

The impact of sovereign debt exposure on bank lending: Evidence from the European debt crisis

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Abstract

This paper identifies the international transmission of tensions in sovereign debt markets to the real economy through the channel of bank lending. We show that while the syndicated loan market recovered in the aftermath of the 2008-09 financial crisis, lending by European banks with sizeable balance sheet exposure to Greek, Irish, Italian, Portuguese, and Spanish (GIIPS) sovereign debt was negatively affected after bond markets became impaired in 2010. We also observe a reallocation away from domestic lending by GIIPS banks whereby their foreign lending contracts relatively less, potentially reflecting superior investment opportunities in non-peripheral EU countries. The overall reduction in lending is not driven by the reduced capacity of domestic sovereigns to support the banking sector, by changes in borrower demand and/or quality, or by other types of shocks that concurrently affect bank balance sheets.

JEL classification: E44, F34, G21, H63.

Keywords: Sovereign debt; bank lending; international transmission

1. Introduction

The sovereign debt crisis which erupted in the euro area in the first half of 2010 has sent ripples through the global banking system and prompted interventions by governments and central banks on a scale comparable to the programs implemented during the financial crisis of 2008-09. The 440 bln. euro-strong European Financial Stability Facility was established by the 27 member states of the EU in May 2010 with a mandate to provide financial assistance to euro area states. The European Central Bank has implemented a series of non-standard monetary policy measures, such as long-term liquidity provisions up to 3-years, enlargement of the collateral set to be used in refinancing operations, direct intervention in the secondary market for government bonds with the Security Markets Program, and more recently the announcement of the Outright Monetary Transactions Program. The objective of the latter interventions has been to help restore the transmission of monetary policy damaged by the balance sheet shocks exerted on the European banking sector by the deteriorating fiscal position of a number of euro area governments.

Despite the scale of the euro area sovereign debt crisis, there has been no comprehensive analysis so far of the impact that tensions in government bond markets have had on credit supply. We go to the heart of this question by examining the impact of exposure to impaired foreign government debt on lending by banks active in the syndicated loan market. For a sample of 59 banks, domiciled in 16 European countries, for which data on exact exposures to GIIPS¹ sovereign debt are available, we analyse the effect of the deteriorating value of this exposure on the volume of loans extended, as well as on the composition of their loan portfolio in terms of domestic vs. foreign lending. In

¹ Throughout the paper, we use the abbreviation GIIPS to denote Greece, Ireland, Italy, Portugal, and Spain.

the process, we make sure that our tests are not contaminated by changes in borrower demand and/or quality, by other types of shocks to bank balance sheets, or by time-invariant bank characteristics. In order to pin down the effect of balance sheet exposure to foreign sovereign debt, we also control for changes in the capacity of the bank's own sovereign to support the domestic banking sector.

Banks hold a large amount of government debt securities on their balance sheet, importantly because the Basel Accords assigns a 0% risk weight to government bonds. Banks in general have a strong home bias in their portfolios and bank holdings of domestic government bonds as a percentage of bank capital tend to be larger in countries with high public debt. However, banks also hold sizeable amounts of debt issued by foreign sovereigns. BIS data suggest that banks' exposure to the public sector in all foreign countries ranges from 75% of Tier 1 capital for Italian and German banks to over 200% for Swiss and Belgian banks (BIS 2011). This also includes exposure to the GIIPS. Therefore the European sovereign debt crisis provides for an ideal experiment to examine how exposures to foreign sovereign debt impact bank lending, both domestically as well as across borders.

In theory, one can distinguish two channels through which exposure to foreign sovereign debt can have an impact on bank lending. First, losses on sovereign debt have a direct negative effect on the asset side of the bank's balance sheet and on the profitability of the bank. This weakening of the bank's balance sheet increases its riskiness, with adverse effects on the cost and availability of funding. Second, sovereign debt is often used by banks as collateral to secure wholesale funding. Increases in sovereign risk therefore reduce the availability or eligibility of collateral, and hence banks' funding capacity.² If higher bank funding costs translate into a reduction in the provision of loans,

² In addition, higher sovereign risk raises concerns about bank exposures. It drives up counterparty risk and leads to higher funding costs of banks. For example in the wake of the European sovereign debt crisis market counterparties (particularly US money market mutual funds) became concerned about the risk of lending to banks with significant exposures to sovereigns facing fiscal and growth pressures. This led to a sharp retraction of money market mutual funds' exposure to European banks (IMF 2010).

one should find a negative relationship between the riskiness of foreign sovereign debt and credit supply by banks.

Figure 1 provides a first indication that this is the case. It plots the evolution of total syndicated lending by 59 European banks over the period 2009:Q1 to 2012:Q2.³ Based on their asset-weighted exposure to (foreign) GIIPS debt we split the banks in two groups, “non-affected” (below median) and “affected” (above median). Up until 2010:Q2, there were no significant differences in the volume and rate of change of syndicated lending by both groups. After the Greek government secured a 110 bln. euro bailout loan from the EU and the IMF in 2010,⁴ lending by European banks exposed to GIIPS sovereign debt has been substantially lower than lending by European banks not exposed to GIIPS sovereign debt; for instance, in 2011:Q4, the latter group of banks distributed almost 53% more in syndicated lending than the former (84.2 bln. euro vs. 55.1 bln. Euro).

Our empirical analysis confirms that there is a direct link between deteriorating foreign sovereign creditworthiness and lending by banks holding this debt on their balance sheet. When using our preferred econometric specification, we find that a doubling of the bank’s risk-weighted exposure to GIIPS debt reduces total lending by a bank exposed to this debt by 17.6%. This is true when controlling for both time-varying bank characteristics and for bank fixed effects, as well as after including borrower country-quarter fixed effects which control for unobservable changes in borrower demand and/or quality. This effect is qualitatively unchanged when we exclude GIIPS banks, when we exclude lending to non-European customers, or when we exclude bank-borrower pairs with little overall lending activity. The effects survives after we control

³ The large drop in lending in 2012 is partially due to the fact that it can take up to half a year after loan signing before a loan is included in Dealogic Loan Analytics, our source of information for syndicated loans.

⁴ This was followed by a 85 bln. euro rescue package for Ireland and by a 78 bln. euro rescue package for Portugal in May 2011. For a timeline of the euro area sovereign debt crisis, see Appendix Table 1.

for the impact of a deterioration of the fiscal health of the bank's own sovereign, which on its own also leads to a decline in lending.

We also find evidence of a foreign-bias, especially in the GIIPS segment of banks, whereby lenders seem to have rebalanced their portfolios by reducing domestic lending relatively more than foreign lending in response to foreign sovereign-originated shocks to their balance sheets. While we do not aim to explain this last fact, one possible explanation is that growth and profit opportunities are considerably higher in countries that have not requested a bail-out from the IMF and the EU.

Our results are consistent with the existence of an international transmission of financial market shocks through the balance sheets of multinational banks. It therefore adds to the literature that has shown that banks transmit negative shocks to their capital both domestically (Kashyap and Stein, 2000) as well as across borders (Peek and Rosengren, 2000; Cetorelli and Goldberg, 2011; De Haas and Van Horen, 2012a; Giannetti and Laeven, 2012a; Popov and Udell, 2012; Schnabl, 2012). We add to this literature by studying a channel of transmission that, to the best of our knowledge, has not been examined so far: the impact of exposure to impaired government debt on overall bank lending. Our results show that there exists a clear link between the supply of credit to (domestic and foreign) corporates and foreign sovereign debt problems. This shows that the European sovereign crisis has important cross-border implications for the real economy through the bank lending channel.

