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The importance of deposit insurance credibility ☆

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ABSTRACT

Sovereigns usually back up their deposit insurance arrangements to lend them credibility. When the sovereign is in distress, the credibility of deposit insurance might be threatened, with detrimental effects to financial stability. We investigate the behavior of depositors during the euro area sovereign debt crisis to understand the importance of deposit insurance credibility. We find that depositors responded to foreign banks' decision to convert their subsidiaries into branches. By relocating their deposits into these newly formed branches during a period of sovereign distress, depositors became insured by a deposit insurance scheme with a stronger fiscal backstop. These results document a novel channel through which sovereign-bank links can be reinforced during a crisis: the credibility of deposit insurance.

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 in the failure of the financial system, this led to a search for mechanisms capable of protecting banks from the liquidity shocks induced by runs. Diamond and Dybvig (1986) showed that deposit insurance could offer banks such protection while still affording them the opportunity to provide liquidity services to depositors. However, the deposit insurance arrangement has to be credible. This explains why the vast majority of deposit schemes are offered by governments (or have their explicit support).

In this paper we investigate what happens when the credibility of deposit insurance is threatened. When the sovereign backing up the deposit insurance scheme is in distress, depositors might question its ability to reimburse them in case of bank failures. This will be particularly important when banks themselves are under pressure. During the euro area sovereign debt crisis, when some countries and some banks were in distress, depositors were arguably more worried about the protection afforded by deposit insurance, leading them to pay close attention to their deposit allocation decisions. We explore events during this period that allow for the

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identification of depositors' reaction to the credibility of the protection offered on their deposits.

More specifically, we examine the decision by foreign banks operating in Portugal to convert their subsidiaries into branches. While subsidiaries of foreign banks offer their depositors the insurance of the host country, branches offer their depositors the insurance coverage of the country of their parent bank. These conversions of subsidiaries into branches are a unique opportunity to investigate the importance of the credibility of the deposit insurance arrangement. They occurred in the midst of the Portuguese sovereign debt crisis, when there was considerable uncertainty about both the country's ability to meet its debt obligations and the stability of its banking system. In contrast, origin countries of these foreign banks had high credit ratings. We show that there was an increase in deposits at those financial institutions after they changed their legal status, even though they were offering interest rates that were 2 p.p. lower than their competitors. These results are robust to different empirical strategies and control groups. They are consistent with the hypothesis that sovereign risk is important for the credibility of deposit insurance.

In 2013, the Portuguese deposit insurance fund covered 1% of total eligible deposits, ranking 17th (out of 188 countries analyzed) in terms of the generosity of the safety net it offered depositors (Demirgüç-Kunt et al., 2015). Further, at the time both the level of insurance coverage and the reimbursement rules in Portugal were the same as in all European Union (EU) countries. Soon after the failure of Lehman Brothers, all Member States adopted a common minimum protection threshold of 100,000 euros and common rules concerning the reimbursement period of depositors.[1] Gatti and Oliviero (2021) show that the increase in the depositor protection threshold led to a decrease in the risk premium demanded by depositors in the euro area. A share of up to 10,000 euros of all deposits covered had to be reimbursed within a maximum period of seven days. The remainder (up to the maximum insured amount) had to be paid within a period of twenty working days. However, since Member States were unable to establish an European Deposit Insurance arrangement, the insurance protection of each national arrangement was intimately linked to the ability of the state to honor its obligations with the deposit insurance fund. Even for a well capitalized deposit insurance fund it would be challenging to meet the short reimbursement periods without government support. The uncertainty about the length of time that depositors may effectively wait to be reimbursed may in itself trigger a run (Goldsmith-Pinkham and Yorulmazer, 2010; Shin, 2009). As such, the depositors' reaction we document suggests that the credibility of deposit insurance was valuable during an episode of macroeconomic and financial distress.

Indeed, Portuguese depositors reacted positively to an improvement in the sovereign backup support to the deposit insurance protection offered to them notwithstanding the Portuguese arrangement being well-capitalized and meeting all of the European Union rules. It is worth noting that Portuguese depositors were made aware of the implications of the conversion of subsidiaries into branches for deposit insurance coverage. For example, several newspapers noted that Deutsche Bank's decision to convert its subsidiary into a branch would eliminate the bank's exposure to Portuguese sovereign risk and likely give it a competitive advantage in attracting deposits given "that depositing money at the Lisbon branch would be identical to have the money deposited in Germany."[2] While there were no significant aggregate deposit outflows to other countries, unlike what happened in other economies at the core of the euro area sovereign debt crisis, as we will show, there were reallocations of deposits within the Portuguese banking system.

The perception that Portuguese depositors cared about the credibility of deposit insurance was reinforced later, in a scenario of heightened uncertainty on the level of insurance coverage. In March 2013 it became public that the bailout package the IMF and European authorities granted Cyprus included a requirement to impose losses on *all* bank deposits, including insured deposits. This information, together with former Eurogroup Chairman Jeroen Dijsselbloem's announcement that this could be the template to handle future banking crises, sent shock waves throughout Europe, especially in countries facing financial difficulties, because it introduced uncertainty about the coverage offered by their deposit insurance arrangements. We show that Portuguese depositors responded to that announcement by moving their deposits into banks that were less susceptible to that uncertainty, i.e. branches of foreign banks from financially sound countries.

Our findings offer a valuable contribution to understand the importance of the credibility of deposit insurance mechanisms. Deposit insurance is widely recognized as an instrumental tool to prevent depositors' runs. During the global financial crisis many governments in advanced economies increased the coverage of their deposit insurance arrangements to avoid panic runs. Our findings suggest that the effectiveness of deposit insurance at insulating banks from runs goes beyond the level of coverage it offers depositors. It also depends critically on the certainty of the protection it offers them, 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 (Demirgüç-Kunt and Huizinga, 2013; Horvath and Huizinga, 2015; Leonello, 2018, and Fecht et al., 2019).

Our findings also offer an important insight for the long-standing debate in Europe about completing the Banking Union. While the European Union took important steps toward establishing a Banking Union following the sovereign debt crisis, it fell short of creating a single European deposit insurance system (Carmassi et al., 2020; Jokivuolle and Pennacchi, 2019). Without a common fiscal backstop, differences in the perceived risk of sovereign debt due, for example, to large fiscal deficits, can trigger deposit outflows, adding additional strains to the local banking sector. This might be enough to reignite a sovereign-bank doom loop.

Our paper adds to an already vast empirical literature on deposit insurance. Demirgüç-Kunt and Detagriache (2002) and Demirgüç-Kunt and Huizinga (2004) argue that deposit insurance reduces market discipline based on their study of banks across countries. Alanis et al. (2015), Bennett et al. (2015), Berger and Turk-Ariss (2015), Calomiris and Jaremski (2019), Chen et al. (2022), Egan et al. (2017) and Iyer and Puri (2012) arrive at a similar conclusion, but by investigating insured and uninsured depositors' monitoring. Martin et al. (2023) show that as distressed banks approach failure, insured deposits actually increase. In contrast, Martinez Peria and Schmukler (2001) and Lamers (2015) show that deposit insurance may not be detrimental to market discipline. Ioannidou and Penas (2010) and Karas et al. (2013), in turn, explore the effect of deposit insurance on banks' risk-taking. They argue that banks increased their risk following the introduction of deposit insurance in Bolivia and Russia, respectively. Anginer et al. (2014), Boyle et al. (2015), and Hasan et al. (2022) focus on the role of deposit insurance during financial crises. Anginer et al. (2014) argues that deposit insurance plays an important stabilizing role during crises, while Boyle et al. (2015) find that the introduction of deposit insurance only partially mitigates the likelihood of a run during crises.

[1] Our analysis is anchored on bank-level, monthly data on household and corporate depositors, but we do not have information on the percentage of deposits covered by deposit guarantees, in this period.

[2] Translation of a passage in "Deutsche Bank foge ao risco de Portugal," in Jornal de Negócios, June 16, 2011.

Boyle et al. (2015) also find that depositors are less likely to run if they have a long relationship with the bank, a finding consistent with evidence uncovered by Iyer et al. (2016).

Most of these papers analyze the effect of having or not deposit insurance. Our evidence on depositors' responses to shocks affecting the credibility of the deposit insurance arrangement suggests that it is important to factor in this credibility in any attempt to investigate its effectiveness. This is important in banking crises, particularly when they coincide with a sovereign debt crisis. In these instances, governments, which are the ultimate supporters of deposit insurance arrangements, may find themselves unable to meet their obligations with the deposit insurance fund or be tempted to change the rules governing the insurance coverage to alleviate the financial burden resulting from bank failures. Our findings on depositors' responses to the conversion of foreign subsidiaries into branches also illustrate the importance of deposit insurance in the complex mechanisms underneath the negative feedback loops between banks and sovereigns, as discussed by Farhi and Tirole (2018) and Brunnermeier et al. (2016). The rest of our paper is organized as follows. The next section presents our empirical strategy, data sources, and characterizes our sample. Section 3 reports the results of our investigation on Portuguese depositors' responses to banks that converted their subsidiaries into branches. Section 4 adds further evidence on Portuguese depositors' responses building on the news that followed the announcement of the bailout package granted to Cyprus. Section 5 concludes with some final remarks.

