

# The importance of deposit insurance credibility\*

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## Abstract

Deposit insurance is the most widely used instrument to mitigate the risk of bank runs. As deposit insurance schemes are not fully funded, they need to be credible ex-ante to serve their purpose. In this paper we look at specific episodes during the global financial crisis that have threatened the credibility of deposit insurance. Using monthly bank level data on deposits from households and firms, we find that depositors actively react to events that raise doubts about the credibility of deposit insurance. For some depositors this may entail moving their savings to financial institutions whose deposits are guaranteed in other countries, while for others this may be reflected in a preference for intrinsically sounder banks.

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# 1 Introduction

Bryant (1980) and Diamond and Dybvig (1983) were critical to our understanding that banks' provision of liquidity services to depositors leaves them exposed to the risk of runs. Since deposit runs can culminate with the failure of the financial system, this led to a search for mechanisms capable of protecting banks from the liquidity shocks induced by deposit runs. Diamond and Dybvig (1986) showed that deposit insurance could offer banks such a protection while still affording them the opportunity to provide liquidity services to depositors. However, the deposit insurance arrangement had to be credible and there should be no uncertainty about the coverage it offered depositors. This explains why the vast majority of deposit schemes are offered by governments, as opposed to the private sector, and have detailed information about their coverage and the time it takes for depositors to recover their funds in the event of a bank failure.<sup>1</sup>

In this paper, we investigate the importance of credibility for deposit insurance arrangements. We use data on deposits at banks operating in Portugal, including branches and subsidiaries of foreign banks, and build on two events that occurred during the euro area sovereign debt crisis to identify the effect of shocks to deposit insurance credibility on depositors' reactions.

The first event examines depositors' response to sovereign risk. We consider the decision by some foreign banks operating in Portugal to convert their subsidiaries into branches. This decision is important because subsidiaries of foreign banks offer their depositors the deposit insurance of the host country. In contrast, branches offer depositors the deposit insurance coverage of the country of origin of the foreign bank. In a situation in which depositors might be concerned about the credibility of the national insurance scheme, these changes provide an interesting source of variation. In this case, we investigate whether the conversion of subsidiaries into branches triggered an increase in deposits at the branches.

The second event that we explore is related to depositors' response to uncertainty about insurance coverage. We look into the uncertainty that emerged following the announcement by policymakers that insured depositors in Cyprus could be asked to share on the losses of their banks in order to reduce the burden imposed on the country in the event of a bank failure.

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<sup>1</sup>The uncertainty about the this length of time played a role in triggering retail depositor runs in the case of Northern Rock, in the U.K. (Goldsmith-Pinkham and Yorulmazer, 2010, Goodhart, 2008, Shin, 2009).

This announcement sent shock waves throughout Europe, in particular to countries facing financial difficulties, because it created uncertainty about the coverage offered by their deposit insurance arrangements. We build on that announcement and investigate whether depositors in Portugal responded and moved their deposits out of weaker banks.

Our results show that depositors, most notably households, reacted to the two events. There were no significant outflows of deposits abroad, unlike what was seen in other countries at the core of the euro area sovereign debt crisis. However, there were significant movements of deposits within the Portuguese banking system in the dates around the two events that we consider. Our results on the conversion of subsidiaries into branches show that this conversion triggered an increase in deposits at the branches. Our investigation on the aftermath of the Cyprus event adds support to this assertion. Depositors behaved more cautiously with smaller and less profitable banks. This suggests that depositors actively monitor banks, especially when there is heightened uncertainty about banks' financial condition and doubts about the coverage offered by the deposit insurance arrangement.

Our findings offer an important contribution to understand the importance of the credibility of deposit insurance mechanisms. Deposit insurance is widely recognized as an important tool to prevent depositors' bank runs. During the global financial crisis, many governments in advanced economies increased the coverage of their national deposit insurance schemes to avoid panic runs. Our findings suggest that the effectiveness of deposit insurance at insulating banks from liquidity shocks goes beyond the level of coverage it offers depositors. It also depends critically on the certainty of the protection it offers depositors, in particular the government's commitment to not alter the rules of the arrangement and the country's ability to honor the arrangement's promises to depositors. As such, these findings illustrate part of the complex mechanisms underneath negative feedback loops between banks and sovereigns (Farhi and Tirole, 2016)

On top of the solid theoretical underpinnings of deposit insurance, the role of deposit insurance has been extensively analyzed from an empirical perspective. Martinez Peria and Schmukler (2001) find that deposit insurance does not seem to decrease the extent of market discipline. However, most of the existing literature suggests the opposite: deposit insurance weakens market discipline. For instance, Demirgüç-Kunt and Detaghiache (2002) find that explicit deposit insurance increases the likelihood of banking crises, using data for 61 countries.

This empirical result is stronger when bank interest rates are deregulated, the institutional environment is weak and the scheme is run or funded by the government. Demirgüç-Kunt and Huizinga (2004) also use cross-country data to study the effect of deposit insurance on bank interest rates and market discipline. They find that explicit deposit insurance reduces market discipline, as it lowers banks' interest expenses and makes interest payments less sensitive to bank risk. Ioannidou and Penas (2010) explore the effect of deposit insurance on banks' risk-taking. Using loan level data, they find that after the introduction of deposit insurance in Bolivia banks become more likely to grant riskier loans, with poorer ex-post performances. In a more recent paper, Karas et al (2013) test the effects of the introduction of deposit insurance in Russia for household deposits, in the midst of a crisis. They also conclude that this institutional setting numbs depositor sensitivity to changes in banks' risk. Anginer et al (2014) look at the role of deposit insurance during the global financial crisis and in the years leading up to that period. They find that even though generous financial safety nets induced excessive risk taking by banks in the pre-crisis years, during the crisis deposit insurance has an important stabilization role, helping to safeguard financial stability. Boyle et al (2015) find that the introduction of deposit insurance during a crisis only partially mitigates the likelihood of a run. They also find that depositors will be less likely to run if they have established long relationships with a given bank, what is also consistent with Brown et al (2015) and Iyer et al (2016a).