Second, our paper adds to the rapidly emerging literature on the linkages between sovereigns and banks, especially with respect to the propagation of the European sovereign debt crisis. Angeloni and Wolff (2012) find, for example, that European banks' stock market performance in the period July to October 2011 was impacted by Greek debt holding and in October to December 2011 by Italian and Irish sovereign exposures. In addition, Arezki, Candelon, and Sy (2011) show that news on sovereign ratings affected bank stock prices in Europe during the period 2007 and 2010. They also find that rating downgrades near speculative grade have significant spillover effects across

countries. Using a larger sample of countries and longer time period, Correa, Lee, Sapriza and Suarez (2012) find that sovereign rating changes impact bank stock returns, especially in the case of downgrades. Furthermore, studying correlations in changes in CDS spreads of European sovereigns and banks, De Bruyckere, Gerhardt, Schepens and Vander Vennet find evidence of significant spillovers during the European sovereign debt crisis. Several other papers examine how a deterioration of the fiscal position of the own sovereign affects banks. Brown and Dinc (2011) provide evidence that a country's ability to support its financial sector, as reflected in its public deficit, affects its treatment of distressed banks. Demirguc-Kunt and Huizinga (2010) find that in 2008 systemically large banks saw a reduction in their market valuation in countries running a large fiscal deficit as these banks became too big to save. Our paper contributes to this literature by identifying a spillover from foreign-issued sovereign debt to bank credit supply.

The impact of a deterioration of sovereign creditworthiness on the availability of credit has been addressed by the literature that studies sovereign debt crises. This literature, however, focuses mostly on the impact of a sovereign debt crisis on sovereign borrowing (see, Eichengreen and Lindert 1989; Ozler 1993; Gelos, Sahay and Sandleris 2004; Tomz and Wright 2005). To our knowledge only the paper of Arteta and Hale (2008) studies the effects of a sovereign debt crisis on the supply of (in their case foreign) credit to the private sector. Looking at foreign bond and syndicated loan data, they find that sovereign debt crises in emerging markets lead to a decline in foreign credit to domestic private firms, both during debt renegotiations and in the period after restructuring agreements are reached. Our paper complements and expands their analysis in several ways. First, we study the cross-border spillovers associated with the euro area sovereign debt crisis. This allows us to study the impact of *foreign* sovereign debt problems rather than of *own* sovereign debt problems, which is the focus of Arteta and Hale (2008). Furthermore, our focus lies on how banks adjust their credit supply when faced with sovereign debt problems, while Arteta and Hale (2008) directly study the changes in borrowing between different types of firms (e.g., financial / non-financial;

exporting / non-exporting). This constitutes a large methodological difference as our approach allows us to disentangle demand from supply shocks.

Finally, our work adds to the emerging literature that uses syndicated loan data to explore the impact of financial crises on bank behaviour. Focusing on domestic lending in the United States, Ivashina and Scharfstein (2010), Santos (2011) and Santos and Bord (2012) show that the global financial crisis led to a sharp drop in loan supply, an increase in spreads, and a higher cost of liquidity for corporates. De Haas and Van Horen (2012a) and Giannetti and Laeven (2012a) show that funding constraints forces banks to reduce cross-border lending. Furthermore, Giannetti and Laeven (2012b) find that while international active banks sharply reduce their lending abroad during a financial crisis, they increase the proportion of new credit to borrowers at home, a flight-home effect. Complementing this finding, De Haas and Van Horen (2012b) show that during the global financial crisis international banks reallocated their foreign portfolio towards markets that are geographically close, where they had more lending experience, where they operated a subsidiary and where they were integrated in a network of domestic co-lenders. We add to this literature by using the euro area sovereign debt crisis as a trigger event to examine how banks adjust their syndicated lending in response to tensions in government bond markets.

The rest of the paper is organized as follows. Section 2 introduces the empirical strategy. Section 3 describes the data. Section 4 reports the main results as well as several extensions and robustness tests. Section 5 concludes with the main messages of the paper.

2. Empirical methodology

When foreign sovereign debt is downgraded, banks holding such debt experience a fall in their Tier 1 capital ratio brought about by an increase in the risk weight of the bank's assets. This weakens their balances sheet and reduces profitability. Furthermore, the eligibility of this debt to use as collateral to secure wholesale funding will diminish.

Both factors affect the bank's funding capacity and therefore likely their ability and willingness to extend credit.

The goal of this paper is to explore whether indeed tensions in government bond markets affect lending of banks exposed to this foreign sovereign debt. To that end, we model the volume of syndicated loans issued by bank i to borrowers in country j during quarter t as follows:

$$\text{Log}(\text{Lending}_{ijt}) = \beta_1 \text{Log}(\text{GIIPS Exposure}_{it}) + \beta_2 X_{it} + \beta_3 \phi_i + \beta_4 \phi_{jt} + \varepsilon_{ijt}, \quad (1)$$

where $\text{GIIPS Exposure}_{it}$ is a measure of the degree to which bank i is exposed to GIIPS sovereign debt during quarter t ; X_{it} is a vector of bank-level control variables; ϕ_i is a bank fixed effect; ϕ_{jt} is a matrix of interactions of borrower country fixed effects and quarter fixed effects; and ε_{ijt} is an error term.

Our coefficient of interest is β_1 and it measures the elasticity of bank lending to bank exposure to impaired debt. A negative coefficient β_1 implies that all else equal, an increase in the riskiness of the bank's holdings of foreign sovereign debt is associated with a decline in lending. The numerical estimate of β_1 captures the percentage change in lending by bank i to borrowers in country j during quarter t in response to a percentage change in the riskiness of the bank's holdings of impaired sovereign debt in that period.

The vector of bank-level controls X_{it} allows us to capture the independent impact of various bank-level developments, such as losses on the bank's loan portfolio or changes in bank size. In our preferred specification we also include bank fixed effects and borrower country-quarter fixed effects. By including bank fixed effects, we address the possibility that both the amount of loans extended and the bank's holdings of impaired foreign sovereign debt are driven by a time-invariant bank-specific unobservable factor, such as managerial risk appetite. Finally, by including the interaction of borrower country fixed effects and quarter fixed effects we aim at

alleviating concerns that our results might be driven by time-varying differences in the demand for syndicated loans. In alternative specifications, we also employ less rich sets of fixed effects: only quarter fixed effects (to control for time-specific changes in the syndicated loan market due to changing conditions in the global economy), only borrower country fixed effects (to control for time-invariant differences in the demand for syndicated loans), or both. The empirical estimates are economically and statistically robust to various such combinations. Finally, since banks' portfolio allocation exhibits geographical specialization and is therefore correlated over time, we cluster the standard errors at the bank level.

In extensions (described in more detail in Section 4), we adapt our model to account for the impact of the deterioration of the creditworthiness of the bank's own sovereign and to study whether sovereign stress leads banks to rebalance their portfolio in favour of domestic borrowers or not.

3. Data and descriptive statistics

Our identification strategy is built on exploiting differences between banks and within banks over time with respect to their exposure to impaired foreign GIIPS debt. An analysis like this needs to be based on high-frequency bank-level data, and syndicated loan data are particularly well-suited for this purpose for several reasons. First, syndicated loans (loans provided by a group of financial institutions - mostly banks - to a corporate borrower) are publicly registered, and so information on the universe of loans is readily available, limiting sample selection concerns. Second, syndicated lending has been an important source of external finance to corporates since the 1980s, and so information is available for an extended period of time. Third, borrowers from many countries are borrowing on this market from a large number of financial institutions. As such, the dataset provides us with information on lending by a large number of banks to a large number of countries. This characteristic is crucial for two reasons. First, it allows us to exploit differences between banks (and within banks over time) with respect to the exposure to impaired GIIPS debt. Second, as our goal is to identify a credit supply

channel it is important to be able to control for changes in credit demand and borrower quality. Given that in the syndicated loan market multiple banks lend to the same country, we can use (time-varying) borrower-country fixed effects to control for this. This technique for isolating credit supply was first introduced by Khwaja and Mian (2008) and is now often applied in these types of studies (e.g., Cetorelli and Goldberg, 2011; De Haas and Van Horen, 2012a,b; Schnabl, 2012). Finally, given that a syndicate can consist of both domestic and foreign members, the data are ideally suited to explore both the domestic and the cross-border lending implications of exposure to foreign sovereign debt.

We start off by identifying a group of banks that are both active in the market for syndicated loans and for which information on their exposure to GIIPS sovereign debt is available. To this end we first identify all European banks active in the syndicated loan market over the period January 2009 – July 2012. This list includes 119 banks. Next we cross-check this list with the banks included in the stress test conducted by the European Banking Authority (EBA). Since 2010, the EBA conducts annual stress tests on large European banking groups and publishes this information, including their exposure to GIIPS sovereign debt. This leaves us with a group of 59 European banks. Given that the stress tests are conducted on large European banking groups, the 59 banks in our dataset are representative for syndicated lending provided by European banks. In total they are responsible for over 85% of the syndicated lending issued by the 119 banks in our initial sample.