2. Empirical strategy, data, and sample characterization

2.1. Institutional background

Our main goal is to understand how depositors value the credibility of deposit insurance schemes. Are depositors sensitive to uncertainty about the deposit insurance arrangement's ability to meet its obligations? A challenge to answering this question empirically hinges on the existence of (unexpected) events that allow for a clean identification of that uncertainty. In 2010/2011 Portugal was at the center of the euro area sovereign debt crisis. In the Spring of 2010, Portuguese debt issuers lost access to debt markets. One year later, the country requested international financial assistance (Reis, 2013; Crosignani et al., 2020; Alves et al., 2021).

During that period of time, two foreign banks operating in Portugal converted their subsidiaries into branches. This legal change has a crucial implication for depositors' protection, which allows us to understand how depositors respond to changes in the credibility of deposit insurance arrangements. Specifically, after that change, deposits became insured by the deposit insurance arrangements of the home country of these banks instead of the Portuguese deposit guarantee scheme (Dell'Ariccia and Marquez, 2010; Calzolari et al., 2019). This change matters because deposit insurance schemes usually operate with a fund that accounts for only a small portion of the deposits they insure and rely on explicit support from the government to guarantee their obligations in case one or more banks default. To the extent that depositors value the credibility of the deposit insurance arrangement, the uncertainty about the Portuguese deposit insurance arrangement's ability to fully meet its obligations by virtue of the country's sovereign debt crisis may encourage depositors to migrate to the newly converted branches.

Crucially, the transformed branches are part of banking groups with head office in the core of the euro area, which were perceived as safe havens during the euro area sovereign debt crisis. The first branch conversion refers to Banco do Brasil. This foreign bank was operating in Portugal as a branch of a Brazilian bank. For non-EU branches, deposits are guaranteed by the Portuguese deposit insurance fund (unless the regimes are deemed as equivalent, which was not the case). In 2009, Banco do Brasil changed its legal status to EU branch, becoming a branch of the Austrian Banco do Brasil Aktiengesellschaft.[3] By becoming an EU branch, the equivalence regime automatically applied and the deposits became insured by the Austrian deposit insurance fund.

The second branch conversion happened at the peak of the euro area sovereign debt crisis. In the summer of 2011, the subsidiary of Deutsche Bank operating in Portugal changed its status from subsidiary to branch. As a result, deposits became insured by the German deposit insurance fund.[4] Interestingly, this change had broad media coverage, including explicit mentions to the change in deposit insurance.[5]

Given the small size of these branches when compared to the parent banks, it seems plausible that this is part of a broad branchification trend (Colliard, 2019; ESRB, 2019). Indeed, there is a trend in the euro area of an increase in the number of branches and a decline in the number of subsidiaries. This trend has been common for GIIPS (Greece, Ireland, Italy, Portugal, and Spain, the countries at the core of the euro area sovereign debt crisis) and non-GIIPS countries. Arguably, this is one of the most efficient ways to explore the benefits of financial integration in the European Union (Enria, 2021; Villeroy de Galhau, 2021).

2.2. Empirical strategy

We consider the following model of bank deposits to investigate the effect on deposits of the conversion of subsidiaries of foreign banks operating in Portugal into branches.

$$y_{it} = \alpha_i + \alpha_t + \beta_1 After_t \times branch_{it} + \gamma X_{it-3} + \delta r_{it-1} + \varepsilon_{it} \quad (1)$$

where y_{it} refers to the log of deposits at the end of the month (log(*deposits*)) or, in some specifications, the monthly growth rate of deposits (*gr rate*). We estimate this model for total deposits of the non-financial private sector. We also estimate it separately for households' and firms' deposits. α_i and α_t are bank and time fixed effects, respectively. The main coefficient of interest is β_1, which captures what happens to deposits after subsidiaries are converted into branches, in a differences-in-differences setting. X_{it-3} is a vector of lagged bank characteristics. It includes proxies for bank performance such as non-performing loans as a percentage of total credit, and net profits as a percentage of total assets. It also includes a proxy for the bank's liquidity, measured by liquid assets as a percentage of interbank liabilities, and a proxy for its financial condition, measured by the bank's book equity as a percentage of total assets. In addition, we control for the bank's loan to deposit ratio, and for the interest rate the bank offers its depositors, r_{it-1}.

2.3. Data sources

The data for our paper come primarily from two sources. We use the monthly Monetary and Financial Statistics of Banco de Portugal to gather monthly information on deposits and interest rates between March 2007 and December 2013. We also use this

[3] Séries Longas Setor Bancário Português, page 108 https://www.bportugal.pt/sites/default/files/anexos/pdf-boletim/series_longas_setor_bancario_portugues.pdf.

[4] Deutsche Bank made similar changes in other countries, including Belgium, the Netherlands, and Hungary https://hengeler-news.com/en/articles/hengeler-mueller-advises-deutsche-bank-on-cross-border-merger-of-deutsche-bank-nv-sa-belgium-and-ifn-finance-b-v-dutch-subsidiary https://www.econstor.eu/bitstream/10419/141992/1/774788275.pdf.

[5] Diário de Notícias, Dinheiro Vivo, or Dinheiro Vivo https://www.dn.pt/dossiers/tv-e-media/revistas-de-imprensa/noticias/deutsche-bank-foge-ao-risco-de-portugal-1879562.html https://www.dinheirovivo.pt/empresas/deutsche-bank-vai-passar-a-ser-sucursal-em-portugal-12570146.html https://www.dinheirovivo.pt/empresas/deutsche-bank-tira-clientes-aos-bancos-nacionais-12580132.html.

data source to gather information on households' and firms' deposits. This breakdown is important because households' deposits are more likely to be insured than firms' deposits, due to their smaller amounts, which may lead to different responses to changes in the credibility of the deposit insurance arrangement.

We use banks' monthly supervisory reports to gather data on the additional bank-level variables we use in our investigation, including net profits, non-performing loans, liquid assets, total loans, interbank liabilities, equity, and total assets. We also use supervisory reports to gather information on the financial institution's legal status and country of origin. This allows us to classify institutions as domestic banks, foreign subsidiaries, and foreign branches. This classification is important for our investigation because, as we explained above, deposits in foreign subsidiaries operating in Portugal are guaranteed by the Portuguese deposit insurance arrangement, while those of foreign branches operating in the country are guaranteed by the home country of the parent bank.

2.4. Sample characterization

Table 1 presents summary statistics for the variables we use in our analysis. Panel A presents results for the banks in our sample. Deposits in the banking system increased, but at a small rate between 2007 and 2013. Banks paid higher deposit rates to households than to corporations: The average interest rate on deposits was 2.85% for households and 2.46% for firms. The average return on banks' assets was 0.55% and the net interest margin was 2.97%. Non-performing loans were a driving factor of banks' weak profitability: the average non-performing loan ratio was 7.34% (3.31% for the median bank).

The median loan-to-deposit ratio was 149.8%, showing that Portuguese banks relied substantially on funding from wholesale debt markets (and also from the central bank, in the last years of the sample). There is considerable variation in this ratio, reflecting substantial heterogeneity in business models and funding strategies. The liquidity ratio, defined as liquid assets as a percentage of interbank liabilities, was on average 216.4%, showing that most banks had large liquidity buffers. Last, banks' book equity over total assets (leverage) was on average 7.34%. For the subsample that excludes foreign branches, banks' regulatory capital ratio was on average 15.45%.[6]

Panel B reports summary statistics for the three types of institutions that we consider: domestic banks, foreign branches, and foreign subsidiaries. There are 53 banks at the beginning of our sample period, of which 15 are branches and 11 are subsidiaries of foreign banks. Domestic banks account for more than half of the observations in our sample (54%). Within the group of foreign banks, 59% operate in Portugal with branches and the remaining 41% use subsidiaries.

Foreign branches are smaller than domestic banks and foreign subsidiaries. Deposit growth was greater for foreign banks than domestic banks, even though domestic banks offered higher interest rates. Interestingly, foreign branches attracted more corporate deposits, while foreign subsidiaries were able to attract more household deposits.

With regard to the other bank characteristics, the results are rather mixed. None of the three types of banks shows up as having consistently better or poorer performance. Domestic banks have the lowest loan to deposit ratios and the highest liquidity ratios. Foreign branches have the lowest non-performing loan ratios and foreign subsidiaries have the highest profitability indicators. Importantly, foreign branches have the smallest capital-to-assets ratios. Overall, the results in Table 1, Panel B, show that foreign branches, subsidiaries and domestic banks differ on several characteristics, though the differences are not large, or systematic. No banking group seems to outperform or underperform the others, which is relevant for our investigation on the implications from converting from subsidiaries to branches. As such, any shift in depositor preferences toward these institutions is unlikely driven by differences in banks' financial health.

In Table 2 we report summary statistics and mean difference tests for the banks that became branches and for the remaining banks, in the months in which there was a conversion to branches. Banks that became branches did not differ on any characteristics, such as profitability, non-performing loans, or funding structure. The only meaningful difference refers to the interest rate offered on bank deposits, which was significantly lower in the newly established branches and therefore unlikely to be the driver of any increase in deposits.

A bank characteristic that could drive depositors' decisions which we do not observe is the regulatory capital ratio. EU branches are not subject to capital requirements in the host country. Therefore, as soon subsidiaries convert into branches they no longer have capital requirements directly linked to their operations in Portugal. That said, given the small size of these branches compared to the respective banking groups, the change is not expected to lead to a visible adjustment in the parent bank's capital ratio. When we compare their regulatory leverage ratio, defined as book equity over total assets, we cannot find a statistically significant difference.