Many of these papers analyze the effect of having or not a deposit insurance mechanism in place. In our paper, we consider a more subtle issue: what is the role of the credibility of deposit insurance? Given that most schemes would not have sufficient resources to immediately reimburse depositors of medium or large banks, this issue is very relevant. If depositors do not believe that there will be resources to honor the compromises implicit in deposit guarantees, they may act as if the insurance scheme does not exist.

Furthermore, our data allows us to consider separately households and corporate deposits. This allows us to draw important insights about how do different depositors react to perceived changes in the credibility of deposit insurance. The existing literature shows that uninsured depositors have more incentives to more actively monitor banks and thereby exert some market discipline (Alanis et al, 2015, Bennett et al, 2015, Berger and Turk-Ariss, 2015, Egan et al, 2015, Iyer and Puri, 2012). These depositors are expected to react more actively

to the events examined in this paper. By looking separately at household and corporate deposits we are able to proxy for the behavior of insured versus uninsured depositors, given that the fraction of deposits covered by the insurance mechanism is much larger among households and firms.

The rest of the paper is structured as follows. Section 2 discusses our methodology. This section also presents our data sources and characterizes our sample. Section 3 documents depositors' reaction to foreign banks' decision to convert their subsidiaries into branches during the financial crisis in Portugal. Section 4, in turn, shows how depositors in Portugal reacted to the uncertainty created by the possibility of insured depositors in Cyprus incurring losses. Section 5 concludes our paper.

## **2 Empirical strategy, data and sample characterization**

### **2.1 Empirical strategy**

Our main goal is to understand how depositors value the credibility of deposit insurance schemes. Are depositors sensitive to situations in which the expected value of recovery of their savings may change in situations of acute bank or sovereign distress?

The main challenge in empirically answering this question hinges on the existence of events that allow for a clear identification of these mechanisms. The euro sovereign debt crisis that hit Portugal in 2010/2011 provides two important events that allow us to understand how deposits move following changes in the credibility of deposit insurance mechanism.

The first event that allows for a direct test of how this mechanism works is the decision of some foreign banks operating in Portugal to transform their subsidiaries into foreign branches during the global financial crisis. This legal change has crucial implications for depositors' protection: after these changes, deposits were covered by the deposit insurance mechanisms of the home country of these banks, rather than by the Portuguese deposit guarantee scheme. If depositors are concerned about the ability of the domestic scheme to cover their deposits amidst a sovereign debt crisis, we would expect to see more deposits flowing into these banks (and away from domestic banks in more acute distress, i.e., where the likelihood of involvement of the deposit guarantee scheme could be higher).

The second event that we study is arguably more exogenous to the Portuguese situation.

In March 16th 2013, the IMF and European authorities agreed on a bailout package for Cyprus, after a request for financial assistance. One of the conditions defined in the bailout package implied losses on all bank deposits, including those that were insured by the deposit guarantee scheme (Brown et al, 2016). More precisely, deposits above 100.000€ would have a haircut of 9.9%, while deposits below that threshold, which were in theory fully insured, would face a loss of 6.7%. This announcement directly affected the credibility of deposit insurance, not only in Cyprus, but also in other European countries under distress. Given the dramatic shock waves that this announcement created throughout Europe, the decision was reversed on March 25th. We test whether depositors in Portugal reacted to these events in Cyprus by moving their deposits out of weaker banks.

We use monthly bank level data on bank deposits to examine the reaction of depositors to these events. We consider two dependent variables:  $\log(\textit{deposits})$  and the monthly growth rate of deposits ( $\textit{gr\_rate}$ ). We have data on both households and non-financial corporations' deposits. Being able to separate these two sectors is essential for our analysis, as the reactions to changes in the credibility of deposit insurance are not necessarily the same across institutional sectors. Corporate deposits are usually more volatile and most of these deposits are not covered by the deposit guarantee scheme, which covers only deposits below 100.000€ since end-2008.

The first event that we explore focuses on the transformation of some foreign subsidiaries into branches, with immediate implications in terms of deposit insurance coverage. We estimate the following regression with bank and month fixed effects:

$$y_{it} = \alpha_0 + \alpha_t + \alpha_i + \beta_1 \textit{branch}_{it} + \gamma X_{it-1} \quad (1)$$

where  $y_{it}$  refers to the log of deposits for the non-financial private sector, households and firms. Using bank fixed effects in this specification allows us to explore within bank variation. This means that we capture the effect on deposits from *becoming* a branch. Our main coefficient of interest is  $\beta_1$ .

$X_{it-1}$  is a vector of lagged bank characteristics, described in detail in the next subsection. This includes non-performing loans as a percentage of total credit, equity as a percentage of total assets (leverage ratio), the loan to deposit ratio, net profits as a % of total assets (ROA), and a liquidity ratio, measured as liquid assets as a percentage of interbank liabilities. Our data also includes bank-level data on deposit interest rates, which we include in the regressions, as

this may be another very important driver of deposit inflows and outflows, even in a crisis scenario (Acharya and Mora, 2015). We might argue that depositors' bargaining power in setting interest rates is rather limited. This would allow us to say that controlling for deposit interest rates at the bank level broadly controls for bank demand effects. When controlling for this and for other relevant bank characteristics, we may argue that the dummies associated with the pre- and post-financial assistance periods capture mainly the supply behavior of depositors.

In the second exercise, where we explore what happened when there was uncertainty about what would happen to insured deposits in Cyprus, we estimate the following equation:

$$y_{it} = \alpha_0 + \alpha_t + \beta_1 Cyprus_t + \delta type_{it} + \gamma X_{it-1} \quad (2)$$

where *Cyprus* is a binary variable that takes the value one in March and April 2013 (the events took place during March). In this specification we are running an OLS clustered at the bank level and our dependent variable is the growth rate of deposits of the non-financial private sector. In addition to controlling for bank characteristics, as in equation 1, we also control for the *type<sub>it</sub>* of institution, i.e., whether the bank is domestic or foreign and, in that case, if it operates as a branch or a subsidiary.