Our data source for syndicated loans is the Dealogic Loan Analytics database, which contains comprehensive information on virtually all syndicated loans since the 1980s. We download all syndicated loans extended to private borrowers worldwide, focusing on the period from January 2009 to July 2012. Our unit of observation is the volume of syndicated loans issued by bank i to borrowers in country j during quarter t . To this end, we split each loan into the portions provided by the different syndicate members. Loan Analytics provides only exact loan breakdown among the syndicate members for about 25% of all loans. Therefore, we use a procedure similar to the one applied by De Haas and Van Horen (2012a,b) and divide the loan equally among the syndicate members. In

total we split 8,108 syndicated loans in which at least one bank in our sample was active into 35,295 loan portions provided by our sample of banks.

We then use these loan portions to construct our main dependent variable *Lending*. For each bank in our sample, we compute the total amount of loans that the bank issued during each quarter to a particular country. Our dependent variable is the log of this quarterly loan flow. As is common in this literature, we attribute to each bank (including subsidiaries) the nationality of its parent bank (see, e.g., Mian, 2006; Giannetti and Laeven, 2012b).⁵ We exclude bank-country pairs between which no lending took place over the sample period.

In total our group of 59 banks issue loans to corporates in 156 different countries (both advanced economies and emerging markets). The variation across lending banks and borrowing countries is quite large. There are 8,129 non-zero bank-borrower country-quarter observations (19% of the total). Average quarterly bank-country lending is 35 mln. euro with a standard deviation of 173 mln. Euro. All banks in our sample lend to domestic firms, and banks lend on average to 53 foreign countries during the full sample period. The vast majority of lending is within Western Europe (72%) and of this 23% to the GIIPS countries.

[INSERT TABLE 1 HERE]

Our objective is to study the impact of exposure to foreign sovereign debt on bank lending. In order to do this we create a time varying variable capturing the degree to which bank i is exposed to GIIPS sovereign debt during quarter t . The variable *GIIPS Exposure* is calculated using data from the EBA on each individual bank's holdings of GIIPS debt securities as of December 31, 2010, normalised by the bank's total assets as of December 31, 2010. We specifically want to account for the fact that

⁵ Note that only about 6% of all loan portions are provided by subsidiaries.

changes in underlying sovereign risk affect a bank's holdings of sovereign debt securities through the prices investors are willing to pay for insuring this risk. Therefore we weigh, for each quarter, the holdings by bank i 's debt securities of each individual foreign GIIPS country by the CDS spread of that country's sovereign debt at the end of each quarter. In particular,

$$GIIPS \text{ Exposure}_{it} = \sum_k \frac{Debt \text{ Securities}_{ikt} \times CDS_{kt}}{Total \text{ Assets}_{it}},$$

where

$$k \in \{Greece, Ireland, Italy, Portugal, Spain\}$$

For banks domiciled in a GIIPS country, we net out their exposure to their *own* sovereign and only look at the *foreign* component of GIIPS exposure. Because the relationship between *Lending* and *GIIPS Exposure* may be concave, we use the natural logarithm of both variables.

In order to capture changes over time at the bank level we include a number of time-varying bank characteristics. To this end, we link our banks to Bureau van Dijk's BankScope database. We include as bank characteristics the total assets of the bank (*Size*) to capture changes in bank size, and three variables that capture (changes in) bank health that may be unrelated to sovereign stress: the Tier 1 capital ratio (*Tier 1*), the share of impaired loans to total assets (*Impaired loans*), and net income of the bank normalized by total assets (*Net income*). All bank-level variables are measured end of year prior to loan signing. Table 1 describes the main variables we use in our empirical analysis.

Appendix Table 2 provides a list of all banks in our sample. It shows each bank's country of incorporation and the total lending volume of the bank (domestic and foreign) over the sample period. In addition it provides the highest and lowest level of *GIIPS Exposure* over the sample period.

4. Empirical evidence

In this section we present the evidence. We start by presenting the results of Model (1). We then present the estimates from a number of alternative tests in which we account for the impact of deterioration of the creditworthiness of the bank's own sovereign. Finally, we study whether sovereign stress leads banks to rebalance their portfolio in favour of domestic borrowers or not.

4.1. Main results

The main results of the paper are reported in Table 2. The estimates from Model (1) demonstrate that bank exposure to impaired foreign sovereign debt has a negative impact on bank lending. The effect is statistically significant (at the 1% level) and economically significant too. Based on the estimates in column (1), syndicated lending declines by 13.1% in response to a doubling of the bank's risk-weighted exposure to GIIPS debt. This is economically sizeable given that in the year between 2011:Q2 and 2012:Q2, during which period total syndicated lending by non-PIIGS banks more than halved (from 129.5 bln. euro to 58.5 bln. euro), our *GIIPS Exposure* measure almost tripled on average, from 2.7 to 8.7.⁶ Because the specification includes bank fixed effects, quarter fixed effects, and borrower country fixed effects, it is unlikely that our results are driven by unobservable time-invariant bank heterogeneity, by global changes in the syndicated loan market, or by differences in borrower demand and/or quality.

[INSERT TABLE 2 HERE]

The effect is robust when we use alternative econometric specifications. In particular, lending is bounded from below at 0, and 81.5% of all bank-borrower country-quarter observations during the 2009-2012 sample period correspond to zero lending.

⁶ Note that in reality this drop in lending volume is in reality less severe as at the time of downloading the data not all loans signed in 2012:Q2 were already included in Dealogic Loan Analytics.

Throughout the paper we estimate the regression model using OLS because of the high number of dummy variables which may create problems with maximum likelihood estimation. Nevertheless, in column (2) we use a Tobit model to take into account that the dependent variable is left-truncated. The estimates continue to be significant at the 1% statistical level.

In column (3), we replace the quarter and borrower country fixed effects with borrower country-quarter fixed effect interactions. This amounts to using a within-borrower country estimator, allowing us to control for time-varying borrower demand and/or quality, and to alleviate concerns that our results so far have captured changes in the demand for loans. The estimates fully confirm our previous results, and in fact, the numerical estimates are higher than those in the tests with a less rich set of fixed effects.

In column (4), we report the estimates from our preferred specification. This time, we not only include bank fixed effects and borrower country-quarter fixed effects, but also bank balance sheet data. This allows us to account for time-varying shocks to the bank's financial health unrelated to its exposure to impaired GIIPS debt. In particular, we include the logarithm of bank assets, the bank's Tier 1 capital ratio, the ratio of impaired loans to total assets, and the ratio of net income to assets. In order to account for the fact that response to accounting variables may not be immediate, we use 1-year lags in the regression. This also allows us to keep the observations from 2012 as Bankscope currently only contains bank data as of end-2011.

Importantly, our estimate of β_1 continues to be negative and significant at the 1% statistical level. The magnitude of the coefficient implies that a doubling of the bank's risk-weighted exposure to GIIPS debt reduces total lending by a bank exposed to this debt by 17.6%. Furthermore, our balance sheet variables largely have the expected sign. For example, banks with lower Tier 1 capital ratio lend less as they may need to rebalance their portfolio away from risky lending (Berger and Udell, 1994; Peek and Rosengren, 1997). Similarly, banks with a higher ratio of impaired loans to total assets lend less. Somewhat surprisingly, bank size (proxied by total bank assets) and lending are

negatively correlated, but one needs to remember that this is after incorporating bank fixed effects.