In sum, depositors who moved their deposits to the newly established branches were likely driven by the perceived (and advertised) enhanced safety of the German and Austrian deposit guarantee funds. Further, it is worth noting that Germany and Austria were both rated AAA at the time, while Portugal was being gradually downgraded to junk status during that period.

3. Depositors' response to the credibility of deposit insurance

In most countries, deposit insurance is limited, giving depositors incentives to select financially safe banks. Furthermore, government support is critical for the credibility of the country's insurance arrangement (deposit insurance funds account for only a fraction of the insured deposits). Therefore, uncertainty about that support may lead depositors to move their savings to safer banks or outside the national banking system.

The European Union harmonized a set of features of its member countries' insurance arrangements (i.e. level of insurance coverage, time required to reimburse insured deposits in the event of a default), but it fell short of creating a single European deposit insurance system. As a result, the insurance protection that depositors enjoy in each member country remained dependent on the country's ability to support its insurance fund in the event of bank failures. During the euro area sovereign debt crisis, Portugal was in the spotlight, triggering questions about the country's ability to fully meet its financial obligations. In the Spring of 2011, the country had to request international financial assistance. Therefore, during this turbulent period, depositors might have been worried about the safety of their deposits because of a potential inability of the country to meet its commitments to the deposit insurance fund.

Identifying an effect arising from uncertainty about the credibility of the deposit insurance arrangement poses significant challenges. For example, depositors could split their deposits across banks to diversify their risk exposure to individual banks in case of failure. However, this could also be driven by an incentive to increase their insurance coverage because under the Portuguese deposit insurance arrangement the coverage limit was 100,000 euros

[6] Foreign branches from EU countries are not in this subsample because they are exempt from meeting capital requirements in the host countries. All other reporting requirements are the same for all credit institutions.

Table 1
Summary statistics.

Panel A - full sample	N	mean	p5	median	p95
Total deposits (log)	3705	5.48	1.79	5.29	9.79
Households deposits (log)	3132	5.27	0.69	5.36	9.59
Corporate deposits (log)	3663	4.24	0.69	3.69	8.21
Total deposits (monthly growth rate)	3648	1.17	−17.95	0.00	20.00
Households deposits (monthly growth rate)	3063	0.57	−7.14	0.00	9.38
Corporate deposits (monthly growth rate)	3603	3.02	−27.27	0.00	34.98
Non-performing loans	4276	7.34	0.00	3.31	25.34
Leverage	4273	7.34	−2.83	5.67	26.21
Loan to deposit ratio	3947	334.7	10.61	149.8	1000
ROA	4257	0.55	−2.99	0.37	4.32
Net interest margin	4272	2.97	0.15	1.49	10.64
Liquidity ratio	4245	216.4	0.70	53.63	1000
Total capital ratio	3065	15.45	7.99	12.30	39.99
Log of total assets	4276	21.09	17.97	20.89	24.92
Interest rate on household deposits	1662	2.85	0.94	2.78	4.86
Interest rate on corporate deposits	1934	2.46	0.30	2.27	4.93
Dummy domestic banks	4276	0.54	0.00	1.00	1.00
Dummy foreign branches	4276	0.27	0.00	0.00	1.00
Dummy foreign subsidiaries	4276	0.19	0.00	0.00	1.00

Panel B - by bank type	Domestic banks		Foreign branches		Foreign subsidiaries	
	N	mean	N	mean	N	mean
Total deposits (log)	2166	6.04	969	4.12	570	5.63
Households deposits (log)	2047	5.81	677	3.27	408	5.83
Corporate deposits (log)	2154	4.42	939	3.42	570	4.89
Total deposits (monthly growth rate)	2134	0.78	957	1.92	557	1.39
Households deposits (monthly growth rate)	2014	0.65	652	0.17	397	0.87
Corporate deposits (monthly growth rate)	2121	1.80	925	5.99	557	2.74
Non-performing loans	2297	9.60	1165	4.41	814	5.20
Leverage	2297	8.84	1162	3.34	814	8.81
Loan to deposit ratio	2265	240.9	975	484.2	707	428.7
ROA	2286	0.56	1160	0.27	811	0.92
Net interest margin	2296	2.83	1162	2.63	814	3.87
Liquidity ratio	2268	309.9	1163	108.7	814	109.7
Total capital ratio	2264	15.64	–	–	800	14.84
Log of total assets	2297	21.32	1165	20.18	814	21.76
Interest rate on household deposits	1184	3.13	266	2.00	212	2.40
Interest rate on corporate deposits	1226	2.88	475	1.46	233	2.32
Dummy domestic banks	2297	1.00	1165	0.00	814	0.00
Dummy foreign branches	2297	0.00	1165	1.00	814	0.00
Dummy foreign subsidiaries	2297	0.00	1165	0.00	814	1.00

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 percentage of total assets and net interest margin computed as percentage 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. The loan to deposit and the liquidity ratio are truncated at 1000.

per depositor in each bank. Similarly, depositors could move their savings to branches of foreign banks operating in Portugal to benefit from the insurance protection of these banks' home country.[7] However, these branches might be financially sounder than other banks and depositors are simply reacting to that difference.

We capitalize on two foreign banks operating in Portugal that converted their subsidiaries into branches during the sovereign debt crisis to deal with these identification challenges. If depositors were concerned about the credibility of the Portuguese insurance arrangement, then we should see deposits flowing into these newly converted branches (and away from domestic banks, particularly those in more acute distress, i.e., where the likelihood of involvement of the deposit guarantee scheme could be greater). Importantly, these conversions occurred at different dates during the sovereign debt crisis and there was no change in the intrinsic soundness of the parent banks of those branches. Additionally, while Portuguese debt had a junk rating from the main three agencies at the time, the home countries of the banks that changed the legal status of their subsidiaries in Portugal were at the top of the rating scale.

Despite the magnitude of the crisis, aggregate Portuguese deposits did not fall as much as they did in Greece, for instance (Fig. 1). However, Portuguese depositors appear to have responded to the change in the legal status of foreign subsidiaries into branches (Fig. 2). Subsidiaries that converted to branches were able to attract more deposits than the other banks in the twelve-month period after they changed their legal status. The response was faster for households, with the increase concentrated around the moment of conversion, but more persistent for corporations. These changes do not appear to have been driven by an attempt to gain market share by offering higher deposit rates (Fig. 3). In fact, deposit rates offered by the newly converted branches were

[7] Recall that deposits held at foreign branches are insured by the home country deposit insurance scheme, while deposits held at foreign subsidiaries are guaranteed domestically.

Table 2
Mean comparison tests.

	New EU branches mean	Other banks mean	Difference	t-stat
Total deposits (log)	5.06	5.43	−0.38	−0.29
Households deposits (log)	4.72	5.40	−0.68	−0.47
Corporate deposits (log)	3.61	4.22	−0.61	−0.52
Total deposits (monthly growth rate)	10.14	0.17	9.97	0.93
Households deposits (monthly growth rate)	−1.65	−0.29	−1.36	−0.22
Corporate deposits (monthly growth rate)	39.39	4.15	35.24	1.64
Non-performing loans	2.81	5.97	−3.16	−0.68
Leverage	11.07	6.17	4.90	0.93
Loan to deposit ratio	159.63	355.17	−195.54	−1.02
ROA	0.21	0.07	0.13	0.10
Net interest margin	1.31	1.98	−0.67	−0.68
Liquidity ratio	126.87	210.12	−83.26	−0.48
Log of total assets	20.60	21.17	−0.57	−0.60
Interest rate on household deposits	2.21	3.73	−1.52*	−1.74
Interest rate on corporate deposits	0.97	3.38	−2.41**	−2.41

Notes: The sample covers bank level data in the months in which there was a conversion to EU branches. 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 percentage of total assets and net interest margin computed as percentage of total assets. The liquidity ratio is defined as liquid assets as a percentage of interbank liabilities. The loan to deposit and the liquidity ratio are truncated at 1000.

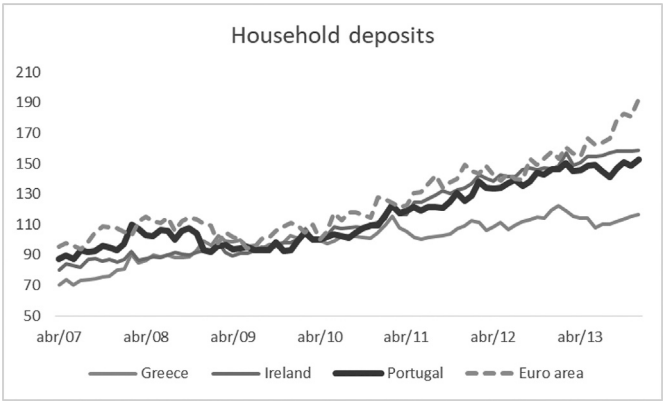

Fig. 1. The evolution of household deposits in Europe
Note: Household deposits from ECB's Monetary and Financial Statistics. March 2010 = 100.

significantly below those offered by their competitors during most of the period. Specifically, the interest rate on household deposits was 1.6 p.p. lower, while that of corporate deposits was 2.7 p.p. lower. On average, the interest rate on total deposits was 2.1 p.p. lower.