To better link the two events being studied, we run a modified version of the equation above:

$$y_{it} = \alpha_0 + \alpha_t + \beta_1 Cyprus + \beta_2 Cyprus * type_{it} + \delta type_{it} + \gamma X_{it-1} \quad (3)$$

By including the interactions between the *Cyprus* event and the type of financial institution, we are able to understand whether the behavior of depositors was heterogeneous across institutions. In particular, we want to know whether their behavior was differentiated across foreign branches and subsidiaries, given the potential differences in the perceived credibility of deposit insurance schemes.

To understand if depositors reacted differently depending on the observable characteristics of their banks, we estimate another adapted version of equation 2, such that:

$$y_{it} = \alpha_0 + \alpha_t + \beta_1 Cyprus_t + \beta_2 Cyprus_t * X_{it-1} + \delta type_{it} + \gamma X_{it-1} \quad (4)$$

where  $\beta_2$  captures the role of bank characteristics in shaping depositor behavior in the period immediately after the Cypriot bailout.



## 2.2 Data

Data on deposits and interest rates at the bank level comes from the Monetary and Financial Statistics. This is a harmonized statistical report in the euro area with monthly frequency. We collect monthly data between March 2007 and December 2013. We can disaggregate deposit data between firms and households. This is very important for the correct analysis of our research question, given that firms and individuals may react very differently to changes in the credibility of deposit insurance schemes. Corporate deposits are usually more volatile and, furthermore, their coverage through deposit insurance should be much lower than for households. Deposits in Portugal are covered up to 100.000€ per depositor in each bank. As such, corporate deposits should be more sensitive to changes in perceived bank soundness, but not so much to changes in the perceived credibility of deposit insurance.

We merge this individual data on banks' from supervisory reports, also with a monthly frequency. This allows us to control for the most relevant determinants of bank deposits. We control for non-performing loans as a percentage of total credit, equity as a percentage of total assets (leverage ratio), loan to deposits ratio, net profits as a % of total assets (ROA), and a liquidity ratio, measured as liquid assets as a percentage of interbank liabilities.

We also collect data from supervisory reports about the type of financial institution. We classify institutions as domestic banks, foreign subsidiaries and foreign branches. An important issue for our research question is that deposits held by foreign branches are guaranteed by the home country's scheme.

In Table 1 we present summary statistics on the variables used in our estimations. In Table 2 we present the results of a regression with the determinants of deposits, such that

$$y_{it} = \alpha_0 + \gamma X_{it-1}$$

where our dependent variable is the growth rate of deposits. Standard errors are clustered at the bank level.

This allows us to know more about how bank characteristics are associated with the evolution of deposits. We find that better capitalized banks are able to capture more deposits, most notably from households. In a period of heightened uncertainty, it is interesting to find that there seems to be some monitoring from households, as they discriminate between banks based on their capital buffers. More profitable banks also recorded stronger deposit growth,

further supporting this hypothesis. In contrast, deposits increased less for banks with a higher liquidity buffer. However, this variable is usually less disclosed and thus less subject to investor scrutiny. Household deposits increased less in banks with higher loan-to-deposit ratios, while the opposite was seen for corporate deposits. Across the board, larger banks attracted more deposits.

Interestingly, the reaction of households and firms to interest rates on deposits is different: household deposits increased more in banks that offered higher deposit rates, while they increased less in banks with higher rates on corporate deposits. This latter somewhat counterintuitive result may be due to the fact that interest rates on corporate deposits are more heterogeneous than for households. As such, the relationship between prices and quantities might be harder to capture through aggregate figures.

### **3 Depositors' response to sovereign risk**

The results discussed so far show that depositors are sensitive not only to the interest rates offered on deposits, but also to a few observable bank characteristics. In a world where deposit insurance was universal, unlimited and perfectly credible, this would be surprising. However, given that there is a limit of 100,000 euros for deposit insurance, depositors seem to actively monitor the banks and make some decisions based on banks' soundness.

In this paper, our goal is to go beyond the existent literature that examines the effects of introducing or changing features in the deposit insurance mechanisms and to explore one important dimension of sovereign-bank links: the importance of the credibility of deposit insurance.

During the euro area sovereign debt crisis, Portugal was in the spotlight. During this period, there were doubts about whether the sovereign would be able to fully meet its financial obligations. In the Spring of 2011 the country had to request international financial assistance. Against this turbulent background, depositors might have worried about the safety of their deposits. Would the sovereign be able to easily reimburse the insured depositors if one or more banks collapsed?

Those depositors that feared this could happen had several choices at their disposal. For instance they could withdraw some money and keep their savings at home or in a safety box. Or they could move their savings abroad. Figure 1 shows that none of these choices was

adapted at a large scale. Despite the magnitude of the crisis, deposits did not fall as they did in Ireland or Greece.

Instead, what seems to have happened is that depositors moved their savings within the banking system. On one hand, well informed depositors are likely to have split their deposits across banks. This allows not only to reap the expected benefits of diversification on the reduction of risk, but also to increase each depositor's insurance coverage, as the coverage limit is of 100,000 per depositor in each bank. On the other hand, depositors might have directed those deposits towards sounder institutions. However, none of these choices is related to the credibility of deposit insurance.

What would indeed be related to this would be if depositors had moved their savings towards foreign banks operating in Portugal, most notably to foreign branches. This distinction is important because deposits held at foreign branches are insured by the home country deposit insurance scheme, while deposits held at foreign subsidiaries are guaranteed domestically. Thus, a low cost and effort way to deal with the uncertainty brought by sovereign distress on deposit insurance would be to move the deposits to branches.