We now perform a series of robustness tests using our preferred specification. First, we change the starting point of our sample period. Throughout the paper, we focus on the period 2009:Q1-2012:Q2. This data choice is dictated by two considerations. First, 2010 was the first year for which EBA reported individual bank data on exposure to GIIPS sovereign debt. Starting the analysis in 2010 though would give us no pre-crisis control period, for which reason we have included one more year of data under the assumption that individual exposures did not change systematically year-on-year between 2009 and 2010. In order to eliminate the need to rely on such a strong assumption, in column (5) we reduce the sample period to 2010:Q1-2012:Q2. The results remain qualitatively unchanged.⁷

Next, we account for the possibility that our results are driven by unusually large negative shocks to a subset of banks. In particular, the GIIPS banks in the sample are heavily exposed to their own sovereign, and the negative impact of exposure to their own sovereign on lending is likely to be sizeable. If the most domestically-exposed GIIPS banks happen to be heavily exposed to foreign GIIPS sovereign debt as well, then our tests will be capturing the effect of domestic exposure. To address this issue, in column (6) we restrict the sample to the non-GIIPS banks only, reducing the number of banks used in the analysis to 34 from the original 59. We continue to find a strong negative effect of exposure to impaired foreign sovereign debt on bank lending.

One final possible concern is that our results may be driven by banks rebalancing their loan portfolio away from markets that are relatively marginal to their overall activities. We address this concern in two ways. First, we restrict our sample of borrowers to EU customers. Column (7) suggests that even though banks tend to

⁷ The same is true if instead we extend the sample period back to 2008:Q1.

rebalance their portfolios in favour of customers in institutionally and economically similar environment (De Haas and Van Horen, 2012b), it is not this effect that is driving our main results. In column (8), we include only observation from countries in which banks have been engaged in syndicated lending in at least 5 quarters during the 2009:Q1-2012:Q2 period. Our results continue to hold, suggesting that our main finding is not driven by the fact that banks retract mostly from marginal foreign markets.

4.2. Controlling for sovereign debt problems at home

We have so far aimed at identifying one channel through which negative shocks to the sovereign's fiscal position can affect bank lending, namely through the effect of impaired foreign sovereign debt on the strength of the bank's balance sheet. However, at the same time fiscal problems of the bank's own sovereign might have occurred concurrently and affected bank lending negatively. If balance sheet exposure to foreign debt is correlated with the health of the bank's sovereign, for a segment of the banks at least, our identification of the international transmission of foreign sovereign debt problems so far may be contaminated by own sovereign problems.

Banks tend to hold a substantial amount of their own sovereign debt on their balances sheet. Like with a deterioration in foreign sovereign creditworthiness, a deterioration of the creditworthiness of the bank's own sovereign will negatively affect the asset side of the bank's balance sheet, its profitability and its ability to use this debt as a source of collateral, thereby raising funding costs. In addition, however, owing to strong links between sovereigns and banks, sovereign downgrades often lead to downgrades of domestic banks, thereby creating an additional channel through which funding costs can rise.

Besides the impact of an impairment of the fiscal health of the bank's own sovereign on the bank's funding cost it can also impact the willingness of the bank to continue lending through a government support channel, as unsustainable public debt makes it less likely that the bank's own government will intervene to recapitalize the bank if it fails. This could, for example, lead depositors to withdraw their savings even

from solvent banks if they come to doubt the credibility of the country's deposit insurance scheme. This effect is expected to be much stronger for banks which are more likely to be already on the margin in terms of solvency, and especially for banks that are by design subject to implicit too-big-to-fail benefits, such as large banks.

[INSERT TABLE 3 HERE]

In Table 3 we explicitly control for deterioration of the creditworthiness of the bank's own sovereign. We do so by including in the model both our proxy for the bank's exposure to foreign GIIPS debt, *GIIPS Exposure*, and a proxy for the fiscal situation of the sovereign in the country where the bank is domiciled. In practice, we simply add on the right-hand side of Model (1) the variable *Sovereign risk* which equals the log of the CDS spread on government bonds of bank *i*'s at quarter *t*.

Column (1) is the analogue of column (4) in Table 2 (in terms of control variables and combinations of fixed effects) where we have added the measure of own sovereign risk we just discussed. The results suggest that both the deterioration of the creditworthiness of the foreign sovereigns to which the bank is exposed as well as that of its own sovereign independently have a negative effect on bank lending. The estimates from the regression imply that the median increase in own sovereign risk between Q2:2010 & Q2:2012 of 66% is translated into a 13.8% decline in syndicated lending. It is important to note that as this is our preferred specification with bank fixed effects and borrower-quarter fixed effects, this effect is confounded neither by time-invariant unobservable bank characteristics, nor by changes in borrower demand or quality.

Demirguc-Kunt and Huizinga (2010) find evidence for both a too-big-to-fail effect, whereby large banks can increase their valuation by taking on more risk, and for a too-big-to-save effect whereby bank valuation is reduced relatively more for large banks in countries with poor public finances. To examine whether banks of different size react differently to a deterioration of foreign sovereign debt which they hold on their balance sheet or a deterioration of the creditworthiness of their own sovereign, we include in

column (2) interactions of our proxies for foreign sovereign debt exposure and for home country sovereign fiscal stress with bank size. To account for the large heterogeneity in bank size in the sample which remains even after we take the logarithm of total assets, we create a dummy variable equal to 1 if the bank is in the top half of the distribution in terms of assets, and to 0 otherwise. Again we find that both the bank's own exposure to foreign GIIPS debt and the fiscal problems of the bank's own sovereign independently have a negative effect on bank lending. However, we do not find a differential impact between the larger and smaller banks in our sample.

In columns (3) - (6), we split the sample into GIIPS banks and non-GIIPS banks. The results show that bank size does matter in our sample of GIIPS banks. Apparently in countries with very large government deficits and public debt, large banks, while reacting more strongly to a deterioration in the value of their foreign sovereign holding, actually increase lending as their sovereign's situation deteriorates further. While we do not investigate this effect in further detail, this behaviour may be consistent either with a "gambling for resurrection" strategy, or with improved access to liquidity by large banks through various Eurosystem operations such as the Securities Markets Program of the ECB and the Emergency Lending Assistance of National Central Banks.

4.3. Portfolio rebalancing

When banks are hit by shocks to their wealth which induce them to rebalance their loan portfolio, banks are less likely to abandon domestic customers with whom they have stronger lending relationships. While there is strong evidence that banks transmit negative shocks to their capital domestically (Kashyap and Stein, 2000), the evidence also suggests that banks sharply reduce lending to their overseas customers as well (Peek and Rosengren, 1997; Cetorelli and Goldberg, 2011; Popov and Udell, 2012; De Haas and Van Horen, 2012a), and the overall effect oftentimes is a rebalancing of the bank portfolio in favour of domestic customers. For example, Giannetti and Laeven (2012b) show that while syndicated loan origination exhibits "home bias" is a feature of good times as well, this home bias increases by around 20% during a banking crisis.

Our results so far point to a reduction in overall bank lending in response to a balance sheet shock induced by an increase in the underlying risk of a portion of the bank's foreign-originated assets and, in addition, by a decline in the creditworthiness of the bank's own sovereign. We now like to ask if in addition to a reduction in lending, there is also a rebalancing of the bank's portfolio away from certain types of borrowers, such as foreign ones. To test this hypothesis, we adopt the empirical methodology in Giannetti and Laeven (2012b).⁸ In particular, we model the portfolio share of syndicated loans issued by bank i to borrowers in country j during quarter t as follows:

$$\begin{aligned} \text{Loan share}_{ijt} = & \beta_1 \text{Foreign loan}_{ij} + \beta_2 \text{Foreign loan}_{ij} \times \text{Sovereign}_{it} \\ & + \beta_2 X_{it} + \beta_3 \phi_i + \beta_4 \phi_{jt} + \varepsilon_{ijt}, \end{aligned} \quad (2)$$

where Loan share_{ijt} denotes bank i 's share of lending to country j at time t as a share of bank i 's total lending at time t ; Foreign loan_{ij} is a dummy variable equal to 1 if the loan is extended to borrowers in a country different from the one where the bank is domiciled; and Sovereign_{it} denotes the bank's own exposure to foreign GIIPS debt or the fiscal position of the sovereign in the country where the bank is domiciled. We employ the same bank-level controls and the same combination of fixed effects as in Model (1). Once again, the matrix of borrower country-quarter fixed effects controls for changes in borrower demand and quality, and it as such nets out the effect of a shock to a borrower country that is common to all banks lending to this country at a particular point in time. A negative coefficient β_1 implies that there is a home bias in syndicated lending (relative fewer foreign loans) at all times. A negative coefficient β_2 indicates that banks rebalance their portfolios even more in favour of domestic borrowers when hit by a shock to their balance sheet through deterioration of foreign sovereign creditworthiness and/or to the deterioration of their own sovereign's creditworthiness.

