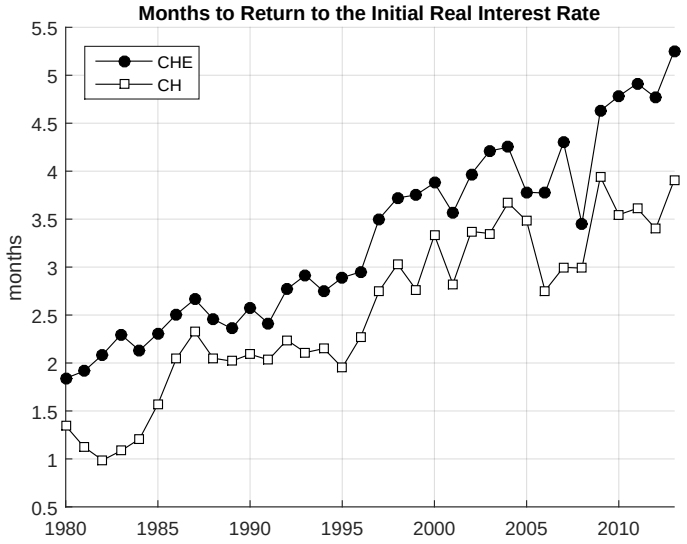

FIGURE 12: CHE: simulations as in figure (4), with cash and equivalents. CH: simulations with the cash portion of cash and equivalents. In both cases, the time to return to the initial value of the real interest rate increases substantially.

Source: Authors' calculations.

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Temporary contracts' transitions: the role of training and institutions

Sara Serra
Banco de Portugal

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Abstract
Despite recent reforms, labour market segmentation is still a marked feature of several European countries. This work empirically analyses transitions out of temporary contracts, by means of a discrete duration model, with a particular focus on human capital features, labour market protection and their interaction. Transitions to open-ended contracts with the same or with a new employer are considered separately, as well as transitions to joblessness, based on data for ten European countries taken from the European Community Household Panel. Firm-training significantly increases the likelihood of transitioning to an open-ended contract with the same employer, but not in countries with more segmented labor markets. In these countries, instead, educational attainment and labour market flexibility are more important determinants of transitions to open-ended contracts. Interestingly, in these countries, firm training actually mitigates the positive (and significant) impact of labor market flexibility on the likelihood of transitioning to an open-ended contract with the same employer. (JEL: E24, J24, J41)

Introduction

Despite recent reforms, labour market segmentation, characterized by strong differences between temporary and open-ended contracts, namely as regards employment protection, is still a marked feature of several European countries.[1]

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The opinions expressed in this article are those of the authors and do not necessarily coincide with those of Banco de Portugal or the Eurosystem. Any errors and omissions are the sole responsibility of the authors.

E-mail: srserra@bportugal.pt

1. According to the definition of the International Labour Organization, labour market segmentation consists in the division of the labour market into separate submarkets or segments, distinguished by different characteristics and behavioural rules. Segmentation may arise, *inter alia*, from particularities of labour market institutions, such as governing contractual arrangements.

A large part of the literature on this topic has focused on transitions from temporary to permanent jobs and on the ability of the former to serve as career stepping stones. In particular, a number of papers focus on firm and worker characteristics that favour the conversion of a temporary contract into an open-ended (permanent) one (Portugal and Varejão (2009), Amuedo-Dorantes (2000), D'Addio and Rosholm (2005), etc.). Other studies have focused instead on the impact of labour market institutions on transitions from temporary to permanent (Kahn (2010), Centeno and Novo (2012)) or job-to-job mobility among permanent workers (Gielen and Tatsiramos (2012) and Orsini and Vila Nuñez (2014) among others). Less explored in the literature is the connection between training decisions and transitions, even though labour market segmentation may imply that temporary workers receive less training, which can have a longer term impact on the skill level of the economy, given that these workers may become trapped in cycles of low productivity jobs, with a consequent effect on output. Even less explored in the literature is the interaction between labour market institutions, namely employment protection legislation (EPL), and training decisions (Bassanini *et al.* (2005) suggest that there is a negative impact of EPL on temporary contracts on training incidence). This work tries to analyse the impact of the interaction between labour market regulations and training decisions on labour market transitions for workers holding temporary contracts. This issue has relevant implications for the definition of both labour market and training policies.

The analysis in the current work is an empirical exercise, based on a panel of survey data for European countries, the European Community Household Panel (ECHP). The modelling approach is based on a semi-parametric discrete duration model with the aim of accessing how the probability of transition to other labour market states evolves over the duration of a temporary contract. This analysis is disaggregated into transitions within the same firm (intra-firm transitions) and to other firms (inter-firm transitions). This distinction of transitions according to employer type is motivated by the fact that training may play a role on the type of transition obtained. In addition, in the case of inter-firm transitions, reasons to quit a job may be substantially different for temporary and permanent workers. In the case of temporary workers this movement may result from the expectation of contract non-renewal or non-conversion. In fact, according to the data used in this study, the reasons that lead to the end of a temporary and a permanent job are somewhat different, given that for the former the legal limit of the contract assumes substantial relevance.

The results presented in this article show that interactions between training and labour market regulations influence transitions to permanent contracts. Moreover, the distinction between intra and inter-firm transitions matters as regards the relative importance of the determinants. For transitions to a permanent job with the same employer, the characteristics of the firm appear to be the most relevant feature, while for inter-firm transitions, the

characteristics of the worker seem to be more relevant. Moreover, being in a training firm insulates to some extent temporary workers from the impact of changes in labour market protection.[2] The breakdown of results across two country groups shows that this latter result stems from segmented labour markets. In these economies, higher labour regulation flexibility increases the probability of all types of transitions considered. However, the size of this response is mitigated in some cases for employees of training firms, which are therefore insulated to some extent from the effects of changes in labour market regulation. In countries with less segmented labour markets, aspects related to training appear to be more relevant than institutional ones, with firm training favouring transitions to an open-ended contract with the same employer, while reducing the probability of transitions to joblessness.

Data and descriptive analysis

Data

The European Community Household Survey is an harmonized longitudinal survey covering fifteen European Union member states (Belgium, Denmark, Germany, Greece, Spain, France, Italy, Ireland, Luxembourg, The Netherlands, Portugal, United Kingdom, Austria, Finland and Sweden) and comprising eight waves (from 1994 to 2001) for the majority of countries. The survey is carried out by national data collection units and coordinated by the Statistical Office of the European Union (Eurostat). The longitudinal nature and standardized methodology and questionnaire are advantages of this database, which allows for the analysis of individual transitions and cross-country comparisons. However, it has the disadvantage of being relatively outdated, and therefore not capturing the impact of policy changes that have taken place in recent years. Notwithstanding, as will be argued bellow, the broad situation as regards labour market segmentation has not changed dramatically since the period of the survey. The main reason for the choice of the database is the availability of questions regarding training incidence, duration, and nature, as well as firm training choices. However, for estimation only part of this information could be used due to sample size limitations.

Some countries were excluded from the database due to data coverage issues (Germany, Luxembourg, UK, France and Sweden). The sample was further restricted to dependent employees working more than 15 hours per week and included in the survey for at least two consecutive years.

2. The term "training firm" is used to define a firm that offers benefits related to training to its workers. The exact wording of this question in the ECHP is "Does your employer provide free or subsidised services or benefits to employees in any of the following areas?", with one of the options considered being education and training.

Employment status is consistent with the International Labour Organization standards. Data from the first wave of the survey could not be used, given that information on the type of contract held by the worker is only available from wave 2 onwards. Furthermore, only observations in which workers state being in a permanent contract or in a fixed or short-term contract are considered.[3] In addition, the treatment of duration prior to the beginning of the survey restricts the sample to those observations for which information on year and month of start of the current job is available. In the case of agents which recorded multiple transitions from a temporary contract to one of the risk states, only the first transition is considered. Individuals which have reported having permanent jobs prior to a temporary contract have also been excluded from estimation.

Finally, the sample is restricted by the availability of information on the regressors considered. These comprise firm characteristics, including sector of activity, provision of training to employees and number of employees in the production unit of the worker. Worker characteristics used as controls include gender, age, highest level of general or higher education completed (ISCED[4] level), job satisfaction[5] and attendance of education or training in the recent past. Job and career information like duration of current job and the number of temporary contracts held prior to the current one is also considered. The available sample comprises 8947 observations and 5910 individuals after these conditions are satisfied.

To control for the evolution of labour market protection over time at country level, the indicator related to labour legislation included in the International Institute for Management Development (IMD) World Competitiveness Yearbook is used. IMD is an yearly assessment of country competitiveness, which includes the results of an executive opinion survey on several issues, including whether labour regulations hinder business activities. An increase in the indicator implies an increase in flexibility of labour market regulation. This indicator has the advantage of having a time series interpretation (Antunes and Centeno (2007)) and more time variability than the commonly used OECD EPL indicator. It also has a scope which is

3. The exact wording of this question is “What type of employment contract do you have in your main job? Please indicate which of the following best describes your situation." The options available for answer are: permanent employment, fixed-term or short-term contract, casual work with no contract and some other working arrangement.

4. ISCED is the acronym for the International Standard Classification of Education, provided by the United Nations Educational, Scientific and Cultural Organization (UNESCO).

5. The indicator on job satisfaction consists of an average of the evaluation of workers regarding several aspects of their job. The exact wording of the question is “How satisfied are you with your present job or business in terms of earnings, hours of work, working conditions etc." and the topics considered are earnings, job security, type of work, number of working hours, working time, working conditions/environment and distance to job/commuting. A higher value implies higher satisfaction, from 1 (not satisfied) to 6 (fully satisfied).

broader than EPL, and relates to actual enforceability of regulations, instead of simply legislative changes like the OECD indicator. The main drawback of the IMD indicator is that it does not allow for a separate analysis of the impact of labour regulations affecting temporary and permanent contracts.

The analysis is developed for the overall sample and for two country subgroups, in order to control to what extent results are driven by more segmented labour markets, where temporary contracts share a relatively similar institutional framework. Group M (more segmented labour markets) is composed of Spain, Portugal and Italy, while group L (less segmented labour markets) contains the remaining countries. This partition was adopted because countries in group M are among those with highest share of temporary contracts in employment at the time of the ECHP survey, and have maintained that status in recent years (Table 1).[6] In addition, these countries implemented two-tier labour market reforms over the 80's and 90's (Boeri (2011)), maintaining however strict average levels of labour market protection (OECD (2013)). Table 2 shows that the relative ranking of the countries regarding labour market regulations strictness measured by the IMD indicator has not changed substantially since the ECHP survey period. In addition, group M countries are among those in the European Union with lowest training incidence (Bassanini *et al.* (2005)). This evidence, along with the one in Table 1, suggests that the fact that the ECHP data extends only to 2001 may not be critical for the analysis of this work, given that the main features under analysis have not changed fundamentally since then.

Descriptive analysis of the data

Table 3 shows how the employment structure described in Table 1 translates into temporary worker flows for the sample considered.[7] About half of the workers change state after one year, and a large share of workers obtain a permanent contract each period, the majority of which with the same employer. One distinctive feature is that while the share of temporary workers that is promoted to a permanent job with the same employer is relatively stable across countries (ranging from about 17% to 33%), the share of workers that transition to open-ended contracts with a new employer is more heterogenous. In fact, the share of inter-firm transitions is lower for countries with a higher share of temporary workers, which also show a higher

6. The temporary employment concept in the OECD data used to compute the composition of employment in recent years is more encompassing than the fixed-term aggregate in the ECHP. However, based on data from the two databases for 2000-2001, the employment share defined by fixed-term plus other temporary contracts in the ECHP is very comparable to the OECD aggregate, with differences of less than five percentage points.

7. Because these are annual flows, some intra-anual transitions (from temporary employment to joblessness and back to temporary employment, for example) are not accounted for.

Country	1995-2001				2008-2012
	permanent	fixed-term	none	other	temporary employment[a]
Spain	64.1	29.7	3.8	2.4	25.7
Finland	84.2	13.5	1.7	0.5	15.3
Portugal	80.0	10.6	3.3	6.1	22.1
Belgium	89.1	8.8	0.4	1.6	8.3
Greece	76.8	8.6	14.0	0.6	11.5
Italy	86.9	7.9	3.2	2.0	13.1
Ireland	82.1	6.1	8.7	3.1	9.4
Denmark	88.3	5.6	5.5	0.6	8.6
Austria	91.7	4.9	0.4	3.0	9.2
Netherlands	89.4	3.3	0.7	6.6	18.6

TABLE 1. Composition of employment by contract type

Notes:[a] Share in dependent employment, OECD data. Data sorted in descending order by share of fixed-term contracts in 1995-2001.
Sources: ECHP and OECD.

	1995-2001	2008-2012
Italy	2.4	3.7
Belgium	3.1	3.3
Spain	3.4	3.4
Portugal	3.9	3.9
Austria	4.1	5.4
Greece	4.2	3.6
Netherlands	4.5	4.4
Finland	4.6	5.0
Ireland	5.9	5.2
Denmark	7.6	8.1

TABLE 2. IMD- Labour regulations indicator

Notes: Data sorted in ascending order by 1995-2001 values. A higher value of the indicator implies higher perceived flexibility in the economy.
Source: IMD World Competitiveness Online.

percentage of transitions into joblessness (unemployment plus inactivity). This evidence suggests that there is a margin for use of temporary contracts that is similar across countries (possibly related to temporary labour needs from firms), but another one which is more variable. In addition, there is some overlapping of countries with a low share of inter-firm transitions and with strict labour regulations as measured by the IMD indicator.

Table 4 shows the descriptive statistics for the sample used, which illustrate the main differences between workers that experience intra and inter-firm transitions and also transitions into joblessness. These statistics correspond to the sample averages of all the individual level variables used in estimation. With the exception of age, for time-varying variables the lagged values were considered (see Section *Transitions out of temporary employment* for more details).

Country	Remain Temporary	Intra-firm transition	Inter-firm transition	Joblessness	Observations
Spain	56.2	17.5	4.3	22.1	3917
Portugal	54.2	24.8	6.6	14.5	1361
Finland	45.6	16.7	8.5	29.2	945
Greece	53.9	18.0	8.8	19.4	434
Italy	44.1	20.2	10.3	25.4	891
Belgium	51.0	26.8	12.1	10.1	298
Austria	36.7	33.3	14.4	15.5	264
Ireland	39.2	26.5	18.0	16.3	245
Denmark	34.8	23.3	21.5	20.4	270
Netherlands	39.8	17.7	25.8	16.8	322
Total	51.0	20.0	8.1	20.9	8947
Observations	4562	1791	726	1868	8947

TABLE 3. Transitions from temporary jobs

Note: Data sorted in ascending order by share of transitions to a job with a new employer.
Source: ECHP.

Table 4 shows that workers that undergo inter-firm transitions tend to be younger and have higher education levels. These workers also received training in the period prior to transition in higher proportion than those that experienced intra-firm transitions. These features suggest that a separate analysis of intra and inter firm transitions may be relevant. Other distinctive features are that workers experiencing the first temporary contract recorded in the survey are much more likely to make a transition than those which had at least one previous temporary contract, and this reflects in particular transitions to joblessness. Transitions to joblessness are made by workers with a higher average age and a lower education level than those going to other states. These workers are also mostly female and work in production units that are on average smaller and less likely to provide training. Regarding the comparison between country groups M and L (results available upon request), workers in the latter have on average a higher education level. The incidence of firm-provided training is also higher in this country group.

Modelling approach

The dependent variable considered in estimation is the time elapsed since the admission into a fixed-term contract with a given employer.[8] Given the annual frequency of the survey, a discrete duration model was adopted.

8. For estimation purposes no distinction is made between contract and job, *i.e.*, renewals or other contractual changes are not accounted for when they do not imply a change in the type of contract declared in the ECHP (permanent, fixed-term, no contract or other arrangement).