Importantly, these branches might be sounder and stronger than other banks and depositors might simply be reacting to that, thus making it empirically challenging to identify this. However, there was a special event during the sovereign debt crisis that allows us to clearly deal with this identification challenge: the transformation of some foreign subsidiaries into foreign branches. This legal change has crucial implications for depositors' protection: after these changes, deposits became covered by the deposit insurance mechanisms of the home country of these banks, rather than by the Portuguese deposit guarantee scheme. If depositors were concerned about the ability of the domestic scheme to cover their deposits amidst a sovereign debt crisis, we would expect to see more deposits flowing into these new branches (and away from domestic banks in more acute distress, i.e., where the likelihood of involvement of the deposit guarantee scheme could be higher). Importantly, there was no change in the intrinsic soundness of these banks, so the changes are not motivated by concerns about deposit safety in that specific bank, but should be directly linked to the perception about the soundness of the host deposit guarantee system, when compared to that of Portugal. While the Portuguese republic had a junk rating in the main three agencies at the time, the home countries of the banks that changed their legal status were at the top of the rating scale.

Figure 2 sheds some light on what was happening to bank deposits at the time of these changes. By looking at the stock of deposits in the 12 months before and after the change from subsidiaries to branches, we see that these institutions were indeed able to attract more deposits than the other banks. For households the reaction was faster, with the increase concentrated around the moment of transformation in legal status. For firms, the moves were spread more evenly through time, but the overall change during these 24 months was more pronounced. Deposits in these foreign institutions increased 9.3% during this 24-month window (13.1% for corporate deposits) and 4.3% in the other banks operating in Portugal (2.7% for corporate deposits).

When we look into interest rates offered on deposits by these banks, we can exclude the hypothesis that these changes were driven by an attempt to gain market share (Figure 3). Indeed, the interest rate offered by these banks on deposits was significantly below that of the other banks during most of the period. The increase seen in deposits was clearly not driven by customers looking for better deals on their savings.

In Table 3 we show the results of the estimation of equation 1. In this specification, we use bank and month fixed effects. Using bank fixed effects allows us to explore within bank variation. This means that we capture the effect on deposits from *becoming* a branch.

The results are quite strong and valid for all deposit segments: when foreign banks become branches, there is a significant deposit inflow. This is valid after controlling for time-varying bank characteristics and interest rates offered on deposits. The results are valid both for households and firms. Given that these changes occurred amidst an environment of heightened uncertainty about sovereign risk in Portugal, these results provide strong evidence that depositors value the credibility of deposit insurance mechanisms.

In the results presented so far, we are comparing the evolution of deposits in the foreign banks that changed to branches with deposits in all the other banks operating in Portugal. Arguably, foreign banks might be different from domestic banks along many dimensions, most notably during a crisis. Foreign banks might have different business models and strategies or they may cater different customers or geographies. Importantly, during a domestic crisis they may be perceived as safer for depositors.

In Table 4 we present the results for 1, but now using as control groups the other subsidiaries operating in Portugal. In other words, we are comparing what happened to deposits

after some institutions changed their status from subsidiaries to branches with others that had the same legal status to start with, but did not undergo any change during the same period.

The results are still valid, but somewhat weaker. The overall effect is now economically larger, but significant only at 10%. However, in this case the effect seems to come only from corporate deposits. This might suggest that the inflow of household deposits for these new branches came essentially from domestic banks (or other branches).

To some extent, the weaker results might be attributable to the change in the sample used in this specification. Now we are using only one third of the initial sample. More importantly, the average size of subsidiaries is much smaller, thus leading to more volatility in some of the ratios used in the analysis.

Summing up, we find that depositors actively reacted to a change in the legal status of foreign banks. Given that, for depositors, the main implication of this shift is a change in the sovereign responsible for the deposit insurance scheme, these results show that indeed the credibility of the deposit insurance scheme plays a role in depositor behavior. Importantly, depositors do not seem to be numbed by the existence of deposit insurance, thus showing that deposit insurance does not undermine market discipline imposed by depositors, at least during a crisis.

## **4 Depositors' response to uncertainty in insurance coverage**

Another strong test to the value of the credibility underlying deposit insurance was the quasi-natural experiment in Cyprus in the Spring of 2013. In March 16th 2013, the IMF and European authorities agreed on a bailout package for Cyprus, after a request for financial assistance. One of the conditions defined in the bailout package implied losses on all bank deposits, including those that were insured by the deposit guarantee scheme. More precisely, deposits above 100.000€ would have a haircut of 9.9%, while deposits below that threshold, which were in theory fully insured, would face a loss of 6.7%. This announcement directly affected the credibility of deposit insurance, not only in Cyprus, but also in other European countries under distress. Given the dramatic shock waves that this announcement created throughout Europe, the decision was reversed on March 25th. Importantly, the direct links between the Portugal and Cyprus are negligible, both economically and financially. Any reaction is thus more likely related to changes in trust on the deposit insurance scheme than to

potential contagion spillovers coming from the bailout.

In Table 5 we present the results of the estimation of equation 2, which allows us to test whether depositors in Portugal reacted to these events in Cyprus by moving their deposits out of weaker banks. In this case, we find that only household deposits were reactive to this event.<sup>2</sup> This supports the idea that the results are indeed related with the credibility of deposit insurance, given that the fraction of insured corporate deposits is much lower than that of households. Only those depositors who are covered by the deposit guarantee scheme would have reasons to react to this event.

Against this background, it is relevant to analyze the role of bank heterogeneity. As we saw before, depositors might not be indifferent between domestic and foreign banks and, more importantly, between foreign branches and other banks. To confirm whether this was relevant during this event window, we estimate 3, where we interact the event dummy with a dummy for foreign banks (columns 1 to 3) or with dummies for foreign branches and subsidiaries (Table 6).

The main result is unchanged: only household depositors were worried about deposits following up on the announcements for Cyprus. During this specific period, the ownership and legal type of the institutions did not play any role, across the board. The only exception comes from corporate deposits in subsidiaries, which also experienced some outflow during the crisis.