We start by investigating whether there are significant differences arising from *being* a branch or a subsidiary i.e. do branches and/or subsidiaries consistently attract more deposits relative to domestic banks? To that end, we use the monthly growth rate of deposits (total, household and corporate deposits) as the dependent variable and include time fixed effects. The results of this exercise, which are reported in Columns (1)-(3) of Table 3, show that depositors do not have a preference for either foreign branches or subsidiaries (relative to domestic banks) during our sample period. The coefficients associated with being a branch or a subsidiary are never statistically significant. This shows that depositors do not have a structural preference for branches or subsidiaries during the sample period, after controlling for other bank characteristics.

Looking at the other controls we see that deposit growth is higher for banks with higher equity (higher leverage ratio), higher profits (ROA), but also lower liquidity ratios. Household deposits grow more when interest rates are higher, but the opposite actually happens for corporate deposits.

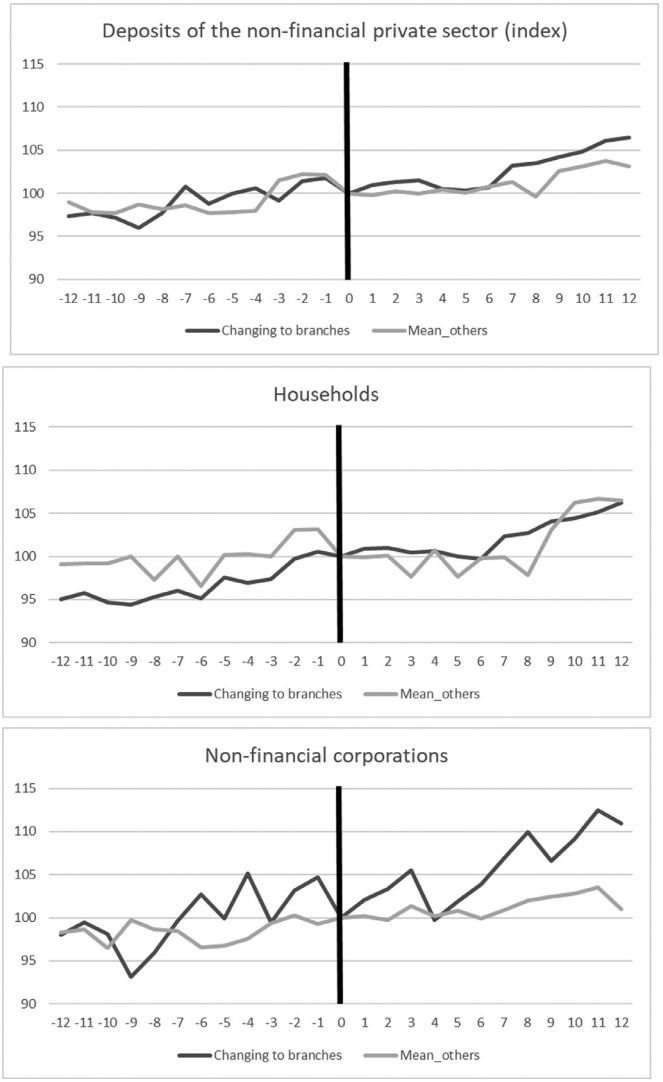

Fig. 2. Evolution of bank deposits – effects from changing to branches
Note: Evolution of deposits in Portuguese banks. Date 0 corresponds to the date in which subsidiaries became branches. The lighter line corresponds to the average of all other banks around the same event dates.

Table 3
The effect of being or becoming a branch on deposits.

	Being a branch			Becoming a branch				Bank*year fixed effects		
	Dependent variable			Dependent variable				Dependent variable		
	Total deposits (1)	Household deposits (2)	Corporate deposits (3)	Total deposits (4)	Household deposits (5)	Corporate deposits (6)	Pooled (7)	Total deposits (8)	Household deposits (9)	Corporate deposits (10)
$After_t$ * Branch	–	–	–	0.671***	0.555***	0.811***	–	–		
	–	–	–	*(11.029)*	*(14.597)*	*(10.290)*	–	–		
Branch (0/1)	0.427	0.553	1.133	–	–	–	–	0.258**	0.358***	0.075
	(0.568)	*(0.796)*	*(0.852)*	–	–	–	–	*(2.346)*	*(5.737)*	*(0.519)*
Subsidiary (0/1)	0.473	0.624	−0.842	–	–	–	–	–	–	–
	(1.001)	*(1.431)*	*(−1.327)*	–	–	–	–	–	–	–
$After_t$ * $Branch_{it}$ * HH $deposits_{it}$	–	–	–	–	–	–	1.177***	–	–	–
	–	–	–	–	–	–	*(5.617)*	–	–	–
$After_t$ * $Branch_{it}$ * Corp $deposits_{it}$	–	–	–	–	–	–	0.322	–	–	–
	–	–	–	–	–	–	*(1.518)*	–	–	–
Non-performing $loans_{t-3}$	−0.003	−0.001	−0.038	0.006***	0.014***	−0.011***	−0.001	0.002*	0.004***	0.001
	(−0.181)	*(−0.047)*	*(−0.898)*	*(3.208)*	*(5.335)*	*(−6.035)*	*(−0.746)*	*(1.858)*	*(4.504)*	*(0.547)*
$Leverage_{t-3}$	0.079*	0.071**	0.103**	0.008**	0.012***	0.003	0.005	0.004	0.013***	0.004
	(2.008)	*(2.442)*	*(2.377)*	*(2.315)*	*(2.928)*	*(0.640)*	*(1.156)*	*(1.372)*	*(6.932)*	*(1.081)*
Loan to deposit $ratio_{t-3}$	0.001	−0.002*	0.003	−0.001***	−0.001	−0.001*	−0.001	−0.001***	−0.001***	−0.001***
	(0.623)	*(−1.828)*	*(1.616)*	*(−3.045)*	*(−1.588)*	*(−1.850)*	*(−1.068)*	*(−6.414)*	*(−11.643)*	*(−3.623)*
ROA_{t-3}	0.167*	0.198***	0.233*	−0.001	0.001	−0.001	−0.003	0.004	−0.005***	0.006*
	(1.997)	*(3.474)*	*(1.740)*	*(−0.214)*	*(0.220)*	*(−0.151)*	*(−0.456)*	*(1.519)*	*(−2.710)*	*(1.946)*
Net interest $margin_{t-3}$	−0.006	−0.045	−0.056	0.001	−0.000	0.002	0.004	−0.001	0.001	−0.001
	(−0.059)	*(−0.895)*	*(−0.437)*	*(0.194)*	*(−0.049)*	*(0.375)*	*(0.859)*	*(−0.514)*	*(0.646)*	*(−0.829)*
Liquidity $ratio_{t-3}$	−0.002**	−0.002**	−0.002	−0.000	−0.000	−0.000	−0.000	0.000**	0.000	−0.000
	(−2.311)	*(−2.684)*	*(−1.323)*	*(−0.900)*	*(−0.905)*	*(−0.437)*	*(−0.003)*	*(2.318)*	*(0.371)*	*(−0.166)*
Interest $rate_{t-1}$	−0.097	0.625**	−0.783**	0.055*	0.068***	0.033	−0.071	0.010	0.020***	0.013
	(−0.464)	*(2.604)*	*(−2.377)*	*(1.770)*	*(2.889)*	*(0.849)*	*(−1.163)*	*(1.315)*	*(3.891)*	*(1.486)*
Log of total $assets_{t-3}$	−0.135	−0.089	−0.128	0.477***	0.292**	0.660***	0.160	0.369***	0.429***	0.499***
	(−0.784)	*(−0.739)*	*(−0.461)*	*(4.078)*	*(2.095)*	*(3.422)*	*(1.030)*	*(7.356)*	*(10.637)*	*(7.417)*
Bank fixed effects	N	N	N	Y	Y	Y	Y	Y	Y	Y
Time fixed effects	Y	Y	Y	Y	Y	Y	Y	N	N	N
Bank*year fixed effects	N	N	N	N	N	N	N	Y	Y	Y
Dependent variable	Δ Ln	Δ Ln	Δ Ln	Ln	Ln	Ln	Ln	Ln	Ln	Ln
Number of observations	1943	1588	1852	1943	1588	1852	3667	1942	1584	1849
Number of banks	45	40	44	45	40	44	44	45	40	44
R-squared	0.006	0.046	−0.010	0.312	0.486	0.282	0.850	0.995	0.999	0.990

Notes: T-stats reported in italics and standard errors clustered by bank. Explanatory variables lagged by one quarter, except for interest rates (lagged by one month). The first three columns examine the effects of being a branch (or subsidiary) on deposit growth. The last three columns examine the effects of becoming a branch on the level of deposits, using equation (1). Corporate deposits refer to deposits from non-financial corporations. After is equal to 1 after subsidiaries are converted to branches. Leverage is defined as equity as a percentage of total assets. ROA computed as net profits as a percentage of total assets and net interest margin computed as percentage 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%.