Variable	Overall	Remain temporary	Intra-firm transition	Inter-firm transition	Joblessness
Duration in months:					
$]0,3[$	0.20	0.18	0.13	0.25	0.28
$[3,6[$	0.15	0.14	0.10	0.15	0.20
$[6,9[$	0.10	0.10	0.09	0.12	0.11
$[9,12[$	0.08	0.07	0.08	0.09	0.08
$[12,15[$	0.11	0.11	0.13	0.11	0.10
$[15,18[$	0.08	0.08	0.09	0.06	0.06
$[18,21[$	0.05	0.05	0.06	0.04	0.04
$[21,24[$	0.04	0.04	0.05	0.03	0.02
$[24,30[$	0.08	0.09	0.10	0.06	0.05
≥ 30	0.12	0.14	0.17	0.08	0.05
First job	0.58	0.39	0.75	0.77	0.80
Not first job	0.42	0.61	0.25	0.23	0.20
Age [16,30[	0.54	0.53	0.54	0.60	0.53
Age [30,45[	0.33	0.35	0.35	0.32	0.29
Age [45,65]	0.13	0.13	0.12	0.08	0.18
Firm size <20 workers	0.48	0.46	0.48	0.44	0.54
Firm size 20-99 workers	0.28	0.30	0.27	0.26	0.27
Firm size >99 workers	0.24	0.24	0.25	0.29	0.19
Secondary education or more	0.53	0.52	0.58	0.64	0.47
Less than secondary education	0.47	0.48	0.42	0.36	0.53
Training worker	0.34	0.32	0.33	0.44	0.34
No training worker	0.66	0.68	0.67	0.56	0.66
Training firm	0.24	0.24	0.30	0.31	0.18
No training firm	0.76	0.76	0.70	0.69	0.82
Training worker+firm	0.15	0.14	0.18	0.21	0.11
Training worker+no training firm	0.18	0.17	0.15	0.22	0.24
No training worker+training firm	0.09	0.09	0.12	0.10	0.07
No training worker+no training firm	0.57	0.59	0.55	0.47	0.59
Men	0.52	0.54	0.52	0.54	0.47
Women	0.48	0.46	0.48	0.46	0.53
Agriculture	0.04	0.05	0.02	0.03	0.06
Industry	0.33	0.34	0.35	0.30	0.29
Services	0.63	0.62	0.63	0.67	0.65
Private sector	0.73	0.72	0.77	0.73	0.71
Public sector	0.27	0.28	0.23	0.27	0.29
Job satisfaction	3.88	3.85	4.00	4.01	3.77
Observations	8947	4562	1791	726	1868

TABLE 4. Descriptive statistics - Overall Sample

Note: the statistics presented are the average proportion of the sample corresponding to each category, with the exception of job satisfaction, for which the average sample value is reported. Source: ECHP.

Each period, the length of a spell, in this case of a temporary contract, is expressed as a random variable T, with an associated cumulative distribution function $F(t)$. The elapsed time since the beginning of the spell is given by the survivor function $S(t) = 1 - F(t)$.

In a discrete duration setup in which data is grouped, *i.e.*, in which the underlying process is inherently continuous but observed in at discrete frequency, time is aggregated into intervals of the type $]a_i, a_j]$ where $a_i \in \{0, 1, ...a_{j-1}\}$ and $a_j \in \{1, 2, ...\infty\}$. In that case, the hazard rate corresponds to the probability that a spell ends before a_j, given that it lasted up until a_{j-1}:

$$\begin{aligned} h(a_j) &= Pr(a_{j-1} < T \leq a_j | T > a_{j-1}) \Leftrightarrow \\ h(a_j) &= 1 - \frac{S(a_j)}{S(a_{j-1})}. \end{aligned} \tag{1}$$

The duration is modeled by assuming a proportional hazard model, where $h_0(t)$ represents the baseline hazard function, λ_t the proportional changes implied by different values of the covariates X_t and v is an unobservable individual effect, assumed to be a random variable with unit mean, finite variance and independently distributed from t and X, that only assumes positive values:

$$h(t, X_t | v) = h_0(t) \lambda_t v. \tag{2}$$

The modeling approach followed was a complementary log-log (cloglog) specification, which corresponds to the discrete time representation of a proportional hazard model with grouped data (see Jenkins (2005) for a proof). In that case, the hazard rate of the discrete process can be specified as:

$$h(a_j, X_t) = 1 - \exp[-\exp\left(\beta' X_t + \gamma_j + u\right)]. \tag{3}$$

where γ_j is the log of the difference between the integrated continuous time baseline hazard corresponding to the continuous process which is only observed at discrete intervals, evaluated at the extremes of the interval $]a_{j-1}, a_j]$, X is the vector of (possibly) time varying covariates and $u = \ln(v)$. The baseline hazard is assumed to be constant over a given interval.

A competing risk approach is adopted that takes into account three mutually exclusive possible modes of exit from temporary employment: being promoted to a permanent contract with the same employer, obtaining an open-ended contract with a new employer or joblessness (unemployment or inactivity). A latent duration variable is associated with each exit mode from a temporary job, and only the minimum of the latent failure times, if any, is observed. For simplicity, competing risks are assumed to be independent. Moreover, transitions are assumed to occur at the limits of intervals, *i.e.*, at the moments the survey takes place, which allows the model to simplify to three single cause hazard models (Portugal and Varejão (2009)).

Estimation Results

Transitions out of temporary employment

Overall Sample. Table 5 presents the results of the estimation of the competing risks duration model for transitions out of temporary employment. Robust standard errors (in order to correct for potential error heteroskedasticity) are presented in parenthesis.

One note on coefficient interpretation: in a continuous proportional hazard model, the exponential of the coefficients can be interpreted as hazard ratios, the relative change in the hazard rate when a covariate changes by one unit. Given that the cloglog model corresponds to the discrete version of a continuous proportional hazard model, the exponential of coefficients in Table 5 can be interpreted as the hazard ratio of the corresponding continuous model. Therefore, a positive (negative) coefficient associated with a given covariate will imply that an increase in that covariate corresponds to a higher (lower) hazard than for the reference (omitted) category.

For the estimated models presented in this article, a non-parametric approach was followed as regards the estimation of the baseline hazard rate, with dummies representing regular intervals of duration of the temporary job. These durations are measured at the beginning of intervals, therefore corresponding to the minimum duration of the temporary job. Therefore, the last dummy included covers minimum durations above 2.5 years. Due to legal limitations on the maximum duration of a temporary contract, closed intervals above that duration would lead to the exclusion of some countries from that parameter estimation sample.

For time-varying variables (except age), lagged values were considered, not only to reduce potential regressor endogeneity issues, but also because that would be the only way to make models comparable by considering the characteristics of the departure state for all competing risks. For example, the time frame of the question regarding training spans the whole year prior to the one of the survey, so a worker that has changed job in survey year t can report in that survey training received either with his previous or current employer.[9] In addition, the variable related to labour market flexibility (IMD indicator) is standardized across countries to facilitate the interpretation of interaction effects.

Duration is measured using a combination of stock sampling (individuals that are in a temporary contract when they started being observed in the survey) and flow sampling (individuals which enter the state of interest during the period of the survey), to account for the fact that a large part

9. The exact question on training for survey year t is: Have you at any time since January of *year t-1* been in vocational education or training, including any part-time or short courses?

VARIABLES	Same employer	Diferent employer	Joblessness
Duration in months:			
$[3,6[$	0.1166	-0.1494	-0.1259*
	(0.1003)	(0.136)	(0.0716)
$[6,9[$	0.3739***	0.0641	-0.4443***
	(0.1041)	(0.1485)	(0.0867)
$[9,12[$	0.4661***	-0.0594	-0.3885***
	(0.11)	(0.1682)	(0.0981)
$[12,15[$	0.8105***	0.023	-0.3803***
	(0.0972)	(0.1554)	(0.0934)
$[15,18[$	0.8245***	-0.1668	-0.5726***
	(0.1082)	(0.1953)	(0.1136)
$[18,21[$	0.8404***	-0.0802	-0.6988***
	(0.1207)	(0.2311)	(0.1352)
$[21,24[$	0.9814***	-0.0497	-0.8167***
	(0.1273)	(0.2557)	(0.1578)
$[24,30[$	0.9655***	-0.0187	-0.6619***
	(0.1135)	(0.2071)	(0.1214)
≥ 30	1.1303***	0.0702	-1.0957***
	(0.1188)	(0.1972)	(0.1262)
Not first job	-0.9981***	-0.8352***	-1.3165***
	(0.0623)	(0.1164)	(0.0726)
Age [30,45[	0.0744	-0.1477	-0.1858***
	(0.0565)	(0.1002)	(0.0599)
Age [45,65]	-0.0508	-0.7493***	0.1871**
	(0.0813)	(0.1716)	(0.0734)
Firm size 20-99 workers	-0.0684	-0.075	-0.1170*
	(0.0583)	(0.1057)	(0.0597)
Firm size >99 workers	-0.0506	-0.036	-0.2213***
	(0.0628)	(0.1135)	(0.0708)
Secondary education or more	0.2581***	0.2398**	-0.4864***
	(0.0579)	(0.1045)	(0.0611)
Training worker+firm	0.2361***	0.3316**	-0.5437***
	(0.0838)	(0.1457)	(0.1023)
Training worker+no training firm	-0.1559**	0.2314*	0.1420**
	(0.0775)	(0.1211)	(0.0695)
No training worker+training firm	0.2769***	-0.0995	-0.2906***
	(0.0829)	(0.1666)	(0.1046)
IMD Labour market Regulations	0.3716***	0.5968***	0.1056
	(0.0933)	(0.1542)	(0.1017)
IMD Training worker+firm	-0.3274***	-0.4309***	0.0804
	(0.0853)	(0.1326)	(0.1024)
IMD Training worker+no training firm	-0.157	-0.1361	0.0584
	(0.0999)	(0.1357)	(0.0925)
IMD No training worker+training firm	-0.2424**	-0.1548	-0.0877
	(0.0969)	(0.1488)	(0.122)
Men	0.0543	0.3433***	-0.2522***
	(0.052)	(0.0946)	(0.0561)
Industry	0.5451***	0.2778	-0.2379**
	(0.1588)	(0.2641)	(0.1163)
Services	0.4418***	0.3137	-0.1316
	(0.159)	(0.2577)	(0.1141)
Job satisfaction	0.1652***	-0.0132	-0.1845***
	(0.0301)	(0.0492)	(0.0297)
Private sector	0.5140***	0.3343***	-0.2627***
	(0.0704)	(0.1111)	(0.0659)
Constant	-3.6854***	-3.1474***	0.7546**
	(0.3635)	(0.6032)	(0.3581)
Observations	8,947	8,947	8,947
Country dummies	yes	yes	yes
Time dummies	yes	yes	yes
ρ	0.000145	0.433	0.127
Log-pseudolikelihood	-4078	-2277	-3972

TABLE 5. Transitions - Results for the overall sample

Notes:Robust standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1.

of spells is left-censored (the temporary job has already started when the individual enters the survey).

Results in Table 5, column 2, which refer to temporary workers who were promoted to permanent with the same employer, show that the probability of intra-firm transition increases with the duration of the job, a common result in the literature (Portugal and Varejão (2009), Alba-Ramirez (1998) and others), which supports the theory that a temporary job is an experience good (Jovanovic (1979)) with a screening objective. There is a peak of conversions for contracts that lasted more than two years and a half (this corresponds to the legal duration limit of temporary contracts for some countries at that time, including Belgium, Denmark and Portugal (OECD (2004))). A similar result is found for Spain by Guell and Petrongolo (2007). The fact that firms appear to explore to some extent the legal limits of the temporary contracts suggests that firms take advantage of the lower (actual and potential) firing costs associated with this type of contracts while it is possible to retain the option value of converting the worker to a permanent position.

Workers that have higher formal education show a higher hazard of promotion to a permanent contract than their lower educated counterparts. The same is true for workers with temporary jobs in training-providing firms, independently of whether the worker has actively taken advantage of that feature in the recent past, when compared to the reference category (employees which do not receive training and that work in firms that do not provide training to their workers). On the contrary, there is a significant negative impact on the hazard for those workers which received training prior to transition while employed in a non-training firm.

The estimated models include regressors that control for the interaction between IMD and the firm-worker pairs training status. The corresponding estimated coefficients show that the positive net impact of an increase in labour market flexibility measured by the IMD indicator is mainly relevant for workers of non-training firms. That is, workers in training firms are somewhat insulated from the negative impact that a strict labour market legislation will have on transitions to a permanent contract. This is possibly related to the nature of the production process of the firm, given that a training investment in a specific individual may imply expected productivity gains for that worker that are more relevant for the contract conversion decision than the changes in the expected value of the job brought about by legislation changes.

Other significant coefficients signal that agricultural workers have a lower hazard than their counterparts from other sectors of activity of being promoted to permanent with the same employer, which possibly reflects the seasonal nature of many of the jobs in agriculture. There is also a lower hazard of transitions for workers in the public sector when compared to those from the private sector. In addition, higher job satisfaction implies an increased hazard of transition.

For inter-firm transitions (Table 5, column 3), duration dependence is negative but not significant, and therefore there is no large difference in the probability of leaving to obtain an open-ended with a new firm after only a few months of tenure or after two years.

As concerns human capital effects, both formal education and training favour transitions to a permanent job with a new employer, independently of whether that training was obtained in a training firm (and thus has more likely a vocational nature) or not. However, the interaction coefficients between the IMD indicator and firm-worker training show that a change in labour market flexibility has a low net impact on the hazard of workers that received training and which worked in training firms, possibly because these type of transitions are more related to firm competition (another firm hiring a worker that had vocational training in another firm in the same sector of activity) than to the overall state of the labour market. Workers with all other training status types see the hazard associated to inter-firm transitions increase with less strict labour market regulation.

Additionally, men have a higher probability than women of experiencing inter-firm transitions, in line with the findings by Booth *et al.* (1997) that job quitting behaviour is more pronounced for this group. Older workers, on the other hand, have lower hazards than their younger counterparts, possibly because mobility costs increase with age (Winkelmann and Zimmermann (1998)), while benefits to hiring firms decrease, given that they have less time to benefit from the new worker skills. Similarly to what happens for intra-firm transitions, private sector employees are also favoured in transitions to a permanent contract with another employer vis-á-vis their public sector counterparts.

The view that a temporary job is an experience good is also supported by the negative duration dependence found for transitions to joblessness (Table 5, column 4), given that both the firm and the worker access the quality of the match, and as the job progresses the probability that the match is found to be poor decreases. Job duration and human capital determinants have an impact on transitions to joblessness that is to a large extent of symmetrical sign to those in the model for intra-firm transitions. Namely, the hazard of transition from a temporary job to joblessness declines with time, reaching the lowest point for durations longer than 30 months. As concerns the effects of human capital variables, education and presence in a training firm reduce the hazard to non-employment, while having received training while working in a non-training firm increases it. However, the degree of labour market regulation strictness does not have a significant effect on these transitions, independently of training status, which resonates with the unclear sign found in the literature for the impact of EPL on unemployment levels (see Boeri and van Ours (2013) and Blanchard and Portugal (2001), among others).

Smaller firms are more likely to originate transitions into joblessness, possibly because in these cases the end of the job is more directly connected

with the survival of the firm itself. The lower hazard of men into joblessness is possibly associated with higher incidence of transitions of women into inactivity due to family reasons. Being in the private sector implies a lower hazard of transition into joblessness, which in addition to the previous results regarding this regressor, indicates that private sector employees are more likely to transition to permanent employment than their public sector counterparts.