⁸ Our methodology differs from the one employed by Giannetti and Laeven (2012b) in the sense that we allocated each loan over all members of the syndicate and not only to the lead arranger(s) as they do.

Unlike specification (1), we do not include our proxy for foreign-induced shocks and our proxy for the fiscal position of the banks own sovereign on their own. The reasons is that the dependent variable in (2) captures the geographic distribution of new loans, unlike the dependent variable in (1) which captures the total amount of new loans in the bank's portfolio. The share of foreign loans in the bank's portfolio in a particular quarter is by default normalised by the bank's supply of loans in this quarter and therefore already controls for the impact of *GIIPS Exposure* and *Sovereign Risk*

The estimates from regression model (2) are reported in Table 4. In column (1), we test for the effect of the bank's balance sheet exposure to foreign GIIPS debt on portfolio reallocation between domestic and foreign borrowers. The coefficient on the variable *Foreign loan* is negative and significant, confirming the finding in Giannetti and Laeven (2012b) that the share of bank *i*'s loans extended to borrowers in country *j* is significantly lower for foreign loans. The coefficient of -0.38 is comparable to their coefficient of -0.51 in the identical specification. However, the coefficient on the interaction term is positive and significant, implying that as markets attach a higher probability of default on a portion of the bank's assets, banks reduce their lending to foreign borrowers relatively *less*.

[INSERT TABLE 4 HERE]

This result is seemingly at odds with the findings in Giannetti and Laeven (2012b) who find that during a banking crisis, banks reduce lending to foreign borrowers relatively more. One possible explanation is in the econometric difference between the country-level shock they use (a dummy equal to 1 for all banks in a country during a banking crisis) and the bank-level shock we use. It is entirely possible that the country's banking sectors experiences a reallocation away from foreign lending, but this is less so for the most affected banks. In column (2), we replace the sovereign shock based on own exposure with a more Giannetti and Laeven (2012b)-like country-wide shock, i.e., the proxy for the sovereign's fiscal health that we used in Table 3. This time, the results are

fully in line with their evidence: the home bias in bank lending increases when the country's banking sector is hit by a shock to its sovereign's support capacity.

In column (3), we juxtapose the bank-level and the country-level sovereign shock, and we confirm that the two shocks are jointly significant and go in opposite direction. Namely, banks reduce foreign lending relatively more when hit with a systemic sovereign shock, but relatively less when hit by a bank-specific shock derived from negative changes in the underlying value of their foreign-originated assets.

We now investigate in more detail the impact of bank nationality and borrower nationality on portfolio reallocation. In columns (4) and (5), we split the sample again in GIIPS banks and non-GIIPS banks. The results imply that the relative increase in foreign lending in response to the bank's exposure to foreign sovereign debt is fully due to portfolio reallocation by GIIPS banks. One can hypothesize that faced with a deterioration of the underlying value of their foreign-originated assets in combination with deteriorating growth prospects at home, banks cut their lending at home and redirect it to foreign borrowers of superior quality.

Columns (6) and (7) look at the borrower side of this hypothesis. The sign and the economic magnitude of the estimates imply that GIIPS banks have cut relatively less lending to non-domestic EU customers. To the extent that growth prospects in countries undergoing a severe contraction of the public finances must be suddenly much lower than those in neighbouring countries with sound fiscal balances, the totality of the results in Table 4 may be indicative of a flight-away-from-low-quality effect. In other words, the most impaired (GIIPS) banks are responding to an additional deterioration of the *foreign* (GIIPS) segment of their exposure by cutting lending relatively less to the most credit-worthy (EU) borrowers.

5. Conclusion

The sovereign debt crisis which erupted in the euro area in the first half of 2010 has sent ripples through the global banking system and prompted interventions by

governments and central banks on a scale comparable to the programs implemented during the financial crisis of 2008-09. We examine the impact of exposure to impaired foreign sovereign debt on lending by banks active in the syndicated loan market. For a sample of 59 banks, domiciled in 16 European countries, for which data on exact exposures to GIIPS sovereign debt are available from EBA, we analyse the effect of the deteriorating value of this exposure on the volume of loans extended, as well as on the composition of their loan portfolio in terms of domestic vs. foreign lending.

Our results suggest that foreign sovereign stress can have a sizeable impact on bank lending through the channel of bank funding. We find that a doubling of a bank's risk-weighted exposure to GIIPS debt reduces total lending by the bank with 17.6% when controlling for both time-varying bank characteristics and for bank fixed effects, as well as after including borrower country-quarter fixed effects which control for unobservable changes in borrower demand and/or quality. We also confirm that the effect of changes in foreign sovereign debt risk through balance sheet exposure exists alongside the negative effect of deteriorating fiscal health of the bank's *own* sovereign.

At the same time, we find especially for banks located in GIIPS countries a foreign-bias effect whereby lenders seem to have rebalanced their portfolios by reducing domestic lending relatively more than foreign lending in response to foreign sovereign-debt originated shocks to their balance sheets. While we do not aim to explain this last fact, one possible explanation is that growth and profit opportunities are considerably higher in countries that have not requested a bail-out from the IMF and the EU. Finally, we find evidence for home bias in response to deteriorating finances of the country where the bank is domiciled, whereby banks reduce relatively more domestic lending in response to their own sovereign's problems.

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Figure 1
Impact of foreign sovereign debt exposure on bank lending

This figure shows the evolution of total syndicated lending by 59 European banks over the period 2009:Q1 to 2012:Q2. *Non-affected* contains the group of banks whose asset-weighted exposure to GIIPS debt was below the median level and *Affected* contains the group of banks whose exposure was above the median level.

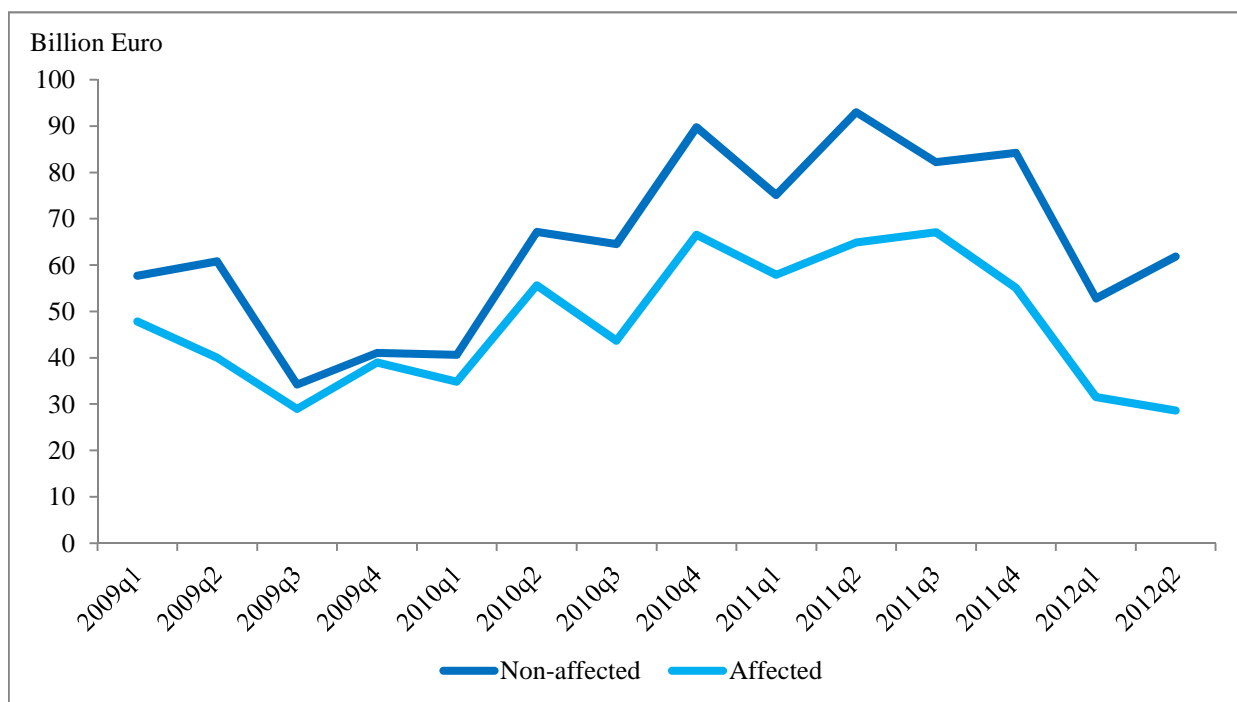


Table 1
Descriptive statistics

This table presents definitions and summary statistics of all variables used in the paper. Sample consists of 43,932 bank-country-quarter observations over the period 2009:Q1-2012:Q2. Syndicated loan variables are computed by the authors using data from Dealogic's Loan Analytics database. *GIIPS Exposure* is computed using information provided by the European Banking Authority on foreign sovereign debt holdings by European banking groups. CDS spreads used to calculate *GIIPS Exposure* and *Sovereign Risk* come from Datastream. Bank-specific variables are computed using BankScope.