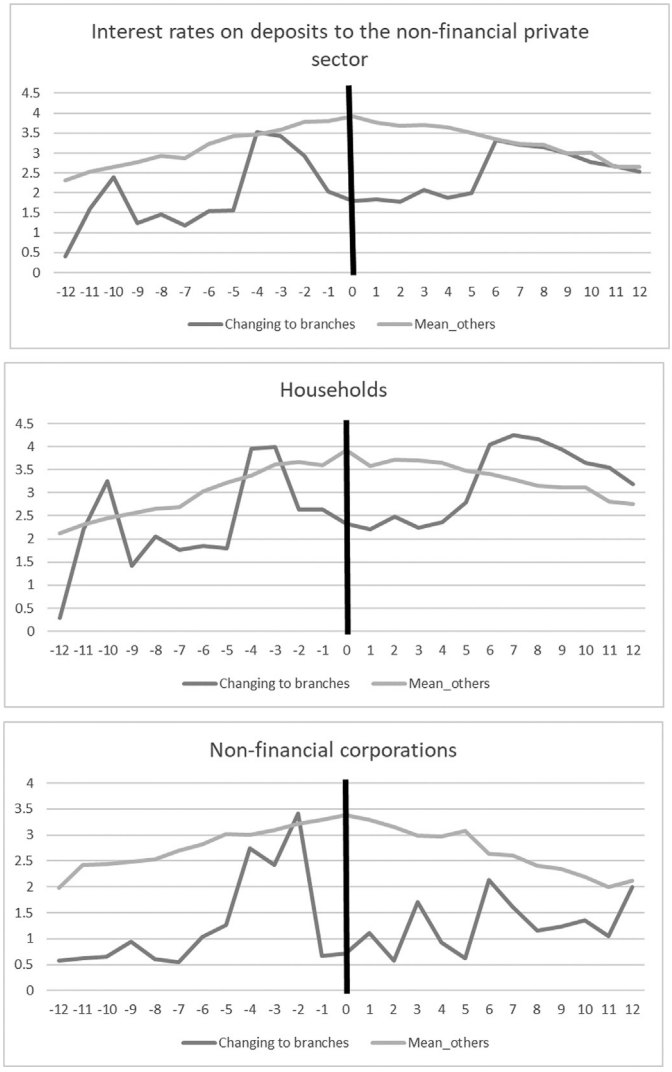

Fig. 3. Interest rates on bank deposits – effects from changing to branches
Note: Evolution of interest rates in Portuguese banks. Date 0 corresponds to the date in which subsidiaries became branches. The lighter line corresponds to the average of all other banks around the same event dates.

More important for our purposes, however, is to understand what happens when a foreign subsidiary converts its legal status and becomes a branch. In Columns (4)-(6) we report our main results. To investigate the impact of this change in legal status, we estimate equation 1, with bank and time fixed effects, capturing the effect on deposits from *becoming* a branch. Because now we are investigating a within bank variation, we use as our dependent variable the level of deposits, rather than its growth rate. In other words, we examine if deposits *grow* after a foreign subsidiary becomes a branch, rather than if the growth rate of deposits *accelerates* after that conversion.

The results in Columns (4)-(6) show that when foreign subsidiaries become branches there is a significant inflow of deposits. Fig. 2 already presented suggestive descriptive evidence of this effect. We now document that this finding holds when control for time-varying bank characteristics, including deposit rates, as well as bank and time fixed effects. Also, the deposit inflow occurs in both the household and corporate segments of the market.

According to the 2013 Household Finance and Consumption Survey, the median deposits of households in Portugal were 11,100 euros. Even for the highest decile of wealth, the median deposits were 24,700 euros. In contrast, based on data from the Central Balance Sheet managed by Portuguese banks, the average amount held in cash and deposits by corporations in the same period was 81,800 euros. Thus, while a small portion of firms' deposits might benefit from the protection offered by deposit insurance, the vast majority of Portuguese household deposits were covered by deposit insurance. Even though we do not have data on the share of deposits covered by deposit insurance during the sample period, these values suggest that the breakdown between households and corporations offers a reasonable proxy for the intensity of deposit insurance coverage. Also, given the operational nature of some of the corporate deposits, it maybe be more difficult for corporations to switch banks. As such, we expect that household deposits are more sensitive to changes in the perceived credibility of deposit insurance.

To investigate this hypothesis, we present in Column (7) one additional specification in which we pool the data on households and corporations. In this pooled dataset we interact the effect of becoming a branch with two dummy variables that identify households and corporations. The results show that the changes are driven by households, which are the depositors that stand to benefit the most from the additional protection provided by foreign countries' insurance arrangements. A statistical test confirms that the coefficients associated to households and firms are statistically different among themselves.

In Columns (8)-(10) we report the results when we use bank*time fixed effects instead of controlling separately for bank unobserved heterogeneity and for time trends. Our findings continue to hold for total and household deposits, but in this stricter approach they are no longer statistically significant for corporate deposits. This means that when we consider the variation in deposits for the foreign subsidiaries that become branches within the year in which that change occurred, the results are driven by household deposits. This is consistent with the faster reaction documented in Fig. 2.

Overall, the evidence on the inflow of deposits into newly converted foreign branches supports the hypothesis that depositors in Portugal were concerned with the credibility of the local deposit insurance arrangement owed to the country's sovereign debt crisis.

3.1. Robustness tests

The results presented in Table 3 compare the evolution of deposits in foreign subsidiaries that converted to branches with that of deposits in all the other banks operating in Portugal. A potential concern with those results is that foreign banks might have different business models and strategies, or they may cater to different customers or geographies.

To address that concern, we present in Table 4 the results for equation 1, but exploring different control groups. In Columns (1)-(3) we assess the effects of becoming a branch compared to other foreign banks operating in Portugal at the same time. If depositors have a preference for foreign banks, then including domestic banks in the control group could confound the results. When we compare what happens to deposits after foreign subsidiaries become branches to what happens to deposits at the same time in the remaining foreign banks, we still see a consistent and significant effect. In other words, depositors do not migrate to foreign banks operating in Portugal (either through a subsidiary or a branch) during that period of heightened uncertainty; instead they choose specifically to migrate their savings to the newly formed foreign branches.

In Columns (4)-(6) we consider an even stricter control group: the foreign banks that were operating in the country through subsidiaries. In this case, we compare what happened to deposits after some foreign banks converted their status from subsidiaries to

Table 4
Exploring the transformation of foreign subsidiaries in branches - other control groups.

	Control group: other foreign banks			Control group: other subsidiaries			Control group: other branches			Control group: other banks, excluding SIFIs (5 largest banks)			Control group: SIFIs (5 largest banks)		
	Total deposits (1)	Household deposits (2)	Corporate deposits (3)	Total deposits (4)	Household deposits (5)	Corporate deposits (6)	Total deposits (7)	Household deposits (8)	Corporate deposits (9)	Total deposits (10)	Household deposits (11)	Corporate deposits (12)	Total deposits (13)	Household deposits (14)	Corporate deposits (15)
$After_t$ * Branch	0.531***	0.520***	0.688***	0.546***	0.473***	0.678***	0.524**	0.782***	0.637***	0.676***	0.571***	0.775***	0.540***	0.373***	0.765***
	(4.186)	*(6.057)*	*(5.680)*	*(5.689)*	*(4.950)*	*(4.129)*	*(2.539)*	*(10.061)*	*(4.271)*	*(9.541)*	*(12.138)*	*(9.005)*	*(6.236)*	*(4.682)*	*(6.097)*
Non-performing $loans_{t-3}$	−0.014	−0.031***	−0.011	−0.032	0.009	−0.087*	−0.014	−0.019*	−0.012	0.006***	0.016***	−0.012***	−0.062**	−0.047**	−0.082*
	(−1.442)	*(−3.197)*	*(−1.151)*	*(−1.250)*	*(0.330)*	*(−1.990)*	*(−1.375)*	*(−2.007)*	*(−1.018)*	*(3.067)*	*(5.554)*	*(−5.385)*	*(−2.564)*	*(−2.519)*	*(−2.173)*
$Leverage_{t-3}$	0.015	0.005	0.008	−0.013	0.003	−0.032	0.014	0.010	0.003	0.009**	0.014***	0.003	0.001	0.017	−0.024
	(1.054)	*(0.216)*	*(0.530)*	*(−0.806)*	*(0.056)*	*(−0.616)*	*(1.026)*	*(0.641)*	*(0.229)*	*(2.500)*	*(3.123)*	*(0.511)*	*(0.055)*	*(0.564)*	*(−1.047)*
Loan to deposit $ratio_{t-3}$	−0.001**	−0.001*	−0.001	−0.000	−0.000	−0.001	−0.001*	−0.001**	−0.001	−0.001***	−0.001*	−0.001**	−0.001	−0.000	−0.001
	(−2.109)	*(−2.035)*	*(−1.105)*	*(−0.904)*	*(−1.538)*	*(−0.856)*	*(−1.999)*	*(−3.088)*	*(−1.368)*	*(−3.001)*	*(−1.712)*	*(−2.060)*	*(−1.373)*	*(−1.219)*	*(−1.276)*
ROA_{t-3}	−0.019*	−0.009	−0.017	0.007	−0.020	0.039	−0.019	0.007	−0.020	−0.001	0.002	−0.002	0.005	−0.004	0.028
	(−1.977)	*(−1.075)*	*(−1.314)*	*(0.472)*	*(−0.878)*	*(0.994)*	*(−1.692)*	*(0.527)*	*(−1.480)*	*(−0.142)*	*(0.343)*	*(−0.280)*	*(0.362)*	*(−0.513)*	*(0.898)*
Net interest $margin_{t-3}$	0.002	0.007	−0.007	−0.021	−0.008	−0.062	−0.002	0.022*	−0.008	−0.000	0.000	0.002	−0.047	−0.011	−0.096*
	(0.308)	*(0.746)*	*(−0.849)*	*(−0.752)*	*(−0.516)*	*(−1.620)*	*(−0.391)*	*(2.096)*	*(−0.861)*	*(−0.023)*	*(0.036)*	*(0.311)*	*(−1.543)*	*(−0.532)*	*(−2.129)*
Liquidity $ratio_{t-3}$	−0.000	−0.000	−0.000	0.002*	0.001	0.002	−0.000	0.000	−0.000	−0.000	−0.000	−0.000	0.001*	0.001	0.002**
	(−0.777)	*(−0.117)*	*(−0.250)*	*(1.916)*	*(0.473)*	*(1.840)*	*(−0.746)*	*(0.610)*	*(−0.458)*	*(−0.801)*	*(−0.639)*	*(−0.603)*	*(2.302)*	*(1.039)*	*(2.973)*
Interest $rate_{t-1}$	0.197*	0.060	0.215**	0.079**	0.077***	0.095	0.242	0.043	0.302**	0.050	0.075***	0.025	0.102	0.082	0.101
	(1.953)	*(1.627)*	*(2.265)*	*(2.997)*	*(6.032)*	*(1.351)*	*(1.433)*	*(0.811)*	*(2.322)*	*(1.497)*	*(3.104)*	*(0.618)*	*(1.824)*	*(1.595)*	*(1.893)*
Log of total $assets_{t-3}$	0.514***	0.428	0.508**	0.285	0.381	0.451	0.563***	0.714***	0.591***	0.488***	0.376***	0.690***	0.282	0.210	0.505
	(2.863)	*(1.608)*	*(2.638)*	*(1.244)*	*(1.542)*	*(0.779)*	*(3.373)*	*(3.278)*	*(3.157)*	*(4.251)*	*(2.773)*	*(3.726)*	*(1.206)*	*(0.812)*	*(1.861)*
Bank fixed effects	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Time fixed effects	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Bank*year fixed effects	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Dependent variable	Ln	Ln	Ln	Ln	Ln	Ln	Ln	Ln	Ln	Ln	Ln	Ln	Ln	Ln	Ln
Number of observations	723	452	673	304	275	285	503	261	465	1553	1198	1462	474	474	467
Number of banks	20	16	19	8	6	8	14	12	13	40	35	39	7	7	7
R-squared	0.326	0.494	0.298	0.595	0.706	0.294	0.321	0.582	0.312	0.307	0.488	0.287	0.649	0.676	0.397