Given our results in the previous section, we could expect that once again depositors could have moved their deposits to foreign branches, to gain the protection from the host countries' deposit insurance scheme. However, there are several reasons why this might not be true. To start with, this was an European decision. This means that depositors might be worried about the credibility of deposit insurance throughout all Europe, rather than specifically in Portugal. Furthermore, the change was more about trust in institutions, who seemed to be willing to change the coverage limit of deposit insurance overnight, than about the sustainability of domestic public finances.

To further explore the potential role of bank heterogeneity, in Table 7 we present similar results, but now interacting the dummy for the Cyprus event with bank characteristics (equation 4). The results are still concentrated in household deposits. We see that the negative

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<sup>2</sup>In the table we report the results for the reaction of deposits in March and April 2013. The results remain unchanged if we consider only March 2013.

reaction was stronger for deposits held at banks with higher leverage (i.e., more equity) and less profitability. Bank soundness thus seems to play an important role, reinforcing the view that market discipline is not weakened by deposit insurance. Depositors react differently depending on bank characteristics.

Furthermore, smaller banks were more negatively affected. This might be a sign that depositors believe that some banks might be too-big-to-fail and thus prefer to place their savings in these banks in situations of uncertainty about the coverage of deposit insurance.

## 5 Final remarks

Deposit insurance is a widely recognized tool to mitigate the risk of deposit bank runs. This is anchored in solid theoretical contributions (Bryant, 1980, and Diamond and Dybvig, 1983). Empirically, most of the evidence seems to point to the existence of pervasive effects associated with deposit insurance (Demirgüç-Kunt and Detagriache, 2002, Ioannidou and Penas, 2010).

In this paper we consider a different angle. We explore two changes in the perceived credibility of a deposit insurance scheme to understand what is the effect on the behavior of depositors.

Regarding the first event, we find that when foreign banks become branches there is a significant deposit inflow. This legal change has crucial implications for depositors' protection: after these changes, deposits were covered by the deposit insurance mechanisms of the home country of these banks, rather than by the Portuguese deposit guarantee scheme. The results thus suggest that depositors were concerned about the ability of the domestic scheme to cover their deposits amidst a sovereign debt crisis.

The second event analyzed focuses on an announced change in deposit insurance in Cyprus, which would imply losses even for insured depositors. We find that households in Portugal reacted to this event, even though there was no direct link. The perceived change in the credibility of deposit insurance during a crisis is the most likely reason for these changes.

Taken together, our results show that depositors are sensitive to changes in the credibility of deposit insurance. Though there is evidence that the existence of deposit insurance mitigates depositors' incentives to monitor banks, our results show that if there are doubts about the insurance mechanism, depositors actively readjust their portfolios.

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## Tables and figures

Table 1  
Summary statistics

	<b>N</b>	<b>mean</b>	<b>median</b>
Total deposits (log)	3090	5.97	5.59
Households deposits (log)	3132	5.27	5.36
Corporate deposits (log)	3663	4.24	3.69
Total deposits (monthly growth rate)	3019	0.74	0.00
Households deposits (monthly growth rate)	3063	0.57	0.00
Corporate deposits (monthly growth rate)	3603	3.02	0.00
Non-performing loans	4276	7.34	3.31
Leverage	4273	7.34	5.67
Loan to deposit ratio	3947	334.66	149.80
ROA	4257	0.55	0.37
Net interest margin	4272	2.97	1.49
Liquidity ratio	4245	216.39	53.63
Total capital ratio	3065	15.45	12.30
Log of total assets	4276	21.09	20.89
Interest rate on household deposits	1662	2.85	2.78
Interest rate on corporate deposits	1934	2.46	2.27
Dummy domestic banks	4276	0.54	1.00
Dummy foreign branches	4276	0.27	0.00
Dummy foreign subsidiaries	4276	0.19	0.00

Notes: The sample covers monthly bank level data between March 2007 and December 2013. Corporate deposits refer to deposits from non-financial corporations. Non-performing loans reported as a percentage of total credit. Leverage is defined as equity as a percentage of total assets. ROA computed as net profits as a % of total assets and net interest margin computed as % of total assets. The liquidity ratio is defined as liquid assets as a percentage of interbank liabilities. The total capital ratio is the regulatory capital ratio and is not available for branches from EU countries.

Table 2  
Determinants of deposits

	Dependent variable		
	<b>Growth rate of:</b>		
	<b>Total deposits</b>	<b>Household deposits</b>	<b>Corporate deposits</b>
Non-performing loans	0.007 <i>0.53</i>	-0.003 <i>-0.28</i>	-0.038 <i>-0.94</i>
Leverage	0.063 *** <i>3.15</i>	0.062 ** <i>2.56</i>	0.049 <i>1.41</i>
Loan to deposit ratio	0.000 <i>-0.29</i>	-0.001 <i>-9.25</i>	0.000 *** <i>4.40</i>
ROA	0.179 *** <i>3.37</i>	0.196 *** <i>3.18</i>	0.310 ** <i>2.06</i>
Net interest margin	0.055 <i>0.82</i>	-0.019 <i>-0.29</i>	-0.345 ** <i>-2.22</i>
Liquidity ratio	0.000 <i>-1.41</i>	0.000 ** <i>-2.17</i>	0.000 * <i>-1.72</i>
Interest rate	0.219 <i>1.19</i>	0.647 *** <i>2.69</i>	-0.924 ** <i>-2.04</i>
Log of total assets	0.199 ** <i>2.25</i>	0.034 <i>0.35</i>	-0.380 <i>-1.42</i>
Constant	-5.746 ** <i>-2.52</i>	-1.621 <i>-0.65</i>	12.668 * <i>1.82</i>
Number of observations	1486	1577	1841
Number of banks	39	40	44
R-squared	0.060	0.094	0.036

Notes: T-stats reported in italics and standard errors clustered by bank. All regressions include month fixed effects. Explanatory variables lagged by one quarter. Corporate deposits refer to deposits from non-financial corporations. Leverage is defined as equity as a percentage of total assets. ROA computed as net profits as a % of total assets and net interest margin computed as % of total assets. The liquidity ratio is defined as liquid assets as a percentage of interbank liabilities. The total capital ratio is the regulatory capital ratio and is not available for branches from EU countries. \*\*\* significant at 1%, \*\* significant at 5%, \*significant at 10%.