Variable name	Unit	Definition	N	Mean	Median	St. dev	Min	Max
<i>Lending</i>	Log	Log of the volume of loans extended by bank <i>i</i> to borrowers in country <i>j</i> at quarter <i>t</i>	43,932	0.82	0.00	1.80	0	8.84
<i>Loan Share</i>	%	Volume of loans extended by bank <i>i</i> to borrowers in country <i>j</i> at quarter <i>t</i> /Total loans issued by bank <i>i</i> at quarter <i>t</i>	43,322	0.02	0.00	0.09	0	1
<i>GIIPS Exposure</i>	Log	Log of the sum of bank <i>i</i> holdings of GIIPS sovereign debt divided by the bank's assets weighted by the CDS spread of that country's sovereign debt at quarter <i>t</i> . For banks domiciled in GIIPS countries holdings of own sovereign debt are not included.	43,932	1.29	1.07	1.04	0	4.61
<i>Sovereign Risk</i>	Log	Log of the CDS spread of bank <i>i</i> 's own sovereign at quarter <i>t</i>	42,518	4.54	4.35	0.91	3.12	9.25
<i>Size</i>	Log	Log of total assets of the bank (one year lagged)	43,156	19.82	19.87	1.11	16.32	21.65
<i>Tier 1</i>	%	The ratio of Tier 1 capital to risk-weighted assets (one year lagged)	41,436	10.14	10.00	2.27	4.30	22.40
<i>Impaired loans</i>	%	Impaired loans divided by total assets (one year lagged)	39,670	2.54	1.66	2.35	0.09	20.37
<i>Net income</i>	%	Net income divided by total assets (one year lagged)	43,156	0.04	0.19	0.96	-13.41	3.44
<i>Large</i>	0/1	Dummy variable that is 1 if the total assets of bank <i>i</i> are larger than the median assets in the sample of banks, zero otherwise	43,932	0.73	1	0.45	0	1
<i>Foreign</i>	0/1	Dummy variable that is 1 if nationality of bank <i>i</i> differs from the nationality of the borrower, zero otherwise	43,932	0.98	1.00	0.14	0	1

Table 2
Transmission of foreign sovereign debt exposure

This table shows the impact of sovereign debt exposure on bank lending. The dependent variable is *Lending*. Table 1 contains definitions of all variables. All regressions include bank fixed effects. In addition, column [1] and [2] include borrower country and quarter fixed effects and column [3]-[8] borrower country X quarter fixed effects. Column [5] shortens the sample period to 2010Q1-2012:Q12. Column [6] only includes banks that are domiciled in non-GIIPS countries. Column [7] only includes European borrowers and column [8] only includes bank-borrower country pairs in which non-zero lending took place in at least five quarters during the sample period. All regressions are estimated using OLS except those in column [2]. All regressions include a constant. All standard errors are clustered by bank. Robust p-values appear in parentheses and ***, **, * correspond to the one, five and ten per cent level of significance, respectively.

	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
	Tobit				Shorter period	Non-GIIPS banks only	European borrowers only	Important markets only
GIIPS Exposure	-0.131*** (0.000)	-0.833*** (0.000)	-0.114*** (0.004)	-0.176*** (0.000)	-0.169*** (0.000)	-0.188*** (0.000)	-0.255*** (0.000)	-0.550*** (0.000)
Size				-0.121** (0.018)	-0.174 (0.140)	-0.050 (0.376)	-0.129 (0.426)	0.047 (0.762)
Tier 1				0.021* (0.088)	0.010 (0.414)	0.013 (0.353)	0.052** (0.026)	0.046 (0.100)
Impaired loans				-0.030** (0.030)	-0.005 (0.641)	-0.055*** (0.004)	-0.052** (0.048)	-0.102** (0.019)
Net income				0.001 (0.974)	0.009 (0.667)	-0.027 (0.388)	0.019 (0.528)	0.036 (0.642)
Bank fe	yes	yes	yes	yes	yes	yes	yes	yes
Quarter fe	yes	yes	no	no	no	no	no	no
Borrower country fe	yes	yes	no	no	no	no	no	no
Borrower country X quarter fe	no	no	yes	yes	yes	yes	yes	yes
No. of observations	43,932	43,932	43,932	39,298	28,230	29,166	9,844	8,658
R2	0.323		0.396	0.402	0.410	0.453	0.406	0.449

Table 3
Sovereign debt problems at home and abroad

This table shows the impact of both sovereign debt problems at home as well as abroad on bank lending. The dependent variable is *Lending*. Table 1 contains definitions of all variables. All regressions include bank fixed effects and borrower country X quarter fixed effects. The full sample of banks is used in the regressions in column [1] and [2]. In column [3] and [4] only banks domiciled in non-GIIPS countries are included and in column [5] and [6] only banks domiciled in GIIPS countries. All regressions are estimated using OLS and include a constant. All standard errors are clustered by. Robust p-values appear in parentheses and ***, **, * correspond to the one, five and ten per cent level of significance, respectively.

	[1]	[2]	[3]	[4]	[5]	[6]
	All banks		Non-GIIPS banks		GIIPS banks	
GIIPS Exposure	-0.106*** (0.000)	-0.118*** (0.000)	-0.102** (0.020)	-0.115* (0.067)	-0.123 (0.123)	-0.110* (0.056)
Sovereign Risk	-0.209*** (0.000)	-0.247*** (0.000)	-0.189** (0.011)	-0.109 (0.299)	-0.318*** (0.000)	-0.304*** (0.001)
GIIPS Exposure * Large		-0.013 (0.785)		0.021 (0.738)		-0.219* (0.070)
Sovereign Risk * Large		0.082 (0.190)		-0.087 (0.345)		0.343*** (0.000)
Size	-0.118* (0.054)	-0.128** (0.039)	-0.074 (0.135)	-0.058 (0.273)	-0.033 (0.945)	-0.134 (0.740)
Tier 1	0.012 (0.334)	0.011 (0.358)	0.012 (0.387)	0.011 (0.390)	-0.027 (0.278)	-0.036* (0.063)
Impaired loans	-0.014 (0.280)	-0.010 (0.417)	-0.052*** (0.002)	-0.054*** (0.001)	0.020 (0.329)	0.028** (0.038)
Net income	-0.020 (0.339)	-0.023 (0.268)	-0.013 (0.684)	-0.014 (0.650)	0.032 (0.268)	0.039* (0.082)
Bank fe	yes	yes	yes	yes	yes	yes
Borrower country X quarter fe	yes	yes	yes	yes	yes	yes
No. of observations	38,276	38,276	28,144	28,144	10,132	10,132
R2	0.406	0.406	0.458	0.458	0.421	0.421

Table 4
Portfolio reallocation

This table shows the impact of both sovereign debt problems at home as well as abroad on bank lending. The dependent variable is *Loan Share*. Table 1 contains definitions of all variables. All regressions include bank fixed effects and borrower country X quarter fixed effects. The full sample of banks is used in the regressions in column [1] - [3]. In column [4] and [6] only banks domiciled in non-GIIPS countries are included and in column [5] and [7] only banks domiciled in GIIPS countries. All regressions are estimated using OLS and include a constant. All standard errors are clustered by. Robust p-values appear in parentheses and ***, **, * correspond to the one, five and ten per cent level of significance, respectively.