It is worth mentioning that a complementary analysis (available on request) focusing on the overall number of temporary contracts held by workers over the period of the sample by means of a count variable model was also performed. Given that some worker and firm characteristics favour transitions to permanent employment and/or longer durations of temporary contracts, these should consequently imply a lower count of temporary contracts. The results of this exercise confirm some of the results of this section, namely regarding the impact of firm (like sector of activity or size) or firm-related characteristics (like job satisfaction) on transitions.

A feature which is common to the three competing destinations is the strong and negative impact on the hazard of having had at least one previous temporary contract. This regressor tries to control for initial conditions, limiting the sample problem of unavailability of the whole career history of workers. Having at least one previous temporary contract has a large negative impact on the hazard of leaving temporary employment, particularly trough joblessness. This feature suggests that some workers may be trapped in a succession of temporary employment cycles.

Results by country group. Tables A.1 to A.3 in the appendix show the results of the estimation of the competing risk models for country groups M (more segmented) and L (less segmented). Although in many cases results are qualitatively similar for both groups, the significance or even the sign of some coefficients differs across them. This section focuses on the most relevant of these differences.

In the case of workers that obtain an open-ended contract with the same employer (Table A.1), higher formal education has a positive impact on transitions for both country groups, similarly to what was found for the overall sample, but this is only significant for group M countries. This result stems possibly from the fact that in some group M countries higher education levels are only attained by a relatively low share of the population. Training status appears to act trough different channels in groups M and L: being in a training firm directly favours transitions within than firm in group L, without a significant impact in group M, which can be related to the low incidence of vocational training in this latter group (CEDEFOP (2010)). However, training status appears to act on group M through the effect that the degree of labour market regulation strictness has on transitions. As was the case for the whole sample, the transitions of workers in country group M

that are enrolled in temporary contracts in training firms are not affected so much by changes in labour market flexility. This effect is absent from group L results, possibly because in these countries the strictness of labour market regulations is too low to play a relevant role in the contractual options of firms, with production process and consequently human resources policy assuming greater relevance.

The differences across country groups regarding the impact of human capital variables are similar for transitions to a permanent job with a new employer (Table A.2). Inter-firm transitions are favoured by higher formal education in group M countries only, possibly due to the the same reason pointed out above. In this case, however, training status has no significant impact for any of the country groups considered separately (contrarily to what was found for the overall sample). Institutional effects appear to play a larger role in explaining inter-firm transitions in segmented labour markets than individual effects. In particular, changes in the strictness of labour market regulation are only significant for country group M (mitigated for workers in training firms). In addition, job satisfaction does not have a significant effect on inter-firm transitions for this group of countries, while it has a negative significant impact for group L. This is in line with Gielen and Tatsiramos (2012) results for job quits, suggesting that an open-ended contract obtained with a new employer may ensue a voluntary quit for group L, being therefore the result of low satisfaction with the previous job, while for group M countries it may reflect the end of the temporary contract, having therefore an involuntary nature.

The higher relevance of institutional factors for group M is also present in the case of transitions to joblessness (Table A.3), where the impact of the labour market regulation indicator is positive and significant. Given the finding that labour reallocation is larger in countries (or labour market segments) with less strict regulation, job-to-job transitions will be more frequent in those countries, and the survey measurement is more likely to coincide with unemployment periods between jobs simply because flows into and out of unemployment will be higher. For this type of transitions, there do not appear to be other major differences between the two country groups.

As was the case with the overall sample, for all country groups and transition types there is a negative impact in the hazard associated with having at least one temporary job prior to the current one.

Conclusion

This work analysed transitions from temporary to permanent contracts in European countries, with a special focus on human capital aspects and their interaction with labour market institutions. This analysis was empirical, based on a longitudinal survey of European households (ECHP) and performed

trough a discrete duration model with competitive risks. A new perspective was adopted given that the possibility of obtaining an open-ended contract through a promotion with the current employer or having to change job to obtain it were analysed separately. Results support the view that these channels are similar in some aspects, namely that they both benefit from the education of workers and from increases in labour market flexibility, as measured by the IMD. However, they also present differences, namely regarding duration dependence, and interactions between labour market flexibility and different aspects of training. Intra-firm transitions from a temporary to an open-ended contract are facilitated for workers enrolled in training firms, and these transitions appear to be somewhat protected from the effects of changes in labour market protection. On the other hand, the training characteristics of the worker and not of the firm appear to be more relevant in the case of inter-firm transitions. The breakdown of results across country groups indicate that in segmented labour markets institutional aspects play a large role in transitions, rendering individual aspects in some cases a more secondary role. In fact, in more segmented labour markets, higher labour market flexibility favours transitions out of temporary employment, although this effect is mitigated in some cases for workers in training firms. On the other hand, in less segmented markets, aspects related to training appear to be more relevant than institutional ones (which are not found to be significant).

Further research would benefit from a disaggregated analysis of labour market regulations into those affecting temporary and permanent employment, which was not possible with the available data. This would allow to ascertain whether differences observed between country groups stem from overall higher levels of employment protection in southern European countries or from the differences in protection between the two segments, *i.e.*, what is the importance of absolute and relative strictness of labour market regulations, particularly EPL.

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Appendix: Results by country group

The following tables show the results of the competing risk models presented in Table 5, broken down across country groups M and L.

VARIABLES	Group M	Group L
Duration in months:		
$[3,6[$	-0.0249	0.3203**
	(0.1345)	(0.1592)
$[6,9[$	0.3264**	0.4397**
	(0.136)	(0.175)
$[9,12[$	0.5595***	0.3238
	(0.1359)	(0.2007)
$[12,15[$	0.8899***	0.6921***
	(0.1405)	(0.175)
$[15,18[$	0.8345***	0.8430***
	(0.151)	(0.2022)
$[18,21[$	0.8306***	1.0660***
	(0.1712)	(0.2351)
$[21,24[$	0.9767***	1.2425***
	(0.1734)	(0.2447)
$[24,30[$	1.1344***	0.6910***
	(0.1896)	(0.2254)
≥ 30	1.3625***	0.7686***
	(0.2624)	(0.2351)
Not first job	-1.1371***	-0.8137***
	(0.1231)	(0.1205)
Age [30,45[	0.0875	0.1215
	(0.0703)	(0.1077)
Age [45,65]	-0.0867	0.0906
	(0.1052)	(0.1396)
Firm size 20-99 workers	-0.0787	-0.0793
	(0.069)	(0.1171)
Firm size >99 workers	-0.1854**	0.1014
	(0.0816)	(0.1161)
Secondary education or more	0.2924***	0.1154
	(0.0745)	(0.1207)
Training worker+firm	0.0823	0.3545**
	(0.1512)	(0.149)
Training worker+no training firm	-0.0274	-0.5504***
	(0.1041)	(0.1877)
No training worker+training firm	0.1378	0.3105*
	(0.1463)	(0.1618)
IMD Labour market Regulations	0.8715***	-0.1196
	(0.1701)	(0.1557)
IMD Training worker+firm	-0.4753**	-0.1829
	(0.2328)	(0.1299)
IMD Training worker+no training firm	-0.0553	0.1506
	(0.1736)	(0.1776)
IMD No training worker+training firm	-0.5308**	-0.0534
	(0.2398)	(0.144)
Men	0.0725	-0.0251
	(0.0665)	(0.0956)
Industry	0.4722***	0.6873*
	(0.1832)	(0.3548)
Services	0.4103**	0.4982
	(0.1845)	(0.3476)
Job satisfaction	0.1837***	0.1429**
	(0.0371)	(0.061)
Private sector	0.4597***	0.5792***
	(0.0953)	(0.114)
Constant	-2.5364***	-2.6162***
	(0.3344)	(0.606)
Observations	6,169	2,778
Country dummies	yes	yes
Time dummies	yes	yes
ρ	0	0.156
Log-pseudolikelihood	-2704	-1309

TABLE A.1. Transitions to an open-ended contract with the same employer- Results by country group

Notes:Robust standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1.

VARIABLES	Group M	Group L
Duration in months:		
$[3,6[$	-0.1588	-0.1603
	(0.2045)	(0.18)
$[6,9[$	0.3078	-0.1513
	(0.2088)	(0.2049)
$[9,12[$	0.005	-0.1345
	(0.2351)	(0.2402)
$[12,15[$	0.3401*	-0.3048
	(0.2045)	(0.224)
$[15,18[$	-0.1482	-0.1867
	(0.27)	(0.2847)
$[18,21[$	-0.0188	-0.0375
	(0.3065)	(0.3448)
$[21,24[$	-0.0946	0.0601
	(0.3602)	(0.3771)
$[24,30[$	0.1165	-0.1775
	(0.2638)	(0.3035)
≥ 30	0.2033	-0.1167
	(0.2532)	(0.2959)
Not first job	-0.8723***	-0.7677***
	(0.1568)	(0.1681)
Age [30,45[	-0.0986	-0.172
	(0.143)	(0.1377)
Age [45,65]	-0.3211	-1.0154***
	(0.2371)	(0.2405)
Firm size 20-99 workers	-0.0788	-0.1173
	(0.1404)	(0.1565)
Firm size >99 workers	-0.0583	-0.0597
	(0.1635)	(0.1564)
Secondary education or more	0.4502***	-0.1151
	(0.1351)	(0.1502)
Training worker+firm	0.2955	0.2864
	(0.2656)	(0.2132)
Training worker+no training firm	0.1718	0.3009
	(0.1863)	(0.2083)
No training worker+training firm	-0.0709	0.0689
	(0.3172)	(0.2324)
IMD Labour market Regulations	0.9167***	0.3207
	(0.2551)	(0.204)
IMD Training worker+firm	-0.6117*	-0.2983*
	(0.371)	(0.1728)
IMD Training worker+no training firm	-0.1352	-0.1226
	(0.2819)	(0.1978)
IMD No training worker+training firm	0.3953	-0.1702
	(0.483)	(0.1971)
Men	0.2097	0.4527***
	(0.1287)	(0.1368)
Industry	0.2251	0.2347
	(0.33)	(0.4336)
Services	0.2849	0.23
	(0.3276)	(0.4099)
Job satisfaction	0.067	-0.1252*
	(0.0661)	(0.0734)
Private sector	0.3312**	0.2933**
	(0.1683)	(0.1462)
Constant	-2.6979***	-1.6212**
	(0.6101)	(0.7812)
Observations	6,169	2,778
Country dummies	yes	yes
Time dummies	yes	yes
ρ	0.406	0.381
Log-pseudolikelihood	-1254	-1003

TABLE A.2. Transitions to an open-ended contract with a new employer - Results by country group

Notes:Robust standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1.

VARIABLES	Group M	Group L
Duration in months:		
$[3,6[$	-0.088	-0.2153*
	(0.0898)	(0.122)
$[6,9[$	-0.4299***	-0.4913***
	(0.1096)	(0.1452)
$[9,12[$	-0.2395**	-0.7290***
	(0.1168)	(0.1872)
$[12,15[$	-0.2813**	-0.5330***
	(0.1148)	(0.1661)
$[15,18[$	-0.4786***	-0.7809***
	(0.1334)	(0.2304)
$[18,21[$	-0.6686***	-0.7090***
	(0.1609)	(0.2583)
$[21,24[$	-0.7528***	-0.8715***
	(0.1869)	(0.3045)
$[24,30[$	-0.4726***	-1.2146***
	(0.1417)	(0.263)
≥ 30	-0.9357***	-1.6515***
	(0.1437)	(0.2856)
Not first job	-1.3041***	-1.4091***
	(0.0868)	(0.14)
Age [30,45[	-0.0788	-0.3801***
	(0.0709)	(0.1121)
Age [45,65]	0.2007**	0.195
	(0.0924)	(0.1218)
Firm size 20-99 workers	-0.1404*	-0.1382
	(0.0722)	(0.1093)
Firm size >99 workers	-0.2795***	-0.2406**
	(0.0901)	(0.1222)
Secondary education or more	-0.4972***	-0.4314***
	(0.0749)	(0.1146)
Training worker+firm	-0.3783*	-0.8711***
	(0.195)	(0.1639)
Training worker+no training firm	-0.0153	0.1498
	(0.1065)	(0.1375)
No training worker+training firm	-0.1909	-0.6098***
	(0.2021)	(0.191)
IMD Labour market Regulations	0.3737**	-0.2114
	(0.151)	(0.1638)
IMD Training worker+firm	-0.1325	0.4092***
	(0.3107)	(0.1562)
IMD Training worker+no training firm	-0.2636	0.1938
	(0.161)	(0.1605)
IMD No training worker+training firm	-0.1497	0.2521
	(0.3066)	(0.1865)
Men	-0.2947***	-0.1914*
	(0.0683)	(0.0996)
Industry	-0.2862**	-0.1006
	(0.1281)	(0.2941)
Services	-0.1526	-0.0982
	(0.1273)	(0.2788)
Job satisfaction	-0.2258***	-0.0836
	(0.0352)	(0.0573)
Private sector	-0.2918***	-0.3131***
	(0.0869)	(0.1037)
Constant	1.4113***	0.8286
	(0.2591	-0.5309
Observations	6,169	2,778
Country dummies	yes	yes
Time dummies	yes	yes
ρ	0.146	0.0884
Log-pseudolikelihood	-2765	-1175

TABLE A.3. Transitions to joblessness - Results by country group

Notes: Robust standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1.

The Portuguese Banking System during the Sovereign Debt Crisis

Matteo Crosignani
New York University Stern

Miguel Faria-e-Castro
New York University

Luís Fonseca
Banco de Portugal

July 2015

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)

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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E-mail: mcrosign@stern.nyu.edu; miguel.castro@nyu.edu; lpfonseca@bportugal.pt

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.[1]

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,[2] 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,

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,[3] 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

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%;[4] (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.

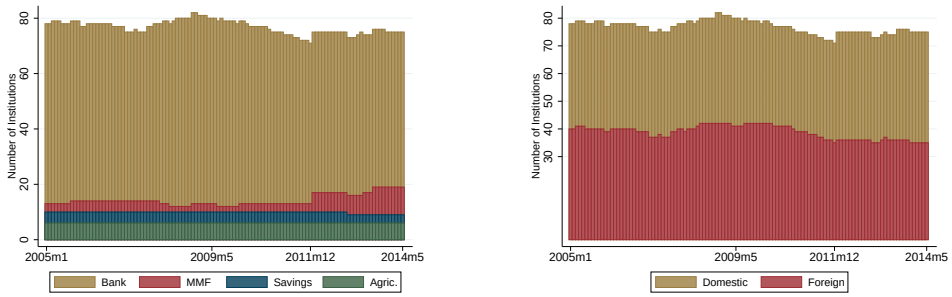
Number of Institutions

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.[5]

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.

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).