Table 3  
Exploring the transformation of foreign subsidiaries in branches

	Dependent variable					
	<b>Log of:</b>					
	<b>Total</b>		<b>Household</b>		<b>Corporate</b>	
	<b>deposits</b>		<b>deposits</b>		<b>deposits</b>	
Dummy branch	0.751 ***	<i>12.77</i>	0.605 ***	<i>9.73</i>	0.892 ***	<i>7.94</i>
Non-performing loans	0.008 ***	<i>13.97</i>	0.015 ***	<i>23.99</i>	-0.008 ***	<i>-7.66</i>
Leverage	0.012 ***	<i>7.68</i>	0.011 ***	<i>7.12</i>	0.006 ***	<i>2.65</i>
Loan to deposit ratio	0.000 ***	<i>-6.82</i>	0.000 **	<i>2.49</i>	0.000 ***	<i>-8.73</i>
ROA	0.004	<i>1.52</i>	0.004 *	<i>1.65</i>	-0.003	<i>-0.83</i>
Net interest margin	0.000	<i>0.08</i>	-0.003	<i>-0.91</i>	0.001	<i>0.23</i>
Liquidity ratio	0.000	<i>-0.78</i>	0.000	<i>-1.28</i>	0.000	<i>0.66</i>
* Interest rate	0.036 ***	<i>3.20</i>	0.075 ***	<i>6.91</i>	0.036 ***	<i>3.25</i>
Log of total assets	0.506 ***	<i>16.42</i>	0.182 ***	<i>5.87</i>	0.595 ***	<i>19.10</i>
Constant	-4.484 ***	<i>-6.47</i>	2.077 ***	<i>3.01</i>	-8.090 ***	<i>-11.72</i>
Bank controls	Y		Y		Y	
Number of observations	1486		1577		1841	
Number of banks	39		40		44	
R-squared	0.393		0.475		0.291	

Notes: T-stats reported in italics. All regressions are estimated with bank and month fixed effects. Unlike the previous tables, our dependent variable are log deposits. The difference has to do with the fact that in these specifications we are using bank fixed effects, to capture the effect of transforming a subsidiary in a branch. Explanatory variables lagged by one quarter. Corporate deposits refer to deposits from non-financial corporations. Leverage is defined as equity as a percentage of total assets. ROA computed as net profits as a % of total assets and net interest margin computed as % of total assets. The liquidity ratio is defined as liquid assets as a percentage of interbank liabilities. The total capital ratio is the regulatory capital ratio and is not available for branches from EU countries. \*\*\* significant at 1%, \*\* significant at 5%, \*significant at 10%.

Table 4  
Exploring the transformation of foreign subsidiaries in branches -  
control group = other subsidiaries

	Dependent variable					
	Growth rate of:					
	<b>Total</b>		<b>Household</b>		<b>Corporate</b>	
	<b>deposits</b>		<b>deposits</b>		<b>deposits</b>	
Dummy branch	2.677	*	-1.206		14.464	**
	<i>1.75</i>		<i>0.61</i>		<i>2.11</i>	
Non-performing loans	0.008	***	0.015	***	-0.008	***
	<i>13.97</i>		<i>23.99</i>		<i>-7.66</i>	
Leverage	0.012	***	0.011	***	0.006	***
	<i>7.68</i>		<i>7.12</i>		<i>2.65</i>	
Loan to deposit ratio	0.000	***	0.000	**	0.000	***
	<i>-6.82</i>		<i>2.49</i>		<i>-8.73</i>	
ROA	0.004		0.004	*	-0.003	
	<i>1.52</i>		<i>1.65</i>		<i>-0.83</i>	
Net interest margin	0.000		-0.003		0.001	
	<i>0.08</i>		<i>-0.91</i>		<i>0.23</i>	
Liquidity ratio	0.000		0.000		0.000	
*	<i>-0.78</i>		<i>-1.28</i>		<i>0.66</i>	
Interest rate	0.036	***	0.075	***	0.036	***
	<i>3.20</i>		<i>6.91</i>		<i>3.25</i>	
Log of total assets	0.506	***	0.182	***	0.595	***
	<i>16.42</i>		<i>5.87</i>		<i>19.10</i>	
Constant	-4.484	***	2.077	***	-8.090	***
	<i>-6.47</i>		<i>3.01</i>		<i>-11.72</i>	
Bank controls	Y		Y		Y	
Number of observations	398		448		669	
Number of banks	15		16		19	
R-squared	0.147		0.181		0.100	

Notes: T-stats reported in italics. All regressions are estimated with bank and month fixed effects. Unlike the previous tables, our dependent variable are log deposits. The difference has to do with the fact that in these specifications we are using bank fixed effects, to capture the effect of transforming a subsidiary in a branch. Explanatory variables lagged by one quarter. Corporate deposits refer to deposits from non-financial corporations. Leverage is defined as equity as a percentage of total assets. ROA computed as net profits as a % of total assets and net interest margin computed as % of total assets. The liquidity ratio is defined as liquid assets as a percentage of interbank liabilities. The total capital ratio is the regulatory capital ratio and is not available for branches from EU countries. \*\*\* significant at 1%, \*\* significant at 5%, \*significant at 10%.