Notes: T-stats reported in italics and standard errors clustered by bank. Explanatory variables lagged by one quarter, except for interest rates (lagged by one month). Corporate deposits refer to deposits from non-financial corporations. SIFI are systemically important financial institutions. Leverage is defined as equity as a percentage of total assets. After is equal to 1 after subsidiaries are converted to branches. ROA computed as net profits as a percentage of total assets and net interest margin computed as percentage 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%.

branches with others that were operating as subsidiaries to start with and did not change their legal status during the same time period. This is the closest matching possible between treatment and control groups. Even though the sample is now much smaller, relying on only 6 to 8 banks, we still find similar results. Depositors move more of their savings to foreign banks that change their status than to those that continue to operate as subsidiaries and thus continue being insured by the domestic deposit insurance arrangement.

For completeness, we compare foreign subsidiaries that become branches with other branches of foreign banks operating in the country (Columns 7–9). A potential drawback of this exercise is that not all of the branches in the control group are held by banking groups with headquarters in the top-rated countries of the euro area. In fact, some of them are branches of banks whose home country was also strongly affected by the euro area sovereign debt crisis, namely Spanish banks. Nonetheless, it is reassuring to see that newly converted branches enjoy an inflow of deposits. The additional inflow may be due to the awareness of the change in the status of the subsidiaries that became branches.

Another potential concern with our findings is that the subsidiaries that became branches are small. Thus, it might seem unreasonable to compare the evolution of deposits at these institutions to that at large banks. For once, depositors may believe the largest banks are too-big-to fail and assume their deposits would be safe regardless of what happens to the bank (Iyer et al., 2019). Indeed, when one of the largest banks failed after our sample period, uninsured depositors were spared from losses, unlike what happened to other more junior debtholders (Beck et al., 2021). Also, one of the largest banks operating in Portugal at the time was a foreign subsidiary, which might confound the effects.[8] To reduce concerns about the presence of large banks in our control group, in Columns (10)-(12) we report the results after we exclude the five largest banks from the control group. Our findings on deposits associated with the conversion of foreign subsidiaries into branches continue to hold.

Finally, in Columns (13)-(15) we adopt the opposite approach and compare the evolution of deposits in the subsidiaries that became branches with deposits in those five largest banks. We still find a robust effect on the reaction of depositors who showed a preference for the new branches even over the banks that are likely perceived to be too-big-to fail. This further supports the argument that our results are driven by concerns that Portuguese depositors had about the credibility of the domestic deposit insurance arrangement. Given that the large banks would be bailed out by the same sovereign that backs up the deposit insurance fund, our results suggest that depositors still have a preference for banks that offer deposit insurance backed by countries immune to the sovereign debt crisis.

4. Depositors' response to the credibility of deposit insurance in an episode of heightened uncertainty

In the Spring of 2013, there was an event that challenged the credibility of deposit insurance in Europe, creating ample uncertainty. On March 16, 2013 the IMF and the European authorities agreed on a bailout package for Cyprus, following a request for financial assistance. One of the conditions defined in that package implied losses on *all* bank deposits, including those that were insured by the Cypriot deposit guarantee scheme (Brown et al., 2016). More precisely, deposits above 100,000 euros would be subject to a haircut of 9.9%, while deposits below that threshold, which were in theory fully insured, would face a loss of 6.7%. That announcement affected the credibility not only of the Cypriot deposit insurance arrangement, but also the credibility of deposit insurance arrangements in the European countries under distress.[9] Uncertainty peaked after that announcement, most notably after the former Eurogroup Chairman Jeroen Dijsselbloem stated that this could be the template to handle future banking crises in Europe.[10] Given the dramatic shock waves that the announcement triggered throughout Europe, the decision was reversed nine days later (March 25).

Notwithstanding that reversal, the episode might have had an impact on depositors, in particular those in countries like Portugal, which were most impacted by the sovereign debt crisis, by affecting their trust on the insurance provided by their home country arrangement. This is the hypothesis we investigate in this section. Crucially for this exercise, the direct links between 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 spillovers coming from the bailout package granted to Cyprus.

We examine if the shock waves of the (temporary) change in deposit insurance rules in Cyprus reached Portugal, affecting the trust of Portuguese depositors, focusing on foreign banks. We build upon the results documented in Section 3 and examine explicitly the behavior of depositors toward the banks that had changed their status to branches. We estimate the following equation:

$$y_{it} = \alpha_i + \alpha_t + \beta_1 Cyprus_t \times Banktype_{it} + \gamma X_{it-3} + \delta r_{it-1} + \varepsilon_{it} \quad (2)$$

where $Banktype_{it}$ refers to the legal status and ownership of the bank (foreign branch, foreign subsidiary, or domestic bank). Instead of focusing on what happens after subsidiaries become branches, as in equation 1, here we focus on what happens after the Cypriot bailout ($Cyprus_t$ is a dummy variable that takes the value 1 in March and April 2013).

The first set of results of this exercise are reported in Table 5, Columns (1)-(3). Across the board, we cannot find meaningful reactions of depositors after the increase in uncertainty around the insurance provided by European deposit insurance arrangements. We only find negative, statistically significant coefficients for corporate deposits, when it comes to subsidiaries and domestic banks, but not for branches. This result indicates that corporations were less worried about the protection of their deposits in foreign branches following the news from the Cyprus bailout, possibly because they were covered by deposit insurance funds outside of Portugal.

Next, we zoom into the event window. We estimate a similar specification, but in a shorter window, ranging from October 2012 up to August 2013. Within this window, we run the estimation in a dynamic differences-in-differences setting, estimating the coefficient associated with foreign branches for each month before and after the event. March 2013, the month of the bailout announcement, is the omitted period. The results are reported in Fig. 4. Point estimates suggest a decrease in deposits in the months following the announcement. However, they fail to be statistically significant in any of the months after (or before) the event.

[8] This particular subsidiary is not among the subsidiaries that convert into branches.

[9] "The worst-case scenario under a plan with a haircut is that the plan triggers a run on banks not just in Cyprus (that appears to already be happening) but in other vulnerable countries like Spain and Italy as customers worry that the E.U. will try to impose similar conditions there. That would exacerbate an already bad situation as it would increase bank shortfalls; fewer deposits, after all, mean a worse deposit-to-liability ratio." *Washington Post*, March 18, 2013.

[10] "Eurogroup Chairman Jeroen Dijsselbloem caused uproar in financial markets by saying in an interview with Reuters and the Financial Times that the Cyprus solution gave a flavor of how Europe would handle future bank crises, by making banks solve their own problems rather than using European taxpayers money.", Reuters, Q A-What next after Cyprus bailout?, March 26, 2013.

Table 5
The effects on uncertainty on deposit insurance associated with the Cyprus event for foreign banks.