(A) Institutions by type

(B) Institutions by nationality

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

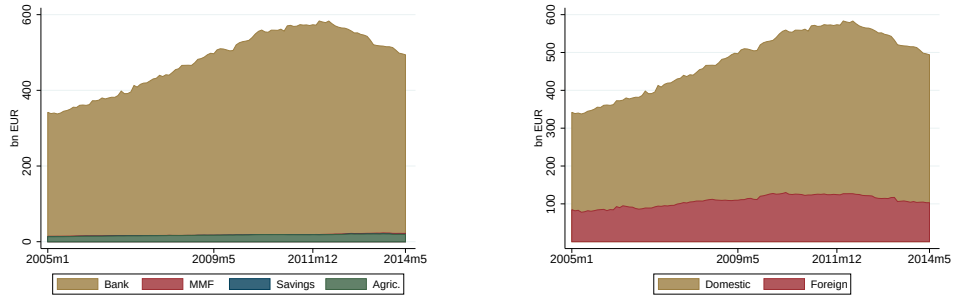
Size of the MFI's

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



(A) Total assets by institution type

(B) Total assets by institution nationality

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.[6] 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

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

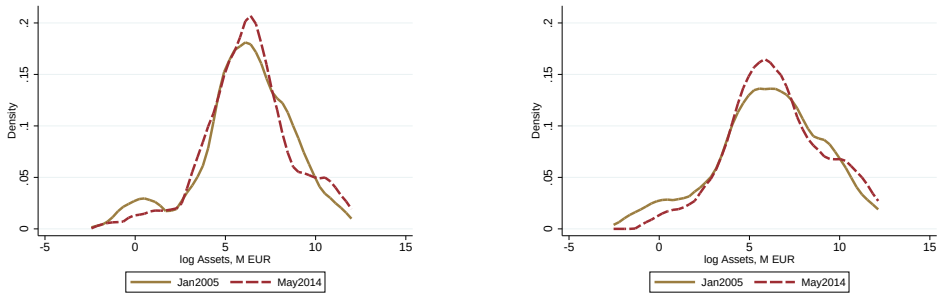
where $K(\cdot)$ is a kernel (a non-negative function that has mean zero and integrates to 1), and $h > 0$ is the bandwidth, a smoothing parameter.[7] We compute the kernel densities for the starting and ending periods of our sample, January 2005 and May 2014, and plot the results in the left panel

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.[8] 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.[9]

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

$$H_t = \sum_{i=1}^{N} s_{it}^2 \tag{2}$$

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[10] and deposits.

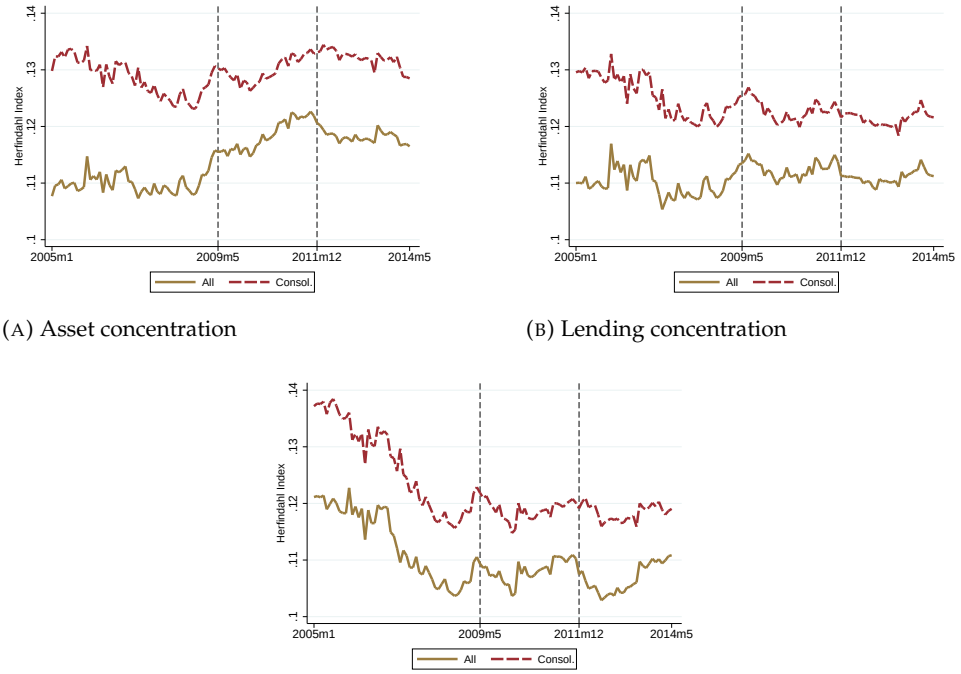
8. Janicki and Prescott (2006) find, however, that the lognormal distribution is unable to capture the thick right tail in the size distribution of banks for the United States. Instead, they fit a Pareto distribution, which has similar shape to a lognormal distribution but has a thicker right tail and 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.[11] 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.

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



(A) Asset concentration

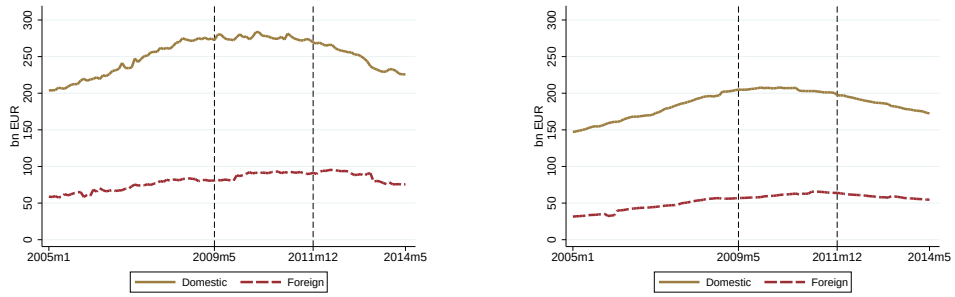
(B) Lending concentration

(C) Deposit concentration

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.



(A) Total lending

(B) Lending to the non-financial private sector

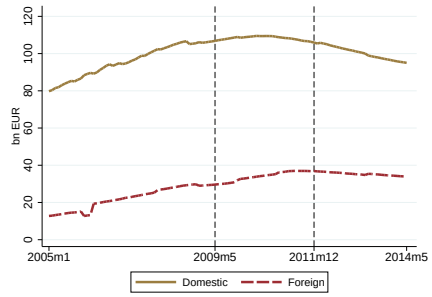
FIGURE 5: Total lending (left panel) and lending to the non-financial private sector (right panel). The latter is defined as lending to non-financial firms and households. Solid line are domestic institutions; dashed line are foreign MFI's.

Lending

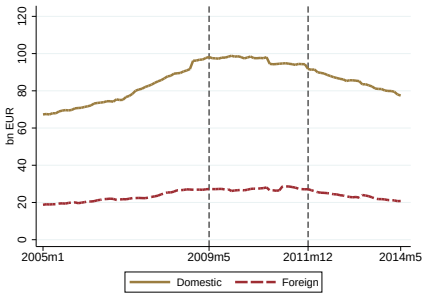
Figure 5 plots total lending in the left panel, and lending to the private non-financial sector in the right panel. The latter refers to lending whose counterparties are either non-financial firms or households. Lending is by far the largest component of assets, accounting, on average, for 70% of the 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)[12] is stable throughout the crisis, with a slight decline in the latter part of the sample. Other counterparties for lending are less relevant.

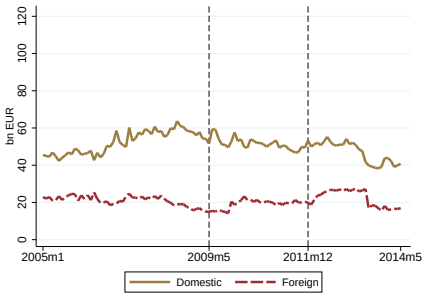
12. We are not able to separate the central bank from other MFI's on the asset side and so this category may include bank reserves.



(A) Lending to households



(B) Lending to firms



(C) Lending to the financial sector

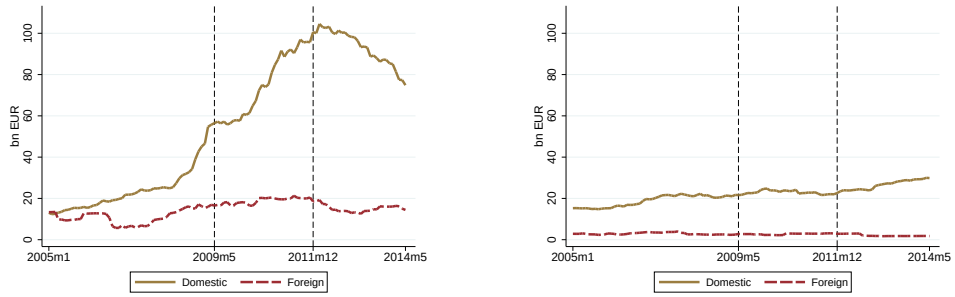
FIGURE 6: Lending to households (top left), non-financial firms (top right), and financial firms (bottom). Solid line are domestic institutions; dashed line are foreign MFI's.

In particular, lending to the Portuguese government (central, regional and local) is relatively small.[13]

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.



(A) Non-public security holdings (B) Equity holdings

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.

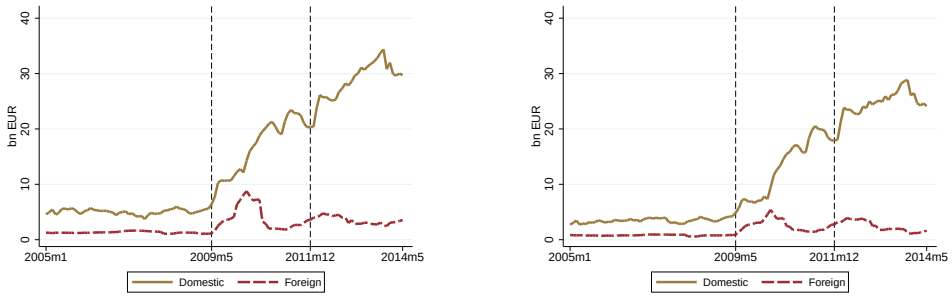
Interestingly enough, equity holdings rise during this period, in spite of much smaller magnitudes. Overall, these two panels illustrate a significant increase in the importance of non-traditional banking activities by domestic institutions. The share of security and equity holdings on assets for domestic 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.[14]

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).



(A) Total Government debt holdings

(B) Portuguese Government debt holdings

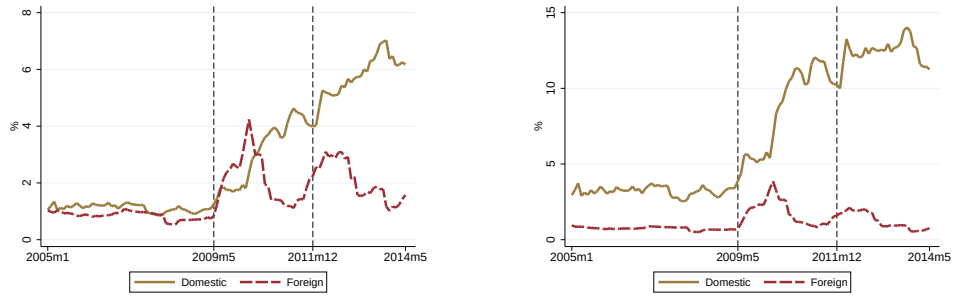
FIGURE 8: Public debt holdings (left panel) and Portuguese public debt holdings (right panel). Solid line are domestic institutions; dashed line are foreign MFI's.

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.[15]

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.[16] 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.



(A) PT Govt securities as % of assets

(B) PT Govt securities as % of total outstanding

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

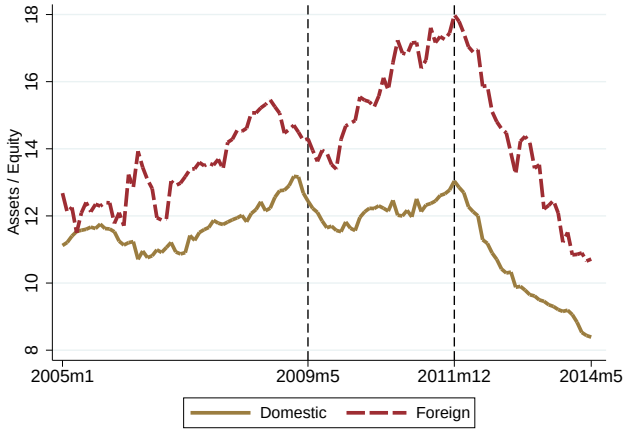


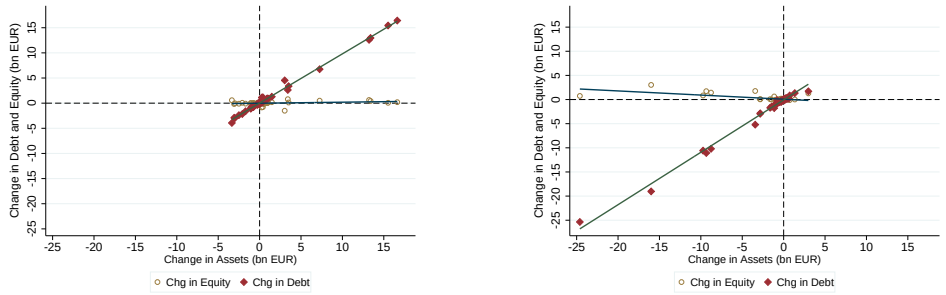
FIGURE 10: Book leverage, defined as total assets divided by total equity. Solid line are domestic institutions; dashed line are foreign MFI's.

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



(A) Pre-vLTRO balance sheet evolution (B) Post-vLTRO balance sheet evolution

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.

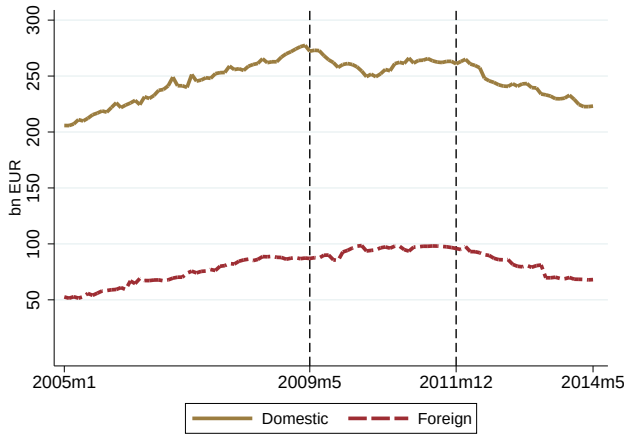
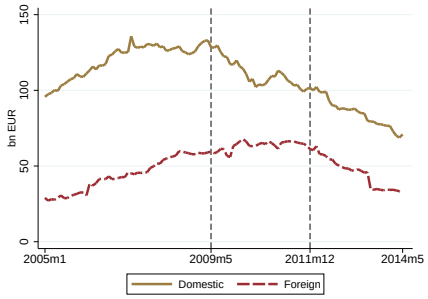
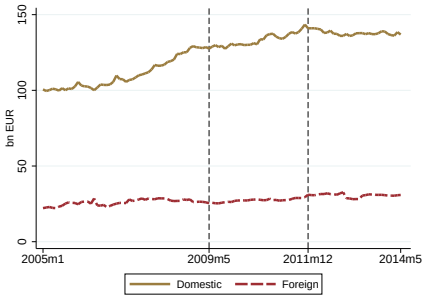


FIGURE 12: Deposits, all maturities and counterparties (excluding ECB). Solid line are domestic institutions; dashed line are foreign MFI's.

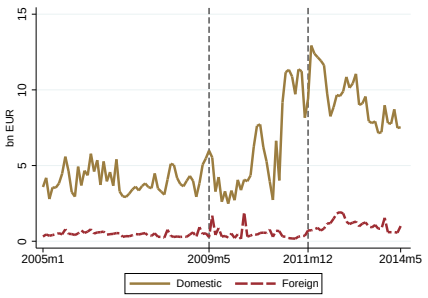
claim that domestic institutions were shut from international money and funding markets at the first signs of sovereign stress. They keep declining even after early 2012, at which stage it is not clear if the decline is driven by persistence of exclusion from money markets, or by intentional deleveraging. 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.



(A) Deposits by MFI's



(B) Private deposits by non-financial privates

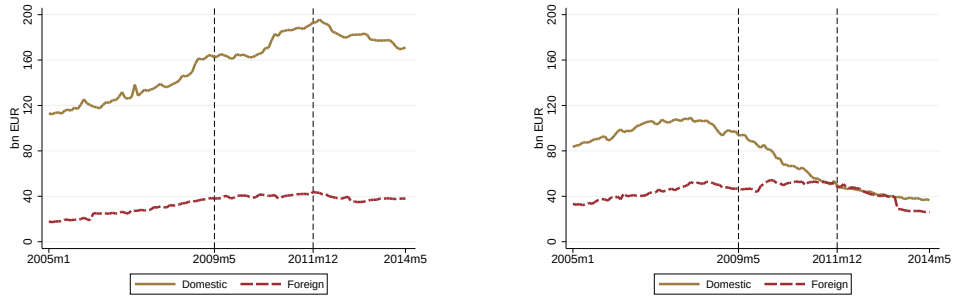


(C) Deposits by Government

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,[17] 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.