Table 5  
The effects on uncertainty on deposit insurance associated  
with the Cyprus event

	Dependent variable					
	<b>Growth rate of:</b>					
	<b>Total deposits</b>		<b>Household deposits</b>		<b>Corporate deposits</b>	
Cyprus	0.813		-1.074	**	2.747	
	<i>1.19</i>		<i>-2.05</i>		<i>0.42</i>	
Dummy subsidiary	0.887	**	1.041	**	-0.660	
	<i>2.07</i>		<i>2.50</i>		<i>-1.15</i>	
Dummy branch	1.231		1.140		2.602	
	<i>1.57</i>		<i>1.56</i>		<i>1.60</i>	
Non-performing loans	0.008		0.000		-0.032	
	<i>0.62</i>		<i>-0.04</i>		<i>-0.98</i>	
Leverage	0.078	***	0.078	***	0.089	**
	<i>3.70</i>		<i>3.10</i>		<i>2.45</i>	
Loan to deposit ratio	0.000		-0.001	***	0.000	***
	<i>-0.80</i>		<i>-8.49</i>		<i>2.67</i>	
ROA	0.196	***	0.210	***	0.333	**
	<i>3.68</i>		<i>3.38</i>		<i>2.10</i>	
Net interest margin	0.049		-0.020		-0.354	**
	<i>0.74</i>		<i>-0.32</i>		<i>-2.36</i>	
Liquidity ratio	0.000		0.000	**	0.000	
	<i>-1.07</i>		<i>-2.03</i>		<i>-1.44</i>	
Interest rate	0.463	**	0.859	***	-0.597	*
	<i>2.19</i>		<i>3.85</i>		<i>-1.67</i>	
Log of total assets	0.224	**	0.057		-0.162	
	<i>2.28</i>		<i>0.62</i>		<i>-0.76</i>	
Constant	-6.894	***	-2.754		6.447	
	<i>-2.71</i>		<i>-1.20</i>		<i>1.17</i>	
Bank controls	Y		Y		Y	
Number of observations	1486		1577		1841	
Number of banks	39		40		44	
R-squared	0.063		0.098		0.037	

Notes: T-stats reported in italics and standard errors clustered by bank. All regressions include month fixed effects. Explanatory variables lagged by one quarter. The Cyprus dummy takes the value one in March and April 2013. Corporate deposits refer to deposits from non-financial corporations. Leverage is defined as equity as a percentage of total assets. ROA computed as net profits as a % of total assets and net interest margin computed as % of total assets. The liquidity ratio is defined as liquid assets as a percentage of interbank liabilities. The total capital ratio is the regulatory capital ratio and is not available for branches from EU countries. \*\*\* significant at 1%, \*\* significant at 5%, \*significant at 10%.

Table 6

The effects on uncertainty on deposit insurance associated with the Cyprus event for foreign banks

	Dependent variable Growth rate of:			Dependent variable Growth rate of:		
	<u>Total deposits</u>	<u>Household deposits</u>	<u>Corporate deposits</u>	<u>Total deposits</u>	<u>Household deposits</u>	<u>Corporate deposits</u>
Cyprus	-0.135 <i>-0.15</i>	-1.227 ** <i>-2.03</i>	2.481 <i>0.65</i>	-0.099 <i>-0.11</i>	-1.218 ** <i>-2.02</i>	2.516 <i>0.66</i>
Foreign	0.684 <i>1.29</i>	0.569 <i>1.27</i>	0.734 <i>0.92</i>	-	-	-
Branch	-	-	-	0.704 <i>0.37</i>	0.490 <i>0.70</i>	1.965 <i>1.64</i>
Subsidiary	-	-	-	0.732 <i>1.59</i>	0.623 <i>1.37</i>	-0.524 <i>-0.78</i>
Cyprus * Foreign	3.506 <i>1.06</i>	1.052 <i>1.39</i>	0.403 <i>0.05</i>	-	-	-
Cyprus * Branch	-	-	-	5.414 <i>1.03</i>	1.216 <i>1.24</i>	3.203 <i>0.26</i>
Cyprus * Subsidiary	-	-	-	0.808 <i>0.57</i>	0.827 <i>1.16</i>	-5.335 * <i>-1.67</i>
Bank controls	Y	Y	Y	Y	Y	Y
Number of observations	1486	1577	1841	1486	1577	1841
Number of banks	39	40	44	39	40	44
R-squared	0.066	0.098	0.038	0.067	0.099	0.039

Notes: T-stats reported in italics and standard errors clustered by bank. All regressions include month fixed effects. Explanatory variables lagged by one quarter. The pre-assistance period refers to January-March 2011 and the post-assistance period refers to April-May 2011. Corporate deposits refer to deposits from non-financial corporations. Leverage is defined as equity as a percentage of total assets. ROA computed as net profits as a % of total assets and net interest margin computed as % of total assets. The liquidity ratio is defined as liquid assets as a percentage of interbank liabilities. The total capital ratio is the regulatory capital ratio and is not available for branches from EU countries. \*\*\* significant at 1%, \*\* significant at 5%, \*significant at 10%.

Table 7

The effects on uncertainty on deposit insurance associated with the Cyprus event across banks

	Dependent variable		
	<b>Growth rate of:</b>		
	<b>Total deposits</b>	<b>Household deposits</b>	<b>Corporate deposits</b>
Cyprus * Non-performing loans	0.046 <i>1.00</i>	-0.007 <i>-0.39</i>	0.066 <i>0.80</i>
Cyprus * Leverage	0.021 <i>0.23</i>	-0.153 <i>-3.02</i>	*** <i>-0.26</i>
Cyprus * Loan to deposit ratio	0.004 <i>0.87</i>	0.001 <i>0.97</i>	-0.008 <i>-0.78</i>
Cyprus * ROA	0.915 <i>1.30</i>	0.449 <i>1.35</i>	2.260 <i>1.13</i>
Cyprus * Net interest margin	-2.712 <i>-0.97</i>	1.695 <i>2.39</i>	** <i>0.10</i>
Cyprus * Liquidity ratio	0.000 <i>0.57</i>	0.000 <i>0.17</i>	0.000 <i>0.20</i>
Cyprus * Interest rate	-2.537 <i>-1.39</i>	0.357 <i>0.69</i>	-5.336 <i>-1.41</i>
Cyprus * Log of total assets	-0.724 <i>-0.97</i>	0.399 <i>1.67</i>	* <i>-0.03</i>
Bank controls	Y	Y	Y
Number of observations	1486	1577	1841
Number of banks	39	40	44
R-squared	0.071	0.100	0.040

Notes: T-stats reported in italics and standard errors clustered by bank. All regressions include month fixed effects. Explanatory variables lagged by one quarter. The Cyprus dummy takes the value one in March and April 2013. Corporate deposits refer to deposits from non-financial corporations. Leverage is defined as equity as a percentage of total assets. ROA computed as net profits as a % of total assets and net interest margin computed as % of total assets. The liquidity ratio is defined as liquid assets as a percentage of interbank liabilities. The total capital ratio is the regulatory capital ratio and is not available for branches from EU countries. \*\*\* significant at 1%, \*\* significant at 5%, \*significant at 10%.