	By type of foreign banks			Separating subsidiaries that became branches		
	Total deposits (1)	Household deposits (2)	Corporate deposits (3)	Total deposits (4)	Household deposits (5)	Corporate deposits (6)
$Cyprus_t$ * $Branch_t$	0.066	0.035	0.142			
	(0.543)	*(0.341)*	*(0.722)*			
$Cyprus_t$ * Branch that had changed status				0.725***	0.540***	1.171***
				(7.460)	*(8.709)*	*(4.429)*
$Cyprus_t$ * Other branches				−0.119	−0.207**	−0.156
				(−1.367)	*(−2.182)*	*(−1.285)*
$Cyprus_t$ * $Subsidiary_t$	−0.002	0.097	−0.234**	−0.019	0.074	−0.262**
	(−0.023)	*(1.170)*	*(−2.285)*	*(−0.190)*	*(0.937)*	*(−2.517)*
$Cyprus_t$ * $Domestic_t$	−0.012	0.036	−0.139***	−0.029	0.011	−0.166***
	(−0.252)	*(0.600)*	*(−2.805)*	*(−0.611)*	*(0.191)*	*(−3.069)*
Non-performing $loans_{t-3}$	0.005***	0.014***	−0.011***	0.005***	0.014***	−0.012***
	(2.973)	*(5.245)*	*(−6.389)*	*(3.035)*	*(5.342)*	*(−6.143)*
$Leverage_{t-3}$	0.008**	0.012***	0.003	0.008**	0.013***	0.003
	(2.189)	*(2.811)*	*(0.588)*	*(2.233)*	*(2.915)*	*(0.637)*
Loan to deposit $ratio_{t-3}$	−0.001***	−0.001	−0.001*	−0.001***	−0.001*	−0.001**
	(−3.154)	*(−1.645)*	*(−1.960)*	*(−3.442)*	*(−1.723)*	*(−2.097)*
ROA_{t-3}	−0.001	0.001	−0.001	−0.002	−0.000	−0.002
	(−0.206)	*(0.193)*	*(−0.127)*	*(−0.329)*	*(−0.045)*	*(−0.362)*
Net interest $margin_{t-3}$	0.001	−0.000	0.002	0.002	0.002	0.004
	(0.124)	*(−0.117)*	*(0.424)*	*(0.409)*	*(0.403)*	*(0.785)*
Liquidity $ratio_{t-3}$	−0.000	−0.000	−0.000	−0.000	−0.000	−0.000
	(−0.929)	*(−0.994)*	*(−0.469)*	*(−0.933)*	*(−0.985)*	*(−0.462)*
Interest $rate_{t-1}$	0.056*	0.074***	0.034	0.056*	0.072***	0.035
	(1.816)	*(2.945)*	*(0.883)*	*(1.804)*	*(2.903)*	*(0.888)*
Log of total $assets_{t-3}$	0.484***	0.306**	0.671***	0.478***	0.306**	0.660***
	(4.090)	*(2.166)*	*(3.455)*	*(4.081)*	*(2.152)*	*(3.433)*
Bank fixed effects	Y	Y	Y	Y	Y	Y
Time fixed effects	Y	Y	Y	Y	Y	Y
Bank*year fixed effects	N	N	N	N	N	N
Dependent variable	Ln	Ln	Ln	Ln	Ln	Ln
Number of observations	1943	1588	1852	1943	1588	1852
Number of banks	45	40	44	45	40	44
R-squared	0.287	0.456	0.263	0.296	0.462	0.278

Notes: T-stats reported in italics and standard errors clustered by bank. Explanatory variables lagged by one quarter, except for interest rates (lagged by one month). Corporate deposits refer to deposits from non-financial corporations. Cyprus is a dummy variable that takes the value 1 in March and April 2013. Leverage is defined as equity as a percentage of total assets. ROA computed as net profits as a percentage of total assets and net interest margin computed as percentage 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%.

To further examine the behavior of depositors in this period, we consider a variant of equation 2 which is closer to the model we considered in Section 3. In Columns (4)-(6) we report the results when we separate branches into two groups: those that had changed their status during the crisis and all of the other foreign branches. The results are now very clear. Following the increase in uncertainty on deposit insurance triggered by the Cyprus announcement, there was an inflow of deposits to banks that had recently become branches. This is true for all segments of the deposit market. Even though from a legal point of view the recently converted branches do not differ from the remaining branches operating in Portugal, the results suggest that depositors were aware that the two banks had their deposits insured in the core of the euro area, where turmoil would be less likely.

In Fig. 5 we report the coefficients associated with branches that used to be subsidiaries estimated with a dynamic specification. We confirm the positive coefficients reported in Columns (4)-(6) of Table 5. However, this only happens for the month immediately after the announcement. As the measures imposing losses on insured depositors were soon reversed and there was communication reaffirming the insurance coverage provided by arrangements in the European Union, depositors did not continue to reallocate their deposits across banks.

We noted above that the reason for depositors' reaction to news that followed the Cyprus bailout, which was concentrated in the branches that had recently changed their status, could be linked with heightened awareness, given the media coverage that these changes had received. However, there is a second possibility that is worth considering. These two foreign banks had their deposits insured in Germany and Austria, two countries with AAA ratings. There was some heterogeneity in the nationality of branches operating in Portugal at the time. While some of the branches were from parent banks headquartered in countries with high ratings, there were others with deposits insured in countries heavily affected by the euro area sovereign debt crisis (notably Spain). To investigate whether this difference matters, in Table 6 we report the results when we control for the home country of the branches operating in Portugal. Specifically, we split the branches that did not change their status between those from parent banks in GIIPS countries and elsewhere. The results confirm that deposits increased in the branches that changed their legal status. Deposits in branches from GIIPS countries decreased, as we would expect, and there was also some decrease of deposits in branches from non-GIIPS countries, in the case of household deposits. These results, therefore, give support to the idea that depositors' awareness about the change in branches' legal status played a role in their decision to relocate their deposits into these branches.

In conclusion, the results we unveiled in this section show that Portuguese depositors responded to the uncertainty on deposit insurance coverage following the events in Cyprus. Importantly, their

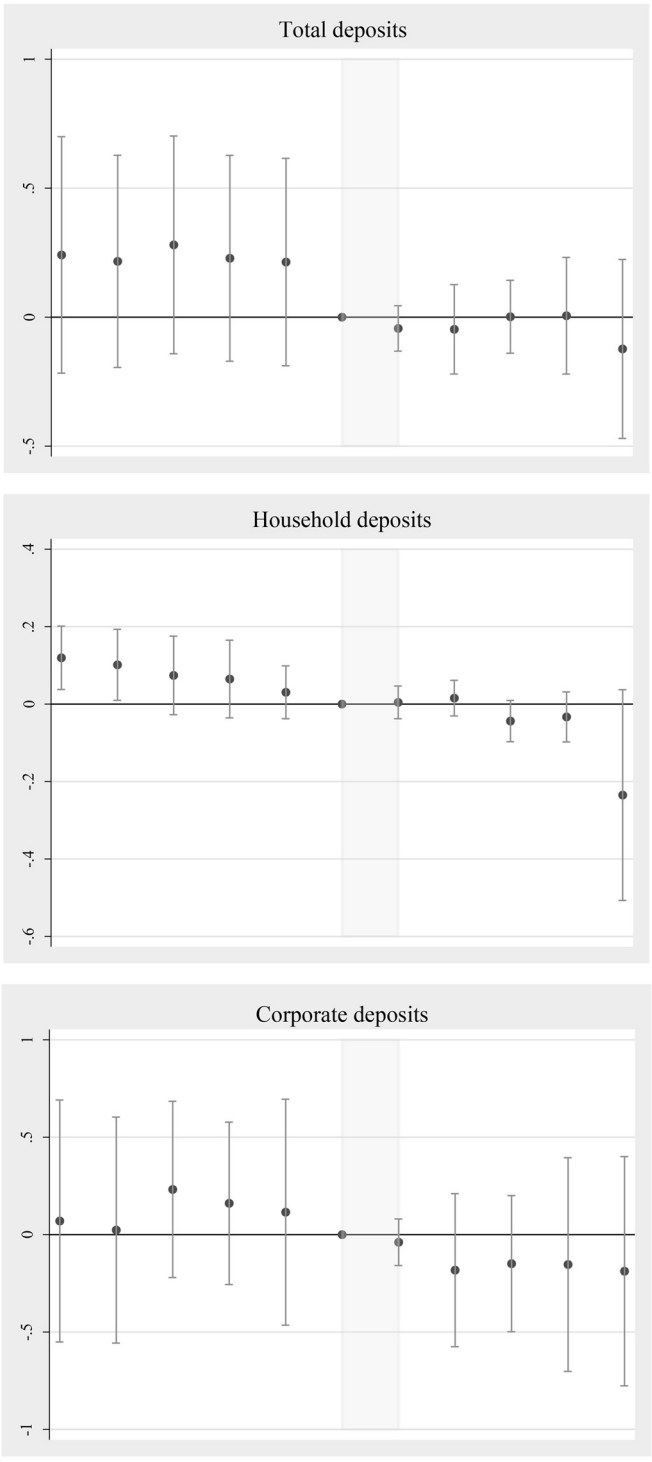

Fig. 4. Change of branches' deposits around the Cyprus event
Note: Each dot corresponds to the point estimate of Equation 3 for branches, in a dynamic setting. The omitted period is March 2013, when the bailout of Cyprus was announced. The estimation period is October 2012-August2013. Confidence intervals at 95% confidence level.