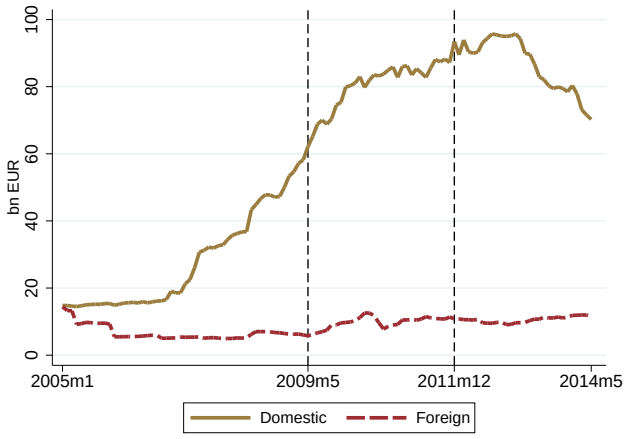


FIGURE 15: Total securities issued plus repurchase agreements whose counterparty is not a central bank. Solid line are domestic institutions; dashed line are foreign MFI's.

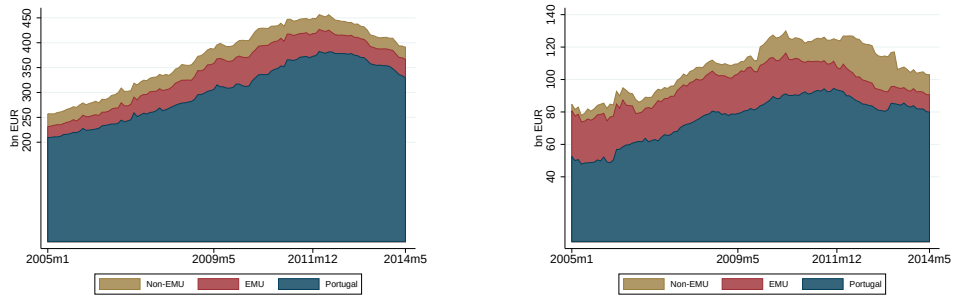
Domestic and Foreign Exposures

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.



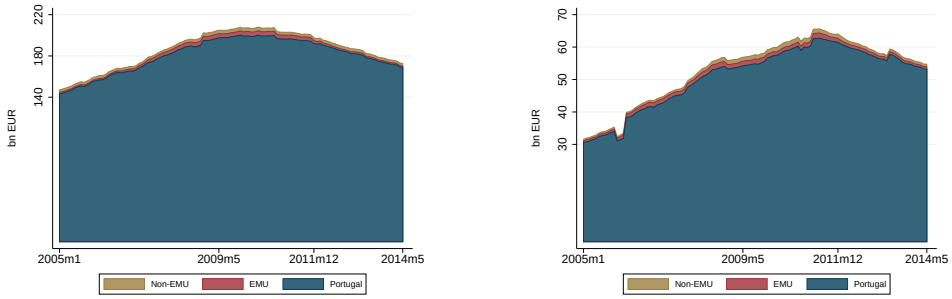
(A) Domestic banks (B) Foreign banks

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.[18] 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.

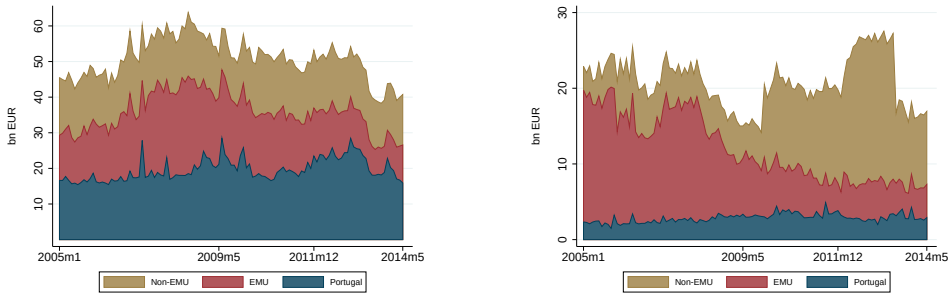
Finally, we look at securities and equity holdings in Figure 19. While exposures are again overwhelmingly domestic, EMU counterparties are substantially more relevant than non-EMU, unlike the previous asset categories. Domestic banks' exposure to EMU security and equity holdings increased both before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



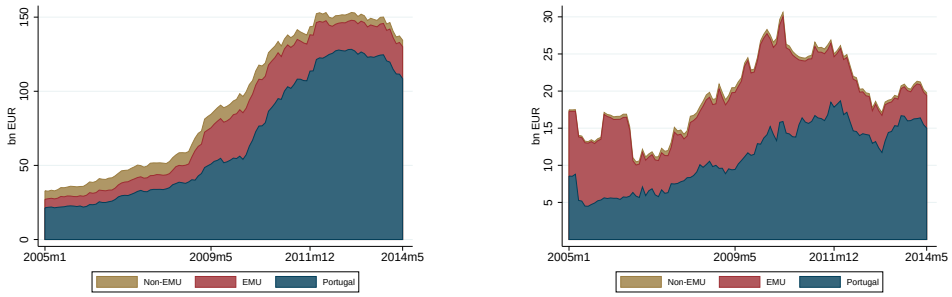
(A) Domestic banks (B) Foreign banks

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



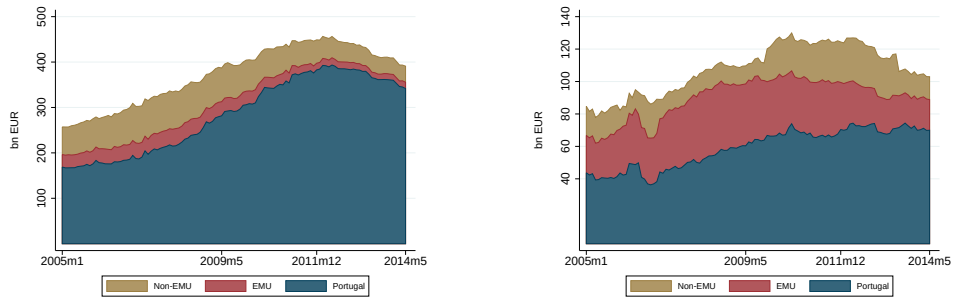
(A) Domestic banks (B) Foreign banks

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).



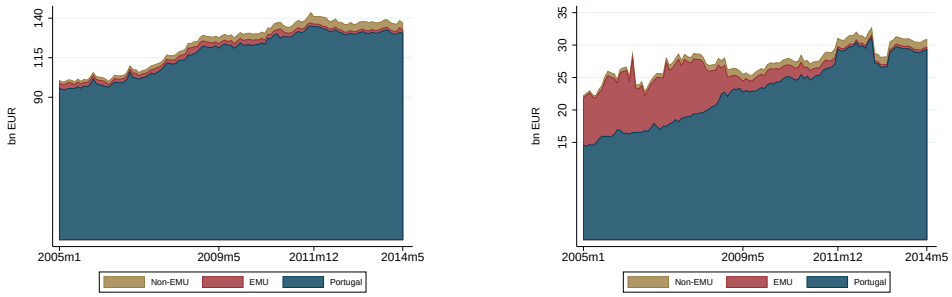
(A) Domestic banks (B) Foreign banks

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

Liabilities

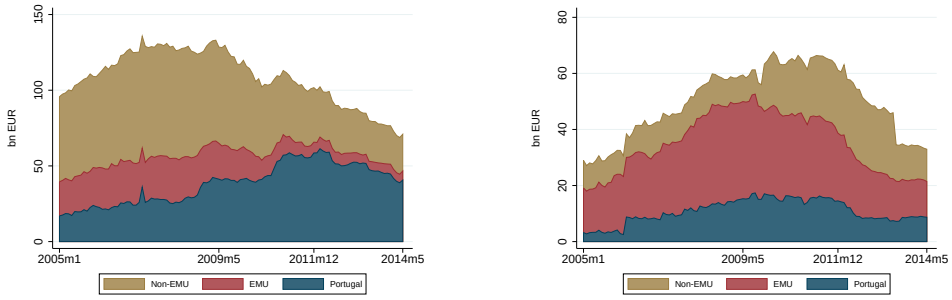
Figure 20 plots total exposures for MFI liabilities (including capital). The general patterns mirror those of assets: domestic banks have predominantly domestic exposures, and there is a trend towards repatriation of their funding in the latter part of the sample. Funding by foreign banks is also mostly 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.



(A) Domestic banks (B) Foreign banks

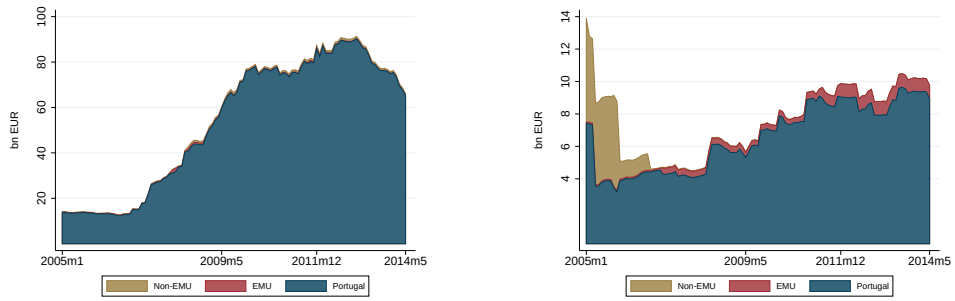
FIGURE 21: Non-financial deposit exposures by geographical area for domestic banks (left panel) and foreign banks (right panel).



(A) Domestic banks (B) Foreign banks

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.



(A) Domestic banks (B) Foreign banks

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).[19] 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.[20] 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.

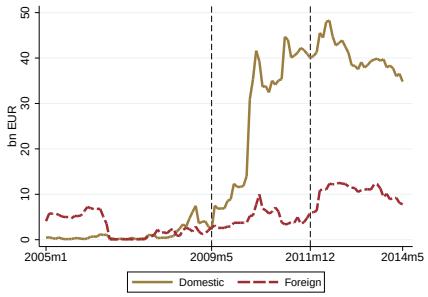
collapsed and was replaced with longer-term borrowing. Together with Figure 24, this provides evidence that the December 2011 allotment was composed mostly of rollover of short-term funding, while the second allotment, in February 2012 involved both rollover and some new net borrowing. Several reasons 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.[21] 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.[22] Only institutions that are subject to these requirements are eligible to become counterparties of the Eurosystem's monetary policy operations.[23] 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

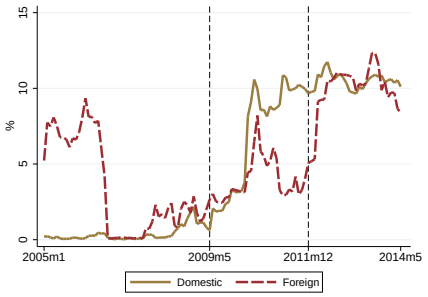
21. This framework allowed for riskier non-marketable assets to be posted as collateral, provided that the collateral risk was assumed by the national central banks. The BdP also introduced stricter risk control measures.

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).

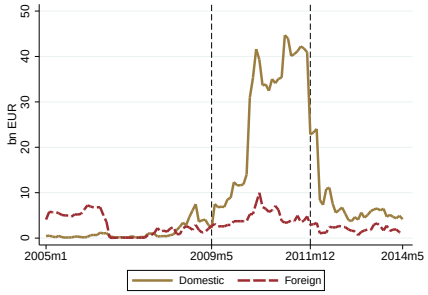


(A) Central Bank funding

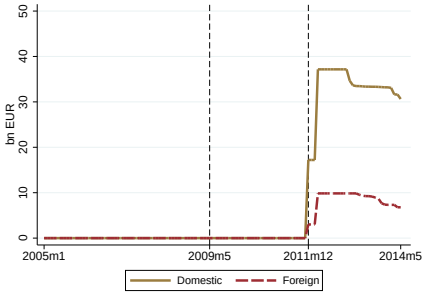


(B) Central Bank funding as a % of total funding

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

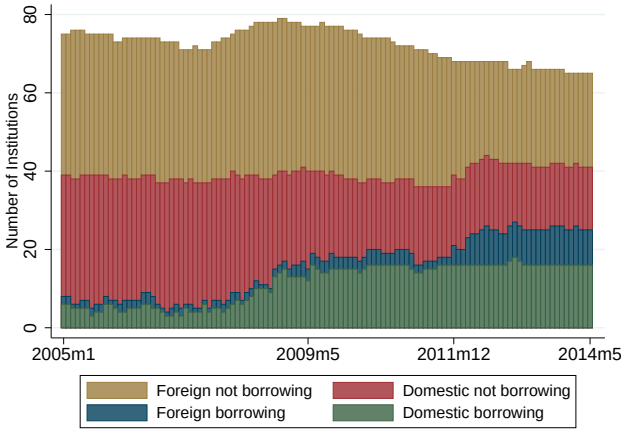


FIGURE 26: Number of MFI's (except money market funds) with liabilities whose counterparty is the Eurosystem.

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

	July 2010		March 2012		May 2014	
Borrows?	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
Securities	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
Dom. Govt	0.03	0.01	0.05	0.01	0.05	0.05
Lending	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
Other Assets	0.07	0.06	0.08	0.05	0.08	0.05
Deposits	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
Eurosystem	0.10	0.00	0.11	0.00	0.09	0.00
Securities + Repo	0.19	0.02	0.19	0.04	0.18	0.04
Other Liab.	0.04	0.04	0.05	0.02	0.05	0.05
Equity	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 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,[24] 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.[25] 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.[26]

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.[27]

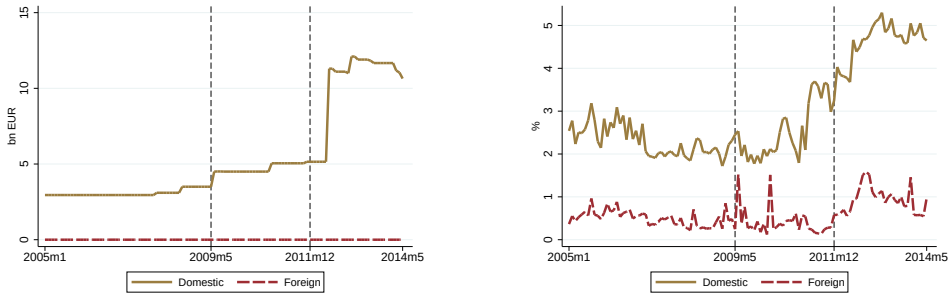
Liquidity concerns decreased thanks to Eurosystem funding and improved market sentiment, which also allowed bond issuance by banks. Bank solvency had also improved beyond the minimum levels required by the BdP that were described earlier. Solvency conditions later declined, however,

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,[28] 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).

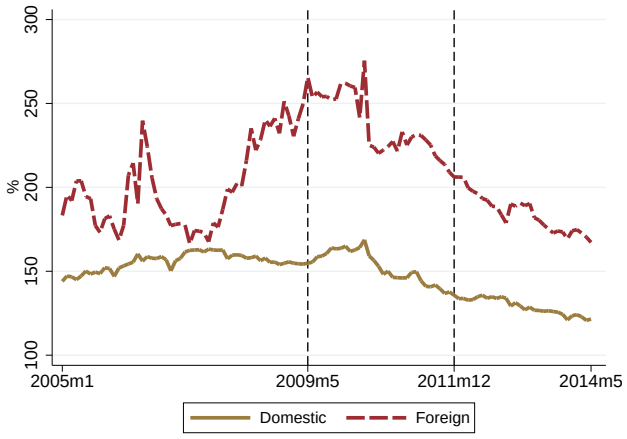


FIGURE 28: Ratio between total lending (excluding lending to MFI's) and total deposits (excluding deposits by MFI's). Solid line are domestic institutions; dashed line are foreign MFI's.