Figure 1

The evolution of household deposits in Europe

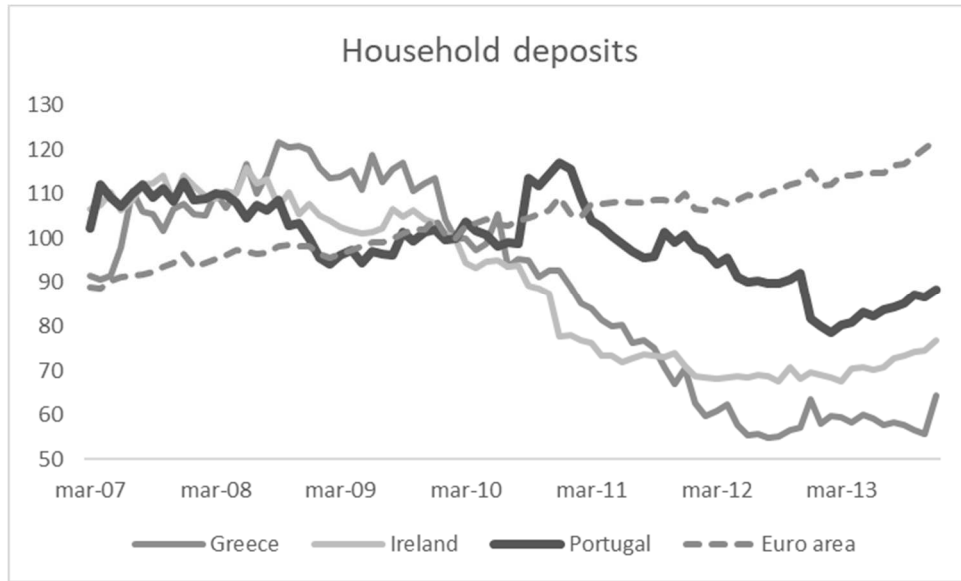


Figure 2

Evolution of bank deposits – effects from changing to branches

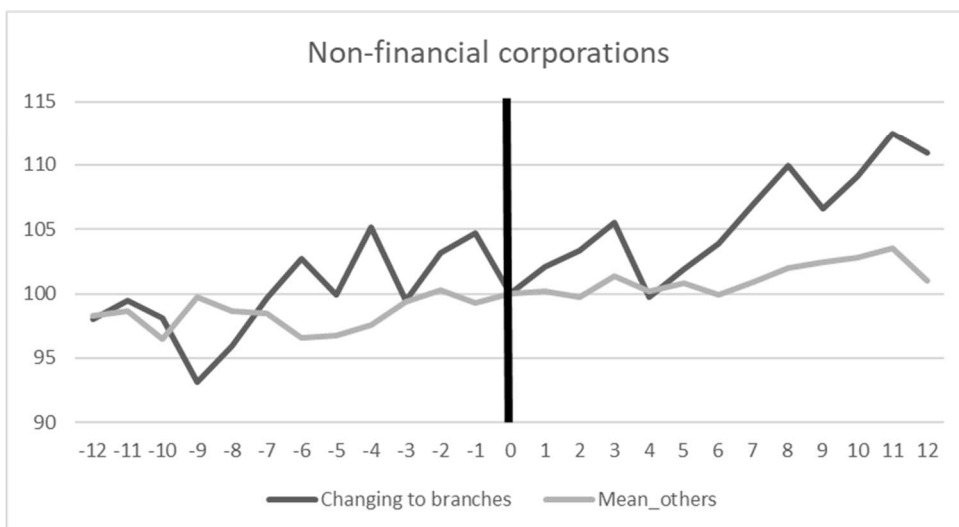
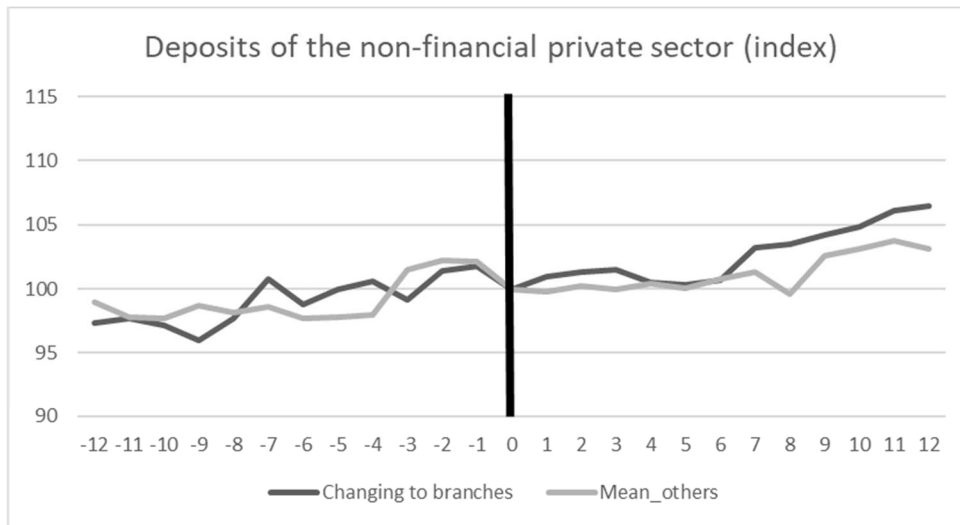


Figure 3

Interest rates on bank deposits – effects from changing to branches