	[1]	[2]	[3]	[4]	[5]	[6]	[7]
	All borrowers			EU borrowers			
		All banks		Non-GIIPS banks	GIIPS banks	Non-GIIPS banks	GIIPS banks
Foreign	-0.381*** (0.000)	-0.322*** (0.000)	-0.322*** (0.000)	-0.286*** (0.000)	-0.320*** (0.000)	-0.485*** (0.000)	-0.503*** (0.000)
Foreign * GIIPS Exposure	0.014*** (0.003)		0.020*** (0.001)	0.003 (0.505)	0.007 (0.619)	0.033** (0.015)	0.066*** (0.004)
Foreign * Sovereign Risk		-0.009** (0.043)	-0.014*** (0.005)	0.001 (0.715)	0.008 (0.453)	-0.001 (0.939)	-0.001 (0.945)
Size	0.007 (0.172)	-0.001 (0.578)	0.007 (0.210)	0.001 (0.574)	0.003 (0.449)	0.031 (0.553)	0.012 (0.914)
Tier 1	-0.000 (0.562)	-0.000 (0.252)	-0.001 (0.138)	-0.000 (0.651)	-0.000 (0.809)	-0.001 (0.724)	0.000 (0.964)
Impaired loans	0.001* (0.067)	0.000 (0.213)	0.002** (0.021)	0.000 (0.391)	0.001 (0.123)	0.003 (0.115)	0.005 (0.179)
Net income	0.000 (0.632)	-0.001 (0.160)	-0.001 (0.266)	-0.000 (0.859)	0.002 (0.334)	0.001 (0.812)	0.002 (0.736)
Bank fe	yes	yes	yes	yes	yes	yes	yes
Borrower country X quarter fe	yes	yes	yes	yes	yes	yes	yes
No. of observations	38,896	37,874	37,874	27,998	6,285	9,876	3,151
R2	0.519	0.517	0.521	0.473	0.489	0.641	0.660

Appendix Table 1
Timeline of events during the euro area sovereign debt crisis

Period	Country/Institution	Event
October 2009	Greece	After winning snap parliamentary elections, new Prime Minister Papandreou's administration uncovers evidence that misleading accounting practices had concealed excessive borrowing by the preceding New Democracy government. Based on corrected figures, the Greek budget deficit for the year more than doubles to 12.7 percent of GDP.
December 2009	Greece	Ratings agencies Fitch and Standard & Poor's downgrade Greece's credit rating to below investment-grade status. The Greek stock market tumbles, and the Papandreou administration reveals that Greece's sovereign debt burden now tops €300 billion (about \$440 billion). This puts Greek debt at 113 percent of GDP, almost double the amount allowed under Maastricht.
	Ireland	Having spent billions to shore up its beleaguered banks, Ireland implements austerity measures that include increasing the minimum eligibility age for pensioners from 65 to 66.
February 2010	Greece	Papandreou unveils an austerity plan aimed at reducing Greece's budget deficit by almost 10 percent by 2012. It includes a freeze on public-sector wages and a variety of tax increases. The EU endorses the plan, but protests and wildcat strikes sweep the country.
	Spain	Prime Minister José Luis Rodríguez Zapatero, facing an economy rocked by plunging property values and soaring unemployment, announces an austerity plan that would increase the retirement age from 65 to 67. Labor unions lead mass demonstrations against the change, but after almost a year of negotiations the plan is approved in January 2011.
March 2010	Greece	Leaders of the euro zone and the IMF have agreed upon a deal whereby both parties would provide financial support for Greece.
April 2010	Greece	The 2009 budget deficit is revised up to 13.6 percent, and Greek government bond yields skyrocket as Standard & Poor's downgrades their credit worthiness to junk status.
May 2010	Greece	On May 2 Papandreou, the IMF, and euro-zone leaders agree to a €10 billion (\$143 billion) bailout package that would take effect over the next three years. In response, some 50,000 people take to the streets of Athens to protest the additional budget cuts mandated under the terms of the deal. Three people are killed when the demonstrations turn violent.
	EU	On 9 May 2010, the 27 EU member states agree to create the European Financial Stability Facility, a legal instrument aiming at preserving financial stability in Europe by providing financial assistance to euro area states in difficulty. The EFSF can issue bonds or other debt instruments on the market with the support of the German Debt Management Office to raise the funds needed to provide loans to euro area countries in financial troubles, to recapitalize banks, or to buy sovereign debt. Emissions of bonds are backed by guarantees given by the euro area member states in proportion to their share in the paid-up capital of the European Central Bank. The €440 billion lending capacity of the facility is jointly and severally guaranteed by the euro area countries' governments and may be combined with loans up to €60 billion from the European Financial Stabilisation Mechanism (reliant on funds raised by

	ECB	the European Commission using the EU budget as collateral) and up to €250 billion from the International Monetary Fund (IMF) to obtain a financial safety net up to €750 billion.
July 2010	EU	The ECB institutes the Security Markets Program whereby it begins open market operations buying government and private debt securities, reaching €19.5 billion in February 2012 and simultaneously absorbing the same amount of liquidity to prevent a rise in inflation.
September 2010	Ireland	The EU releases the results of “stress tests” conducted on 91 European financial institutions. Of the banks that were tested, seven did not maintain the minimum amount of ready capital required by examiners.
November 2010	Ireland	Ireland’s central bank announces that the cost of bailing out Anglo Irish Bank, nationalized by the Irish government in January 2009, could reach as much as €34.3 billion (\$46.6 billion). This pushes Ireland’s budget deficit to 32 percent of GDP.
February 2011	EU	After months of delay, Ireland’s government officially applies for bailout funds from the EU and the IMF. Embattled Irish Prime Minister Brian Cowen submits a harsh austerity budget and promises to call a general election in 2011. Within a week an €85 billion (\$113 billion) rescue package is approved by European leaders.
March 2011	Portugal	European finance ministers create the European Stability Mechanism, a permanent €500 billion (\$673 billion) fund intended to serve as a lender of last resort for ailing euro-zone economies.
May 2011	Portugal	Portuguese Prime Minister José Sócrates resigns when opposition politicians reject his proposed austerity budget. Portuguese government bond yields rise to unsustainable levels as Fitch and Standard & Poor’s cut their ratings of Portuguese sovereign debt. Shortly after Socrates, serving in a caretaker role pending elections in Portugal, requests bailout relief from the EU and the IMF.
June 2011	Greece	European leaders approve a €78 billion (\$110 billion) bailout package for Portugal on the condition that Portuguese officials implement a series of austerity measures.
July 2011	Portugal	Standard & Poor’s downgrades Greece’s credit rating to CCC, making it the country with the world’s lowest-rated sovereign debt.
	Greece	Moody’s rating agency lowers the country’s debt rating to junk status.
August 2011	Italy	European leaders extend an additional €109 billion rescue package to Greece. In an effort to stabilize the euro zone as a whole, existing Greek loans are restructured with more generous terms. The cost of these changes is passed along to private bondholders, and Fitch characterizes the action as a “selective default.” This marks the first government default within the euro zone since the adoption of the single currency.
September 2011	Italy	Interest rates on 10-year Italian government bonds top 6 percent as confidence in the coalition led by Italian Prime Minister Silvio Berlusconi is undermined by Berlusconi’s personal scandals and his ongoing row with finance minister Giulio Tremonti. Italy’s €1.9 trillion (\$2.7 trillion) public debt falls under increasing scrutiny from investors; at 120 percent of GDP, Italy’s rate of indebtedness is second only to Greece among euro-zone countries. In an effort to calm the markets, Berlusconi proposes €45 billion (\$66 billion) in spending cuts and tax increases.
		Standard & Poor’s downgrades Italy’s credit rating and