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 ESPIRITO 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[29]	X		2005/01	2014/05	Bank
0023	BANCO ACTIVOBANK		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[30]		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[31]
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 MADESANT	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 ELECTRÓNICO		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[32]			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[33]	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 VALÊNCIA	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[34]			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).

PERSPECTIVES ON THE PORTUGUESE ECONOMY

Trade Unions: The winners curse?

Hugo Vilares
Banco de Portugal

July 2015

"Legislation is in favor of the worker or employee, against the merchant and the industrial, and against the consumer, and it is assumed that this employee or worker never will bear the effects of that legislation. Production is limited with restrictions on restrictions on hours and working conditions... Laws of this kind are responsible for much of the industrial and trade crises which the whole world is grappling today"

Fernando Pessoa, *As algemas*, Revista do Comércio e Contabilidade, 1926, (translated freely)

Trade unions play a meaningful role in promoting the claims of its members since the industrial revolution. Partly, their increased market power has contributed to the development economies' current framework of the worker as an individual, and therefore it has compelled the construction of equilibriums that consider not only the worker's productivity, but also its welfare.

Precisely, Olivier Blanchard (2000) defines the "anti-exploitation" of workers as one of the four fundamental functions of trade unions, in parallel with the provision of insurance to its members, the appropriation of firm's economic rents in favor of unionized workers, and their representation at national level.

However, seemingly paradoxically, it has been witnessed in all OECD countries a growing divorce between workers and unions, especially since the 1980s (Visser (2013)), materialized by permanent declines in union density, which among others, reached about 50 percent in the case of Germany, France, and the UK. Precisely, Bob Dylan (1983), on the song "Union Sundown", reports the unions as being on the way to become dinosaurs, echoing a growing social perception about the union's loss of relevance.

E-mail: hfvilares@bportugal.pt

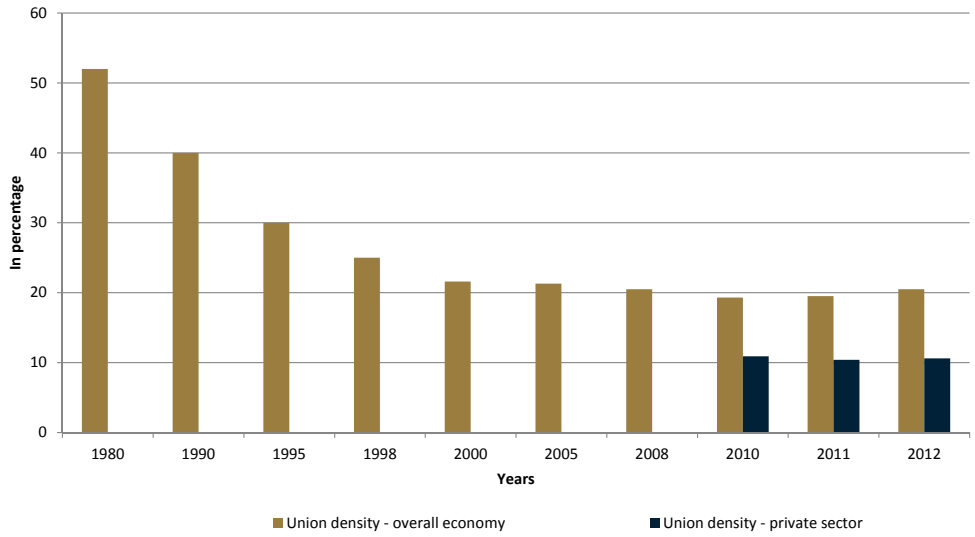

FIGURE 1: Union density in Portugal

Sources: Data on union density for the overall economy, between 1980 and 1998 – Blanchflower and Bryson (2003); data on union density for the overall economy, between 2000 and 2012 – OECD (2015); data on union density for the private sector, between 2010 and 2012 – Addison *et al.* (2015)

Within this aggregate trend, the second most significant erosion occurred precisely in Portugal (Pontusson (2013)), where it is estimated that the private sector's union density is just around 11 percent, between 2010 and 2013 (see figure 1). Even worse is that, as evidenced in Addison *et al.* (2015), this set of members is far from a representative group of workers, consisting more rigorously in pockets existing in large companies, with public capital (or that had public equity in the recent past), and in sectors sheltered from broad competition. It then matters to question what explains this very strong union erosion, and the accelerated loss of representativeness of trade unions regarding employment.

In this debate, Schnabel (2013) offers a useful insight to dismiss persuasive arguments. Although they constitute relevant challenges to unionism, the phenomenon of erosion appears to not be necessarily due to structural changes in the developed economies, such as the recorded shift from manufacturing to services, nor to be unequivocally due to the globalization or the decentralization of collective bargaining.

Increasingly, trade union achievements, in terms of regulatory working conditions, belong to a non-contemporary past of actual workers, and a relevant part are now provided by the state or are clearly embodied in the

fundamental laws (i.e. vacation, insurance in the case of disease, retirement, unemployment, among others). Even when this does not occur, for example in the case of wage bargaining, it is not uncommon to verify the applicability of the bargaining gains to every worker, regardless of its union membership status. In the Portuguese case we have, despite the general decline in union density, that the rules governing 90 percent of labor relations of the private sector are negotiated directly by unions (Addison *et al.* (2015)).

Ironically, this broad process of provision ultimately contributes to the erosion process, turning the trade unions in victims of their own success, as the workers may collect a significant proportion of the benefits of union membership without being members, creating a strong incentive for free-riding. Thus, this phenomenon decreases the value proposition of the union movement to the worker. In this line, Blanchard (2000) considers that the issue of the legitimacy of European trade unions is their biggest challenge, since, for example in the Portuguese case, how can the unions which sustain union densities of only 11 percent of private sector workers have the legitimacy to negotiate 90 percent of their labor relationships? And concurrently, which interests do they defend: the ones of those they influence, or of those members they have?

Pontusson (2013) argues that unions defend the interests of their members, but they show a greater social and redistributive concern, especially when compared to other economic agents that represent specific interests. Consistently, in the conventional economic theory (see Farber (2001)), the unions are presented as agents that maximize the welfare of its members, which in a simplified form turns unions in maximizing agents, with the objective of increasing wages (monopoly model), or payroll (efficient contracts model), which joins wages and employment.

In the process of balancing these priorities, Pontusson (2013) pleads that union erosion led to a depletion in the commitment regarding the defense of redistributive policies and employment, contributing for example to the increase in wage inequality observed in OECD countries. At the same time, as discussed in Martins (2015), it appears that the gap between union density and union coverage, usually filled by administrative acts such as the regulations of extension, has contributed to higher levels of job destruction.

Succinctly, the utility of representative trade unions is undeniable. Also, it seems undeniable its lower relevance when they markedly loose legitimacy to represent the labor force, and when they contribute to fragment the labor market, with a simultaneous increase in inequality and job destruction. Thus, it is relevant to rethink the role of trade unions, seeking to solve the Blanchard's puzzle of legitimacy, and to undermine the Bob Dylan's prophecy.

Specifically, the trade union movement needs to improve the value proposition offered to every potential unionized worker, in order to significantly increase union density, and to regain representativeness

regarding the labor force. This process can be divided into three key dimensions.

Firstly, the worker's representation should be closer to his reality, centered at firm level. In this way, bargaining would cease to prescribe the same proposals for very different realities. This would reduce the destruction of productive employment solely because the economic rent demanded by unions in favor of workers becomes unaffordable, which is undesirable when the firm's working conditions do not place the potential workers in a socially improper position. Moreover, this would allow faster adaptation of the bargaining system to the economic cycle, preventing the worsening of job destruction in the bottom of the economic cycle, precisely at the time where the demand for labor is contracting (see Martins (2015), for further discussion on this point).

Consequently, it would be important to break the monopoly to bargain conferred to trade unions in Article 56 of the Constitution. This would allow the representation of workers to be a mix between workers' councils and trade unions, as these, especially in medium and small firms, have not demonstrated capacity to get to know the reality of who they represent, which ultimately contributes to very low union densities in these relevant fringes of Portuguese businesses.

In another hand, trade unions should expand their ability to be service providers. Portugal and Vilares (2013) pointed out the importance of health insurance provision for the presence of high union density in the case of the Portuguese financial and insurance sector. Another example ordinarily presented lies in the so-called Ghent system, where the trade unions hold a key role, even through co-provision mechanisms, in the unemployment insurance system, leading Schnabel (2012) to remark its occurrence precisely in countries with higher union densities, particularly Finland, Belgium, Sweden and Denmark.

In a generic framework, it is important that trade unions address the concerns of workers not only through the political movement, but also through its own service provision. Thus, the creation of complementary pension systems or savings plans, the extension of provision of health insurance, the creation of unemployment insurance to supplement the unemployment benefits' system, among other services should be analyzed. This service provision increases the value of trade union membership, preventing its benefits to be, in a significant portion, collective. This priority would contribute to the reduction of free-riding, and it would create new incentives to trade union membership.

Last but not least, the trade union movement should position itself as a supporting platform to the various workers' councils, at the same time it would focus on the representation of workers at national level. The existence of a more representative group of unionized workers obtained through a higher value service, and the interconnection with the workers' councils

would ensure a better understanding of the macroeconomic reality at each moment, and it would secure the alignment of trade union priorities with the priorities of workers, mitigating its effect on the fragmentation of the labor market.

In a nutshell, unionism is in a profound crisis of alienation between trade unions and workers, which seriously compromises their legitimacy, and raises the reasonable doubt about their incentives. The reflection about ways to reverse this trend is then justified. If one can disagree on the chosen paths, the need to reflect causes little controversy. In this text, it is proposed that trade unions drop their monopoly to bargain and actively interconnect with workers councils in order to represent employees in a flexible manner in more firms. Furthermore, they should provide more useful services, and they may play a more relevant national role, necessarily founded in an enhanced representativeness.

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On the wage bargaining system in Portugal

Fernando Martins
Banco de Portugal

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Like in many other countries of continental Europe, in Portugal the instruments of collective regulation (IRC) constitute the main structural element of labour relations. Given that the Portuguese Constitution guarantees unions the monopoly of collective representation of workers in the bargaining process (Article 56), the various existing IRC are distinguished above all by how employers are represented in the negotiations. In Sector-level Collective Agreements (Contratos Coletivos de Trabalho, CCT), which up to 2011 were clearly dominant (about 60 per cent of agreements and 90 per cent of all covered workers), firms are represented through employers associations; in Multi-firm Collective Agreements (Acordos Coletivos de Trabalho, ACT), negotiations take place with a group of non-associated firms; finally in Firm-level Collective Agreements (Acordos de Empresa, AE) bargaining involves only a single employer.[1]

Except for the firm-level agreements, the remaining IRC are only binding for workers complying with the so-called double affiliation principle, *i.e.*, workers that are simultaneously members of the subscribing union(s) and that are employed by firms that are members of one of the subscribing employer associations. In the Portuguese case, the combination of these two dimensions would determine a very small coverage of collective agreements due to low union and employer associations' density rates. For instance, Portugal and Vilares (2013) report that only 11 per cent of private sector workers are unionized. In such a scenario, most workers would have their employment relationships determined by individual agreements negotiated directly with their respective employers. In this regard it is interesting to note that even

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E-mail: fmartins@bportugal.pt

1. In 2010, the number of published CCT was 141, *i.e.* substantially above the number of ACT (25) and AE (64) signed the same year. From 2011, in the context of the adjustment program, these numbers were reduced dramatically, particularly in relation to CCT (93 in 2011, 36 in 2012 and 27 in 2013). In 2014, the number of new collective agreements significantly increased compared to 2013 (from 94 to 152) but much of this increase was due to the growth of AE (49 to 80).

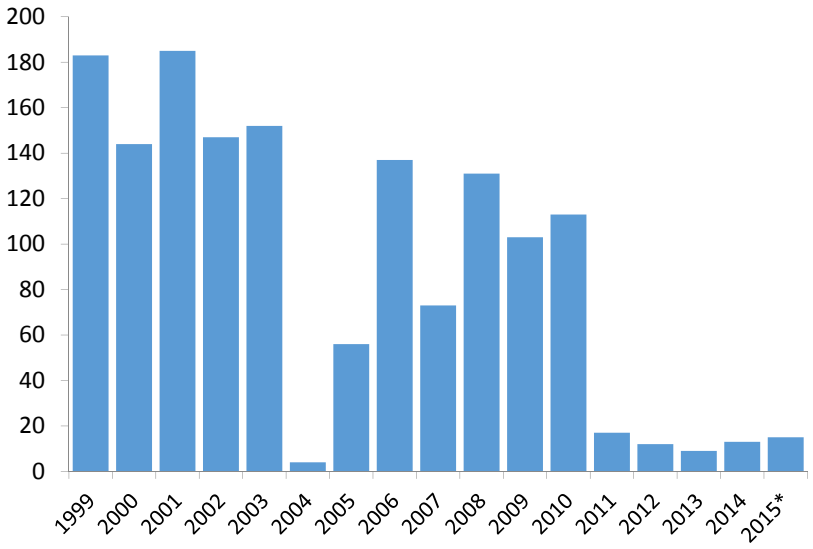

FIGURE 1: Extension Clauses: number of issues between 1999 and 2015

*Up to June 2015.
Source: Ministry of Employment, Solidarity and Social Security.

though the agreements are only binding to workers who comply with the principle of double affiliation, there are no mechanisms in Portuguese law that oblige unions and employers to reveal their constituency.

This legal conundrum has been resolved by various governments through the extension of collective regulations, in particular the CCT, to all the firms in each sector using the so-called Extension Clauses.[2] This mechanism has contributed to accentuate the discrepancy between, on the one hand, the low union density (about 11 per cent) and, secondly, the high coverage rate of IRCs (about 90 per cent). If it is true that the existence of extension mechanisms may act as an incentive for membership of employer associations, so that they can more directly influence the outcome of negotiations, from the workers' point of view incentives to become union members are tiny because the non-unionised workers would benefit from the same contractual conditions of their unionized colleagues without bearing the cost of the union fees.

Until 2004 – the year when the Labour Code entered into force – the number of extension clauses was quite high. After a short-duration decline,

2. Mostly extensions apply only to the CCT, as the AE and the ACT involve, respectively, only one firm or a limited group of firms.

this number increased again until it suffered a drastic reduction from 2011 onwards (Figure) in the context of the economic adjustment program, which initially froze the extensions and then change the criteria for their application more restrictive, as we shall see.

The use of extension clauses has been advocated based on several arguments. One of the most common is that their absence would lead inevitably to the blocking of collective bargaining in that it would promote a scenario of unfair competition by non-subscribing firms. These firms would be able to pay lower wages than those agreed under the IRC of their sector and hence secure lower prices for their products than those of its most direct competitors, which would be subject to the more generous conditions for workers arising from the IRC. In this context, the extension clauses would be an instrument that would ensure greater equity among firms in the sectors concerned, levelling working conditions and render labour inequality and unfair competition.

However, it must be remembered that regulatory instruments are traditionally negotiated by employer associations and trade unions that represent only a small number of workers. These instruments define a number of aspects of labour relations (minimum wages for each professional category, work schedules, holiday schemes, tenure bonuses,…) that may not fit all firms and workers in a particular sector. In particular, the setting of minimum levels of pay for each professional category without the involvement (direct or indirect) of a large part of the firms creates a type of friction that in nature is similar to that resulting from setting a fully-binding national minimum wage in that all firms are required to adjust their wages to the new agreed tables.