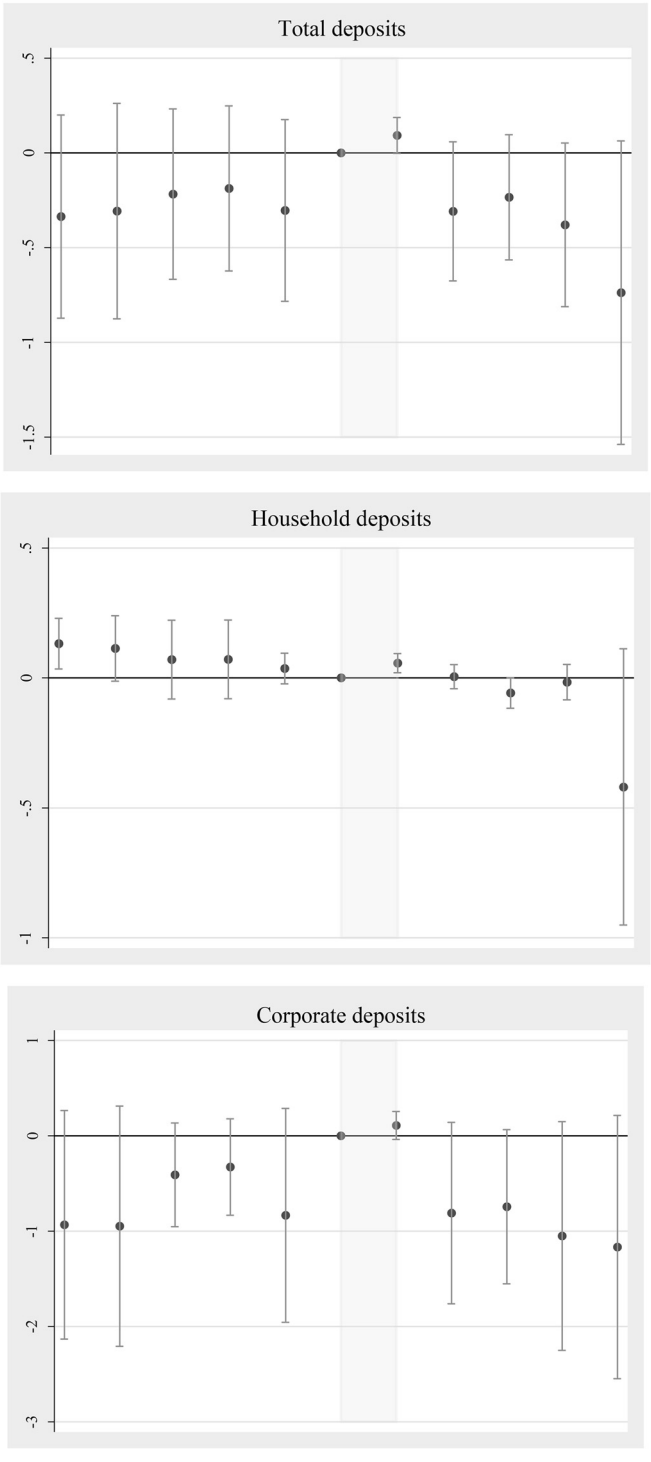

Fig. 5. Change of deposits around the Cyprus event, for branches that had changed status
Note: Each dot corresponds to the point estimate of Equation 3 for branches that used to be subsidiaries, in a dynamic setting. The omitted period is March 2013, when the bailout of Cyprus was announced. The estimation period is October 2012-August2013. Confidence intervals at 95% confidence level.

response was in line with the findings we unveiled in the previous section on depositors' reaction to foreign subsidiaries' conversion into branches. On both occasions, depositors' responses are consistent with them seeking more certainty on the insurance coverage for their deposits, adding support to the thesis that the credibility of the deposit insurance arrangement is critical for its stabilizing role of the banking system.

5. Final remarks

Deposit insurance is a widely recognized effective mechanism to mitigate the risk of bank runs. However, this effectiveness is likely dependent on the credibility of the deposit insurance arrangement. In this paper, we investigate this hypothesis by explor-

Table 6
The effects on uncertainty on deposit insurance associated with the Cyprus event for foreign banks, by parent's bank country.

	By type of foreign banks		
	Total deposits (1)	Household deposits (2)	Corporate deposits (3)
$Cyprus_t$ * Branch from GIIPS	−0.212**	−0.227*	−0.196
	(−2.333)	*(−1.972)*	*(−1.402)*
$Cyprus_t$ * Branch not from GIIPS	−0.048	−0.171**	−0.126
	(−0.454)	*(−2.420)*	*(−0.852)*
$Cyprus_t$ * Branch that had changed status	0.602***	0.332***	1.013***
	(8.243)	*(3.548)*	*(4.231)*
$Cyprus_t$ * $Subsidiary_t$	−0.034	0.010	−0.169***
	(−0.734)	*(0.166)*	*(−3.203)*
$Cyprus_t$ * $Domestic_t$	−0.023	0.073	−0.264**
	(−0.238)	*(0.915)*	*(−2.558)*
Non-performing $loans_{t-3}$	0.005***	0.014***	−0.012***
	(3.065)	*(5.342)*	*(−6.140)*
$Leverage_{t-3}$	0.008**	0.013***	0.003
	(2.238)	*(2.919)*	*(0.639)*
Loan to deposit $ratio_{t-3}$	−0.001***	−0.001*	−0.001**
	(−3.438)	*(−1.721)*	*(−2.095)*
ROA_{t-3}	−0.002	−0.000	−0.002
	(−0.357)	*(−0.055)*	*(−0.374)*
Net interest $margin_{t-3}$	0.002	0.002	0.005
	(0.554)	*(0.422)*	*(0.864)*
Liquidity $ratio_{t-3}$	−0.000	−0.000	−0.000
	(−0.916)	*(−0.985)*	*(−0.459)*
Interest $rate_{t-1}$	0.056*	0.072***	0.035
	(1.801)	*(2.902)*	*(0.887)*
Log of total $assets_{t-3}$	0.479***	0.306**	0.661***
	(4.065)	*(2.152)*	*(3.424)*
Bank fixed effects	Y	Y	Y
Time fixed effects	Y	Y	Y
Bank*year fixed effects	N	N	N
Dependent variable	Ln	Ln	Ln
Number of observations	1943	1588	1852
Number of banks	45	40	44
R-squared	0.296	0.462	0.277

Notes: T-stats reported in italics and standard errors clustered by bank. Explanatory variables lagged by one quarter, except for interest rates (lagged by one month). Cyprus is a dummy variable that takes the value 1 in March and April 2013. GIIPS refer to Greece, Ireland, Italy, Portugal, and Spain. 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 percentage of total assets and net interest margin computed as percentage 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%.

ing the decision by some foreign banks operating in Portugal to convert their subsidiaries into branches and in the process offer the insurance protection of their home countries instead of that granted by the Portuguese insurance arrangement. Importantly, the converted branches belong to banks from countries with the highest credit ratings and occurred during a profound and lasting crisis.

Our results show that when foreign banks converted their subsidiaries there was a significant deposit inflow into the newly formed branches, even though these banks offered substantially lower interest rates. This inflow further increased following the Cyprus financial crisis and the news that the bailout package contained a condition imposing losses on all bank deposits, including those that were insured by the Cypriot deposit guarantee scheme. These findings suggest that the credibility of the deposit insurance arrangement is important for the protection it offers banks against depositor runs. The fact that households reacted more to the events adds support to this assertion. In contrast to corporate deposits, almost all of the household deposits in Portugal fall under the limit covered by deposit insurance and are thus exposed to any changes in the protection afforded by the deposit insurance arrangement. Although there is evidence that the existence of deposit insurance mitigates depositors' monitoring incentives, our results suggest that in periods of heightened uncertainty about the credibility of deposit insurance, depositors respond by moving their deposits to banks whose sovereigns offer them greater protection.

Our findings have relevant policy implications. They show that at the EU level, notwithstanding the harmonization in deposit insurance rules, without a complete Banking Union and a common fiscal backstop, deposit insurance combined with sovereign indebtedness makes 'some euros more equal than others' with implications for both the stability and competitiveness of EU members' banking systems. That said, it is unclear whether depositors would still behave the way they did during the euro area sovereign debt crisis in the presence of a complete Banking Union. That could depend on specific design features, as discussed in Jokivuolle and Pennacchi (2019), Carmassi et al. (2020), or Beck et al. (2022). Our findings also confirm the importance of not altering the rules governing deposit insurance arrangements in ways that create uncertainty regarding the protection granted by these arrangements, especially during financial crises.

Finally, to the extent that insurance funds account for only a small fraction of eligible deposits, our findings show the importance of government support for the effectiveness of deposit insurance arrangements. In countries or instances in which this support is weakened, for example by virtue of high levels of sovereign debt or arrangements with ex-post funding, the stabilization role of deposit insurance arrangements will be compromised. For instance, during the failure of SVB in the U.S. in early 2023, all of the SVB deposits were protected, even if most were not insured. This is only possible for governments with enough fiscal capacity to credibly offer such protection. Otherwise, a blanket guarantee

on all bank deposits (or liabilities) may actually sow the seeds of a sovereign-bank doom loop.

Data availability

The data used is confidential. Banco de Portugal can make it available for reproducibility purposes, under conditions that apply to external researchers.

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