This effect is potentially more devastating when those wage minimum levels result from the issuing of extension clauses, which extend the range of their application beyond the subscribing unions and employer associations.[3] In this context, the number of minimum wages actually existing in the economy is quite extensive, being as many as the existing professional categories (about 30,000). Further, the impact of imposing indiscriminately to all firms in an sector such minimum wage levels is also more far-reaching than what results from setting a national minimum wage, which typically affects only a fringe of less skilled workers.

Equally relevant is the fact that the imposition of minimum wage levels contributes to exacerbate the effects of nominal downward nominal rigidity by limiting the ability of firms to adjust to a recession, particularly in an environment of low inflation. This aspect is particularly relevant in the

3. According to Article 514 of the Labour Code, "the collective agreement in force can be applied, in whole or in part, by an extension clause to the employers and employees integrated into the scope of activity of the agreement". This extension "is possible after weighting the social and economic circumstances that may justify it, in particular the identity or similarity of the economic and social situations within the extension and the collective agreement referred to."

Portuguese case, where from the legal point of view firms cannot reduce bargained wages, including other monetary and non-monetary components paid on a permanent basis, unless this is provided for in the IRC (see Dias *et al.* (2013)).

Recent empirical evidence for Portugal indicates that extensions may have considerable negative effects on net job creation. Martins (2014) estimates that in 2007-2012 formal employment in Portugal falls on average by about 2 per cent in the four-month period following the publication of an extension clause, the impact being large on smaller firms, *i.e.* those less likely to be represented in wage negotiations. The results also show that the greatest impact is observed in the reduction of hiring rates, since the impact on the separations is almost negligible. In contrast, informal employment (service providers), which is not subject to extension clauses, increases by about 1.4 per cent.

Guimarães *et al.* (2015) estimate for each Portuguese firm the wage bill increase implied by each new collective agreement (excluding AE) and analyse how these external shocks affect the net job creation and firms' failure rate. The results for the 1986-2013 period show that firms that are more heavily affected by the change in bargained wage floors decrease their hiring rates and, more importantly, significantly increase their separation rates leading to considerable destruction of jobs among continuing firms. Their results show that an increase of 10 per cent in contracted wages translates into a reduction in the hiring rate of 0,5 percentage points and an increase in the separation rate of 2,1 percentage points. Some studies carried out in other countries in which the extensions are equally relevant show similar effects.[4]

It is important to note that if the working conditions defined under the collective agreement, in particular the new pay scales, are not appropriate for some firms, they can adjust by reducing hirings or increasing separations, but in the limit they can simply decide to close down. Guimarães *et al.* (2015) show a positive impact of increases in bargained wages on firms' failure rate (an increase of 10 per cent of bargained wages increases by 2,2 percentage points the probability of closing a business). This result is consistent with the evidence presented by Martins (2014), which points to an increase of 4 per cent of firms' closing rate in the four months following the entry into force of an extension clause.

The performance of the labour market in Portugal since the turn of the century has been deeply disappointing. In addition to the low growth rates of economic activity, the dysfunctionality of the labour market has also contributed to the unprecedented levels reached by the unemployment rate. Between 2000 and 2014, the unemployment rate rose from 3.9 per cent to 13.9

4. Catalán and Villanueva (2015) show that automatic extensions in Spain in the period that surrounded the onset of the financial crisis (end of 2008) contributed to an increase of 36 per cent in the separation probability for the less skilled workers.

per cent (from 8.6 to 34.8 per cent, considering only the labour force under 25 years). Despite the reduction in the most recent period, the unemployment rate remains at historically high levels. Simultaneously, also revealing is the significant increases of both the share of long-term unemployment (45 per cent in 2000 to 66 per cent in 2014) and the average duration of unemployment (21 months in 2000 to 31 months in 2014).

The disappointing performance of the labour market and the recent empirical evidence should lead us to question the functionality of the current architecture of the wage bargaining system in Portugal. One element that has certainly contributed to the fact that the adjustment of the labour market in recent years has processed mainly through increases in unemployment and reductions in employment lies in the very strong rigidity of nominal wages in Portugal. Apart from the rigidity that results resulting from the prohibition of reducing contracted wages set in Portuguese labour law, the nominal wage rigidity is exacerbated by the widespread use of mechanisms that ensure the extension of agreements to the entire sector. This scenario has contributed to the misalignment between actual and feasible wages, which has translated into increasing structural unemployment.

In particular, in the context of the current low inflation environment the architecture of the wage formation system is unable to ensure the necessary flexibility in real wages. In this sense, following the example of some European countries,[5] it would be appropriate to consider the possibility of introducing more decentralized wage-bargaining mechanisms that foresaw the possibility of firms voluntarily adhere ("opting-in") to a sector agreement or exclude themselves from that agreement ("opting-out"). Simultaneously, a more decentralized bargaining system would have to necessarily go through a more active role by the works councils, whose participation is currently limited by the monopoly that the legislative system assigns to trade unions on worker representation. In the bargaining processes is also essential to create mechanisms to make mandatory the disclosure of representation of unions and employers in order to identify the universe effectively linked to each agreement.

Finally, on the extension clauses it seems justified to limit its use to criteria based on representativeness. The low membership rates of both trade unions

5. Between 1993 and 2008, Denmark recorded a significant drop in the unemployment rate (6.4 percentage points), which was much higher than that observed throughout the European Union (2.2 percentage points). Among the various measures taken there is the decentralization of wage negotiations that allowed 85 percent of the negotiations to be directly established between employees and employers. The outstanding performance of the German market in the last decade, even at the peak of the recession, has often been associated with a greater decentralization of the wage bargaining process with more active participation of works councils in safeguarding employment in firms and with trade unions and employers associations agreeing on clauses that allow firms to opt-out from sector-level agreements [Dustmann *et al.* (2014)].

and employer associations may well lead firms with higher wages to adopt a strategic behaviour in order to avoid competition from lower-wage firms. In this regard, it is worth to note that following the commitment made at the signing of Memorandum of Understanding in May 2011, a Resolution of the Council of Ministers (October 2012) defined as a criterion to make an extension that the subscribing employer associations accounted for at least 50 per cent of the workers of the sector. This was a step in the right direction that was later distorted (June 2014) with the introduction of an alternative criterion that is virtually fulfilled by all employer associations. So if they do not meet the most demanding criteria of representing at least half of the workers in a given sector they just have to fill out the alternative criteria of covering a number of associated firms consisting of at least 30 per cent of micro, small and medium enterprises (firms up to 250 employees). In this context, it is not unlikely that the drastic reduction in the number of extension clauses observed recently could increase significantly in the near horizon.

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On fallacies surrounding the discussion about the reduction of social security contributions

Pedro Portugal
Banco de Portugal
Nova School of Business and Economics

July 2015

"Nem tudo o que parece misericórdia é misericórdia. Há misericórdias, que são misericórdias e mentiras: parecem misericórdias e são respeitos, parecem misericórdias e são interesses, parecem misericórdias e são afectos tão contrários desta virtude, como de todas."

Sermão ao Enterro dos Ossos dos Enforcados, Padre António Vieira

"Como todas as coisas com ar de certas, e que se espalham, isto é asneira; se não fosse, não se teria espalhado."

Notas para a Recordação do Meu Mestre Caeiro, Álvaro de Campos

"The scientific community rewards those that produce strong novel findings. The public, impatient for solutions to its pressing concerns, rewards those who offer simple analysis leading to unequivocal policy recommendations. These incentives make it tempting to maintain assumptions far stronger than they can persuasively defend, in order to draw strong conclusions."

Policy Analysis with Incredible Certitude, Charles Mansky

The public discussion of policies on the reduction of social security contributions is responsible for a recurrent series of equivocations which can neither be sustained by economic theory nor the accumulated evidence of empirical research. This short paper aims to present and discuss these fallacies and to suggest a framework for the more promising

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E-mail: pportugal@bportugal.pt

design of a job creation policy based on a reduction of social security contributions.

Labour costs as a proportion of production costs are so small that a reduction of social security contributions will not have a significant impact on competitiveness or job creation

This argument, which is frequently used to argue against policies for the reduction of labour costs, suffers from two illusions. Firstly it disregards the fact that a company is not an economy and that, in general, the corporate production function incorporates inputs from other companies that, in turn, also use the labour factor and so on. This type of abusive generalisation is referred to as the composition fallacy. It is somewhat surprising that economists, particularly those more devoted to value theory, allow themselves to be taken in by this paralogism. Secondly, the perception of the insignificance of the effects of the reduction of labour costs is often confused by the illusion of apparently very small numbers. The impact of reductions of labour costs involving a few percentage points is, therefore, often disregarded. A one percentage point increase in total labour costs, however, effectively represents a very large amount which can translate into a highly significant reduction of employment (e.g. one per cent) owing to decisions made by companies on the basis of their adjustment margins. Adjustment bands will make several companies change their employment levels while others will not. Inattentive economists are, once again, led astray by the composition fallacy.

As the number of jobs is fixed, unemployment can only be reduced by the reshuffling of workers or job-sharing

This extravagant conception of the working of the labour market is, evidently in a collision course with the basic principles of the labour economy theory that establishes employment and the equilibrium wage through the conjunction of supply and demand labour functions. The idea of a fixed number of jobs underlies the unjustified fear of technological progress and corresponding productivity growth. The ill-fated application of massive early retirement programmes was also largely rooted in this notion, in spite of the fact that substitutability between younger and older workers is clearly very weak. Similarly policies for the reduction of working hours or job-sharing that emphasize the substitution effect between hours and employment, ignoring the effect of scale (reduction of production deriving from higher labour costs), are implicitly justified by the existence of a fixed number of jobs.

Labour costs do not have any impact on employment levels

A literal interpretation of this proposition evidently contradicts the bases of production theory which defines the desired employment level based on the relationship between the marginal labour cost (i.e. wages) and the product's marginal value. A more "benevolent" interpretation will reflect the idea that the elasticity of labour demand (sensitivity of level of employment to changes in labour costs) will be close to zero. Empirical research, however, accepts that lower labour costs are the most effective means of job creation

and retention. Labour economists accept that a one per cent decline of labour costs will correspond to a 0.6 per cent increase in employment (Hamermesh (1993); Addison *et al.* (2014)). The very few studies on the Portuguese labour market have published comparable values for the elasticity of labour, varying between -0.6 and -1 (Varejão e Portugal (2007); Esperança (2011)).

The effect of the nominal incidence of social security contributions coincides with their effective incidence

Economists have, for many years, differentiated between the nominal and effective incidence of tax on labour (Brittain (1971)). In competing markets (or even in monopsony labour markets), whether the social security contribution rate incides (nominally) on the employee or employer is irrelevant. Effectively an employee's only interest is his/her net income whereas for the employer it is the total cost of employing the worker. The way in which the contribution is split (either one or the other) is of no importance as it will generate the same employment and wage equilibrium. A reduction of the employer's contribution therefore translates into a higher wage for the worker (in addition to increased employment). Similarly, a reduction of the worker's contribution will translate into a lower negotiated wage (albeit a higher net wage in any event). The underlying reasoning is that, with the possibility of renegotiating the wage, the balance is established on the basis of elasticities of labour supply and demand factors.

This said, whether the social security contributions are levied on the worker or employer in the event of nominal wage rigidity is not irrelevant. Effectively in the event of the existence of wage floor (which could be a minimum wage or a bargained wage negotiated on the basis of a collective agreement) that is higher than the wage which would be established by the market, then a reduction of the employer's social security contributions would translate into an increase in employment, whereas a reduction of the employee's social security contributions would take the form of an increase in the net wage. The figure presented below compares the effect of the reduction of social security contributions in cases in which the floor wage is an active restriction, to the opposite case. Works by Carneiro *et al.* (2014), Addison *et al.* (2015), Martins e Portugal (2014) and Guimarães *et al.* (2015) provide highly suggestive evidence of the presence of strong, nominal wage rigidity in the Portuguese labour market. The indication of nominal rigidity is especially relevant in low inflation regimes.

Temporary reductions of labour costs have permanent effects on employment

To expect that unsustained reductions of labour costs will originate lasting effects on employment is more based on a willingness to believe rather than on logic and evidence. There is, however, no shortage of active employment policies that are based on temporary reductions of social security contributions. Employers are generally interested in long term labour relationships on which they incur significant hiring and training costs. The

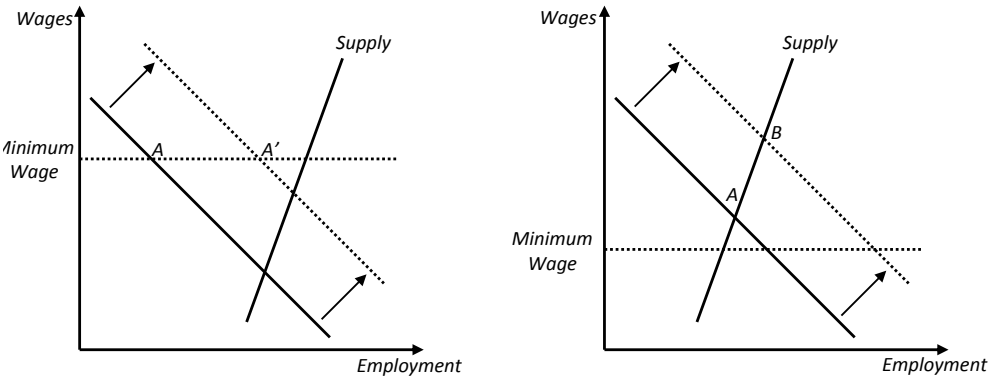

FIGURE 1: The effect of the wage floor in the reduction of social security contributions.
Source: Authors' calculations.

existence of adjustment costs transforms labour into a quasi-fixed factor (Oi (1962)) partially insulating labour from temporary shocks in the demand for product or labour costs. It does not, herein, come as any surprise to note that the effects of policies for the temporary reduction of labour costs are trivial.

How then should a job promotion policy based on the reduction of social security contributions be produced?

This short paper shows that job promotion is best served by means of a **permanent** reduction of social security contributions by employers on their **low wage workers**. Workers with low levels of education and professional skills who still account for a highly significant proportion of the Portuguese active population have been facing a decreasing demand for their services (skilled-biased technological change). It is also in the case of the lowest paid workers that nominal wage rigidity has a more severe effect on employment, insofar as the most important component of their human capital takes the form of the corpus of practical knowledge they accumulate through their professional experience in the companies in which they work. Empirical evidence also suggests that the effect of a reduction of social security contributions on the employment of less skilled workers is significantly more pronounced than in the case of highly paid workers in which an increase of wages is particularly noted (Cahuc (2003); Cahuc e Zylberberg (2005); Kugler e Kugler (2008)).

Lastly, it is understood that any reduction of contributions should be **fiscally neutral**. Forms of financing based on tax increases on consumption have been studied in great depth (Franco (2013)). The saving deriving from the elimination of the various programmes for the temporary reduction of

social security contributions would be a natural choice, pursuant to the scope of this discussion. Rationalisation of the rules for attributing unemployment subsidies to avoid situations in which the length of subsidised unemployment exceeds the period of contributions may also help to finance the reduction of social security contributions. Lastly, making the period of duration of the unemployment subsidy contingent upon the accumulated period of contributions, instead of an unemployed person's age, may also generate a reduction of expenditure in addition to strengthening the tax-benefit link.

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The Portuguese labor market legislation: a technological shock

Álvaro A. Novo
Banco de Portugal
Universidade Lusófona

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Abstract
The recovery of the Portuguese labor market is tenuous. Employment is 5.2 percent below the pre-crisis level; in Spain, it is only 1.3 percent below and, in Ireland, it already exceeds pre-crisis by 3.6 percent. The population loss, at levels similar to the 1960s, reduced the productive potential of the Portuguese economy. The lower oil prices and the devaluation of the euro alleviated the problem, but they are not structural growth factors. In this context, it is necessary to design a labor market regulation closer to the technological frontier. Standardize employment contracts and proper incentives in the unemployment insurance are two steps needed to promote steady growth. Growth based on the investment in the quality of labor matches. (JEL: J08, J41, J65)

Introduction

Among the intervened countries, Greece, Ireland and (partly the banking sector in) Spain, the recovery of the Portuguese labor market is far from a success. If we take as reference the beginning of the economic and financial assistance program, total employment in Portugal is still 5.2 percent lower, while in Spain is lower 1.3 percent and, in the Irish case, it already exceeds in 3.6 percent the 2009 value. Among such countries, only Portugal and Greece observe a reduction in their populations. Because labor is one of the production factors, some argue the most important, this decrease in active population has negative consequences for potential output.

Under these circumstances, it is important to consider a range of structural measures to boost the potential output of the Portuguese economy. We cannot take for granted as driving factors the lower oil prices and the devaluation of euro. Without forgetting our specific context (Section 2), we consider the "best practices" in the organization of a labor market (Section 3), to put forward a set of measures to change the structure of the Portuguese labor market.

E-mail: anovo@bportugal.pt

The proposed measures depart from the idea of income protection, rather than the current vision of employment protection. This will be achieved by reducing employment and non-employment segmentation (Section 4). It will be based on a standardization of labor contracts, which limits the use of fixed-term contracts, and on an overhaul of the unemployment insurance system. The latter with two components. For firms, it induces the internalization of unemployment costs by creating a *bonus/malus* system. For workers, individual accounts reduce the moral hazard, promoting a more rational use of unemployment insurance, which we want universal for all workers.

Although the labor market is the most important of markets, there are other areas whose malfunction is detrimental to the efficiency of the Portuguese economy. Taxation, justice and the product market, although not the object of this reflection, should not be forgotten.

Labor market: characterization

Nicholas Kristof, the *New York Times* of 09/19/2015, notes that a " briefing posted on the White House website Explained why Saudi Arabia would be a good partner in battling ISIS: 'Saudi Arabia has an extensive border with Syria', " concluding that we should be skeptical whenever a war is justified with a country that we do not know where it is.[1]

If we are serious about this sensible advice, characterizing the labor market participants – workers and firms – is a necessary condition to formulate successful proposals.

Over the years, we were fed myths about the functioning of the Portuguese labor market, particularly by creating a false sense of lack of flexibility. The concepts of flexibility and efficiency were misunderstood.

The first myth made us believe that the Portuguese quarterly worker flows – hires and separations – were extremely low. The myth was fed, for example, by Blanchard and Portugal (2001), who placed worker flows at 21 to 28 percent of those observed for the United States. But Centeno *et al.* (2007, 2008) and Centeno and Novo (2012) show that the quarterly worker flows in the Portuguese economy reach at least 2/3 of the American's, or 200 percent above those previously reported. The evidence shows that the rotation in the Portuguese labor market is among the highest in Europe. There is contractual flexibility in Portugal. Unfortunately, inefficient. There is a substantial part of workers who rotate between jobs – foremost fixed-term contracts – feeding an inefficient flexibility.

The second myth burst after the crisis. In 2013, the International Monetary Fund published in its report on the Portuguese economy a histogram showing

1. The Syrian and Saudi borders never coincide, they are apart at least 100 kilometers.

that there were no nominal wage cuts (IMF 2013). As if the labor market was a spot market, the fact that wages of Portuguese workers did not fall justified the rise in unemployment (excess supply). But since Galileo Galilei, we know that the truth is not the daughter of authority, but of time. In the pseudo-histogram, over 15 percent of registered labor contracts in the Portuguese Social Security were missing. The omitted observations corresponded to nominal wage cuts. This paved the path to end one more myth.

All official data show that there is a substantial number of workers with wage cuts in the same job from one year to the next. In 2010 and 2011, *Quadros de Pessoal* report wage cuts affecting, on average, 29.7 percent of workers. In expansionary periods, from 1994 to 2008, the average was 18.7 percent (in 2004, year of recession in Portugal, it reached 28.1 percent). Meanwhile, there are also frozen wages (with zero annual variation); for the recent period, 14.6 percent and, for the period 1994-2008, 7.4 percent.

Here too, the numbers do not differ from other labor markets. Elsby *et al.* (2013), with the data from the *New Earnings Survey* from the UK, show that there are more wage freezes than in Portugal, 18.7 and 8.6 percent, respectively for those periods. In the 1994 to 2008 period, wage cuts are similar to the Portuguese, 20.2 percent, and most recently 23.4 percent.

This regularity is confirmed in the *Survey of Income and Living Conditions (SILC, Eurostat)*, for the period 2003 to 2009. On average in Austria, Belgium, Germany, Denmark, Spain, France, Greece, Ireland, Italy, Luxembourg, Netherlands, Sweden and the UK, 30.3 and 6.2 percent of workers reported wage cuts and freezes, respectively. In Portugal, the same data result in 34 and 5 percent, respectively above and below the average of other European countries. There is no idiosyncrasy in the Portuguese economy; the labor market is governed by the same economic principles and, therefore, it reacts similarly.

With the myths extinct, we now characterize the Portuguese economy in the most recent period. With the international financial crisis of 2008, performance of the Portuguese economy, already weak, has become dramatic, with profound impact in the labor market. The unemployment rate almost doubled between 2007 and 2013, from 8.5 to 16.4 percent, corresponding to an increase of 430,000 unemployed workers. At the same time, Portugal has lost 680,000 jobs. The structural nature of some of the losses, e.g. construction and older and less qualified workers, raises questions of reintegration and long-term unemployment.

Common sense would have us think that the problems of declining employment and rising unemployment result from labor redundancies and company closures. However, what moves the employment cycle are hires, not worker separations. Before the crisis, on average, Social Security recorded 250,000 new quarterly hires and just under 250,000 separations. After 2009, quarterly hires do not exceed 140,000. The fall extended to separations, which are now around 190,000 per quarter. The problem is the absence of hires,

not the excess of separations. Hence the emphasis on structural reforms and short-term policies has to be placed on hires. Full employment, which today is legally synonymous with preventing separations, can only be achieved with job creation.

Employment and non-employment segmentation is the structural problem of the Portuguese labor market.

Employment is segmented between those with permanent contracts and those with fixed-term contracts. Fixed-term contracts were introduced in 1976, but since have gained importance in the management of human resources. In first quarter of 2015, among salaried workers, 21.2 percent had a fixed-term contract or other temporary form of employment. This trend remains because, on a quarterly average, 90 percent of new jobs for unemployed and inactive workers are in the form of temporary contracts. The use of more flexible contractual forms has been gaining importance in Europe, but more in some countries. In 2014, Portugal and Spain used these types of contracts 50 percent more than the average European Union country (14 percent).

Income protection is segmented between those with and without access to unemployment insurance. As a result of short-lived contracts and worker rotation, a significant portion cannot accumulate contribution periods to access unemployment insurance. In 2007, of the 441,000 unemployed, only 245,000 (56 percent) received insurance unemployment. In 2013, this share fell 14 percentage points to 42 percent (293,000 to 713,000). In connection with employment flows, segmentation extends to the periods of non-employment.

Labor market structure

Against the backdrop of the Portuguese labor market, it is necessary to rethink its structure. But we should not do it without recognizing which are the structuring elements of a modern labor market.

Supply, demand and institutions: productivity and wages.

Wages and employment are determined in the labor market as the result of the interaction between supply, demand and institutions.

The demand for labor is derived from the needs of firms to acquire the labor services. The labor supply is made by workers, who are willing to transact working hours in exchange for a wage. But the functioning of the labor market also depends on institutions, defined as all existing regulation.

However, there is a characteristic that distinguishes the labor market from other markets, the traded service has free will. Unlike in the market for apples, in the labor market is important to know the demand and supply actors. We cannot think about the functioning of the labor market only in terms of excess supply or demand because unemployment existing simultaneously with job vacancies and an ongoing effort to search for the better matches.

The success of the economy depends on the quality of this effort. There are two principles that underpin these differences.

First, the structural element of the labor market are the worker-firm matches. The formation of these matches takes place in a setting with imperfect and asymmetric information. In these circumstances, the wage has a increased function in the allocation of workers' qualifications to the needs of companies.

As the traded service has free will, the employee plays a decisive role. This difference is crucial: the paid wage influences productivity. Wages do not have to be equal to the marginal productivity of labor (the notion of efficiency wage). The wage is also an incentive, the labor market is no longer a "spot market"; searching for better matches results in volunteer unemployment.

If institutions penalize long-term labor relations, they reduce the possibilities for firms and workers to invest in these relationships, affecting job stability and, therefore, for production. Precarious jobs induced by bad regulation have consequences far beyond that established between the company and the worker.

Second, the functioning of the labor market is not conceivable without regulation. The occurrence of market failures (information differentials, market power and risk aversion) is the main reason for the existence regulation. The labor contract is the main regulatory mechanism.

Labor contract.

The labor contract has as main objectives: regulate the risk of the labor relation; lessen the effects of asymmetric information between employer and employee; and regulate the hold-up problem in the (mutual) investments of employers and workers in the relationship. In performing these functions, the contract limits the negative consequences of information and bargaining power differentials between the two parties. As in other economic areas, the contract limits the future behavior, making it as predictable as possible.

The contract serves to prolong the duration of labor relations, not to make it harder to terminate them. It does so because it encourages productive investment by protecting the return of each party.

Despite the efforts of each party, labor relations sometimes end prematurely. These situations are all the more destructive, the greater the investment made by each party. If a worker leaves the company after receiving training, the company does not enjoy the return on the investment it made. The same uncertainty arises to the worker whenever (s)he makes specific investments to the employment relationship. The existence of a contract, by providing rights and obligations for the parties, limits the uncertainty induced by the hold-up problem, reducing the uncertainty of the production function.

Through the protection it confers, the contract serves as an insurance that companies provide to their workers. These are more risk averse, requiring

greater protection in the face of fluctuations in demand. The company offers this insurance (severance payment) in compensation for lower wages. The discussion of the impact on employment of different aspects of job protection legislation has important contributions in Lazear (1990); Blanchard and Tirole (2008) and Boeri (2010).

Non-employment protection.

Unemployment protection takes preferably the form of an universal insurance for all workers, while mitigating moral hazard on the behavior of workers and firms. For workers, the moral hazard is associated with the fact that insurance works as leisure subsidy. On the side of firms, unemployment insurance can generate greater rotation of workers. The income protection provided by the current mutual unemployment insurance system leads Portuguese firms and workers to ignore costs imposed on society by their private behavior.

A labor market for the 21st century

The definition of labor market regulation is not a simple task. It should be carefully designed because it interferes in the formation of worker-firm matches, but it also affects social dimensions (e.g. family decisions). This is an atomized relationship, but it should be adjusted due to the asymmetry of information and the bargaining power. The legislator must create regulation that approximates the private and social costs of ending an employment relationship.

While trying to stay true to this principle, the following proposals intend to transform the employment protection in income protection. It requires an efficient adjustment to labor contracts to protect investments in the labor relationship. But it also establishes a tripartite agreement between the worker, the firm and society to share the costs and benefits of such protection.

To reduce segmentation, the new system uses consistently two instruments: the standardization of the labor contract and the protection system in non-employment.

A new labor contract

The new labor law must change the inefficient way it promotes employment protection, which leaves unprotected an increasing fraction of the population.

The biggest difference between contracts lies in the judicial uncertainty at the end of contract. It is inexistent in fixed-term contracts and high in permanent contracts. It is necessary to reduce these differences and thus return contracts to their economic reason. For this, one must standardize the

labor contracts, ending the separation that the legislation promotes between fixed-term and permanent contracts.

The contract is not a productive feature of the job, but it interferes with the incentives to investment in the match. The new contract must be implemented starting from the current permanent contracts, but adjusting its features. In particular, it must balance the procedural components that protect the two parties' rights. This is achieved by paying more generous compensations, with longer periods of dismissal notice balanced with longer trial periods and by establishing a limited set of non-economic dismissal reasons.

The main proximity to existing permanent contracts is the open-ended nature of the new contract. The redundancies will only be permissible for cause, but they always give rise to a monetary compensation for the employee's investment in the match. By paying a compensation, the firm is also internalizing the social costs it imposes on society; the private cost of dismissals for the firm is always lower than the social cost.

Fixed-term contracts should be abolished, except in well-defined situations (e.g. replacement of absent workers on maternity/paternity leave, illness or temporary disability).

The intervention of the judiciary would be limited to discrimination issues (e.g. gender, age or union). Thus, it would reduce the need to involve the system judicial in the economic analysis of redundancy procedures.

Internalizing firing costs

In Portugal, the unemployment insurance system is partially financed by companies through a fixed contribution to Social Security. However, more than half of the Portuguese companies does not have ex-workers with unemployment insurance processes and those that have use it to rather different extensions. There is a cross-subsidization of the "good" (little use) companies to the "bad" (intensive use). The costs of the redundancies are not fully internalized.

The introduction of a *bonus/malus* mechanism, as used in the insurance industry, penalizes companies that induce a higher usage of unemployment insurance. To promote the internalization of social costs by firms, contribution rates must be directly associated with the spending on unemployment insurance and worker rotation of each firm. As a numerical reference, we can use the usage ratios of all companies over the past three years to infer what is "normal" rotation and usage of unemployment insurance. Then, businesses will pay increasing contribution rates at, say, three levels: low, normal and high.

The proper incentive that this system generates in companies would lead to a reduction in the rotation of workers and in the financing needs of the Social Security.

Individual accounts: unemployment insurance

The optimal design of unemployment insurance should balance the liquidity and the substitution effects. The former is virtuous because it allows workers to smooth consumption between periods of employment and unemployment, providing a more effective job search. On the contrary, the latter creates an incentive to reduce labor supply, acting as a leisure subsidy. Unemployment insurance should be designed to promote the liquidity effect. That's what the individual accounts do.

Individual accounts act as an insurance for periods of unemployment. The social contributions – which do not need to be different from the current ones – accumulate a balance in an individual account, which the worker can used when unemployed involuntarily. In order to cover accounts with insufficient funds, a fraction of the contribution feeds a solidarity component. This component, with a level deemed socially desirable, guarantees that all workers receive some income when they lose employment involuntarily. At the end of the working life, the worker receives the remaining balance. The operation of these accounts gives the correct incentive to workers – it is their money –, reducing the moral hazard associated with the substitution effect.

The unemployment system should also consider automatic stabilizers associated with the economic cycle. The entitlement periods can be automatically extended in recessions. Similarly, the minimum number of contributions needed to access the system may also vary with the economic cycle.

Individual accounts are not an esoteric proposal. There are successful experiences in countries such as Austria, Chile, Colombia and Estonia.

Conclusions

Reform creates winners and losers. Rather, it creates new winners and new losers. We must not forget the current thousands of unemployed, those who left the country and the workers with precarious contracts; these did not win with the current status quo. But change is justified if the welfare of the country increases. To avoid social capital destruction and to ease the transition and adoption of the reform, it is necessary to find mechanisms that compensate those who may stand to lose.

In the presence of a high protection, job holders do not invest in more training and applicants – young students – in the face of the few opportunities available to them (and future protection) also lower education investment. The tax system is an obstacle and the distorted access to justice perpetuates inequality.

The proposed reforms aim to create a more efficient labor market and a fairer society. With less segmentation of the labor market and more equitable

access to better job opportunities. Together, they promote productivity and, therefore, growth in Portugal. The market regulation should always facilitate these transition processes, without perverting incentives to induce the correct investment of workers and firms.

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