October 2011	EU	<p>characterizes the outlook for the euro zone's third largest economy as negative.</p> <p>Euro area leaders meet in Brussels for a summit that, it was hoped, would produce a lasting solution for the debt crisis. Merkel and Sarkozy negotiate privately with Greece's creditors, and the result is a bond swap that would effectively cut the value of Greek debt in half. Additional bailout measures include the recapitalization of European banks and the expansion of the EFSF into a €1 trillion slush fund to insulate larger indebted economies such as Italy.</p>
November 2011	Italy	<p>Prime Minister Bersluconi announces that he will resign as soon as parliament approves a new round of economic reforms. Investors are slow to respond to the news, however, and yields on Italian government 10-year bonds reach an unsustainable 7.5 percent.</p>
	Greece	<p>Prime Minister Papandreou announces his resignation. The following day a caretaker government is formed around former European Central Bank vice president Lucas Papademos, and he is sworn in as interim prime minister of Greece on November 11.</p>
December 2011	EU	<p>European leaders convene in Brussels on December 9 for a summit that promises to reshape the EU. Sweeping changes are proposed to integrate euro-zone economies more deeply, creating a "fiscal stability union," and additional penalties are suggested for countries exceeding specific deficit benchmarks. The compact can be enacted by changing an existing EU treaty protocol, a process that will require unanimous approval from the 27 EU leaders present. Those plans are scuttled by British Prime Minister David Cameron, who withholds his vote when he is unable to secure regulatory exemptions for London's financial sector. Cameron's "veto" ultimately has little effect, as the other 26 members of the EU press ahead with the treaty changes; those changes will face referenda or parliamentary approval at the member country level.</p>
	ECB	<p>On December 21 the European Central Bank (ECB) extends €489 billion (nearly \$640 billion) in loans to more than 500 European banks. The long-term refinancing operation is designed to prevent a credit freeze, and it represents the largest such deal in ECB history. The three-year loans are offered at a fixed 1 percent interest rate, and their widespread adoption indicates a radical shift in the mood of the private banking sector, which had long held capital injections from central banks to be anathema.</p>
January 2012	Portugal	<p>Standard & Poor's downgrades the debt of Portugal to junk status. This makes Portugal the second European country (after Greece) to have its debt downgraded to non-investment status by all three ratings agencies. Portuguese 10-year-bond yields skyrocket in response to the news, eventually reaching a euro-era record 18.29 percent.</p>
February 2012	Greece	<p>The Greek parliament another round of spending cuts, opening the door to an additional €30 billion in bailout funds from the ECB, the EU, and the IMF. Global markets respond positively to the news, but initial gains are erased by the continued possibility of an uncontrolled Greek default.</p>
	ECB	<p>Some 800 European banks take advantage of the ECB's second long-term refinancing operation. This round of loans injects an additional €530 billion into the banking system. In just over two months the ECB has loaned more than €1 trillion to private banks in an effort to increase liquidity in the</p>

March 2012	EU	credit market and to encourage lending. Euro-zone finance ministers announce an expansion of the EFSF and European Stability Mechanism. The two primary elements of the euro zone's financial firewall will now have access to a combined €800 billion (about \$1 trillion) in funding. This increase was made at the urging of the G20 and the IMF, who had expressed concern that the existing rescue funds were not sufficient to manage the bailout of a country such as Spain or Italy.
April 2012	Spain	After a Spanish government bond auction falls short of its fund-raising target, the Rajoy government attempts to reassure markets with an additional €10 billion in budget cuts. Yields on Spanish bonds continue to rise, however, and the 10-year benchmark rate once again tops 6 percent - the first time it has done so since Rajoy took office in December 2011.
May 2012	Greece	Greek banks have shed almost one-third of their total deposits since 2010, and on May 14 alone Greek savers withdraw some €700 million from the Greek banking system.
	Spain	Bankia, Spain's largest mortgage lender, is effectively nationalized. The Spanish government announces a €23.5 billion bailout of the ailing bank, and Standard & Poor's downgrades Bankia and two other Spanish financial institutions to junk status. In addition to the banking crisis, Spain faces regional governments that are struggling with unsustainable debt, and, for the fourth year in a row, it registers the highest overall unemployment rate in the EU. The return on Spanish 10-year bonds continues to hover around 6.5 percent.
June 2012	Spain	On June 9 the Spanish government requests €100 billion in financial assistance from the EU to recapitalize its banks. Although Prime Minister Rajoy characterizes the transaction as a "soft loan" rather than a bailout, EU officials emphasize that the so-called "troika" (the IMF, European Commission, and ECB) will oversee both the loan and any conditions that might be attached to it. Although markets initially rejoice at the news of the Spanish bailout, the optimism soon fades. In the weeks following the announcement, Spanish 10-year government bond yields surge, eventually topping 7 percent. Shares on Spain's IBEX index fall, and Moody's downgrades the country's credit rating to one step above junk status.
September 2012	ECB	On 6 September 2012, the ECB announces additional financial support in the form of some yield-lowering bond purchases (OMT), for all euro area countries involved in a sovereign state bailout program from EFSF/ESM (at the point of time where the country regains a complete market access). A euro area country can benefit from the program if - and for as long as - it is found to suffer from stressed bond yields at excessive levels; but only at the point of time where the country regains a complete market access - and only if the country still complies with all terms in the signed Memorandum of Understanding agreement. Countries receiving a precautionary program rather than a sovereign bailout, will per definition have complete market access and thus qualify for OMT support if also suffering from stressed interest rates on its government bonds. In regards of countries receiving a sovereign bailout (Ireland, Portugal and Greece), they will on the other hand not qualify for OMT support before they have regained complete market access, which will normally only happen after having received the last scheduled bailout disbursement. Despite the fact that no OMT programs

are ready to start in September/October, the financial markets straight away take notice of the additionally planned OMT packages from ECB, and start slowly to price in a decline of both short term and long term interest rates in all European countries previously suffering from stressed and elevated interest levels.

Source: Encyclopaedia Britannica

Appendix Table 2

List of European banks

This table lists all 59 banks in our sample, ordered by country of incorporation. *Volume of syndicated lending* measures the total volume of syndicated lending provided the bank over the period 2009:Q1-2012:Q2 in million euro. *GIIPS Exposure (min/max)* equals the lowest and highest value of *GIIPS Exposure* for the bank over the same sample period.

Country	Bank name	Volume syndicated lending (mil. Euro)	GIIPS Exposure (min)	GIIPS Exposure (max)
Austria	Erste Group Bank	4,767	0.41	3.03
Austria	Oesterreichische Volksbanken	1,050	0.55	3.38
Austria	Raiffeisen Bank International	12,606	0.22	1.02
Belgium	Dexia	10,527	1.44	4.40
Belgium	KBC	14,052	1.08	3.24
Denmark	Danske Bank	17,102	0.26	1.04
Denmark	Nykredit Bank A/S	1,328	0.29	2.35
Finland	OP-Pohjola Group	3,671	0.07	0.52
France	BNP Paribas	136,898	0.98	3.61
France	Credit Agricole	108,496	1.01	3.05
France	Societe Generale	89,025	0.86	3.51
Germany	BayernLB	21,415	0.29	1.99
Germany	Commerzbank Group	56,141	1.27	4.17
Germany	DZ Bank	16,197	1.00	3.45
Germany	Deutsche Bank	86,138	0.45	2.58
Germany	HSH Nordbank	5,051	0.42	2.37
Germany	LBBW	16,813	0.50	3.22
Germany	Landesbank Berlin	2,778	0.59	3.67
Germany	NordLB	6,974	0.66	2.61
Germany	WGZ	1,696	1.40	4.00
Germany	WestLB	27,755	1.64	4.61
Greece	ATEbank	348	0.22	0.95
Greece	Alpha Bank	1,075	0.00	0.00
Greece	Bank of Piraeus	586	0.00	0.00
Greece	EFG Eurobank Ergasias	1,624	0.08	0.45
Greece	National Bank of Greece	2,006	0.02	0.12
Ireland	Allied Irish Banks	3,629	0.54	2.23
Ireland	Bank of Ireland	8,109	0.01	0.08
Italy	Intesa Sanpaolo	41,392	0.21	2.45
Italy	Monte dei Paschi	6,032	0.13	1.05
Italy	UniCredit	57,579	0.22	2.26
Italy	UBI Banca	5,131	0.02	1.10
Luxembourg	BCEE	529	1.89	4.07
Netherlands	ABN AMRO Bank	13,563	0.49	1.60
Netherlands	ING	77,900	0.66	2.69
Netherlands	Rabobank	29,776	0.15	2.03
Norway	DNB Bank	26,889	0.00	0.00
Portugal	Banco BPI	1,664	1.50	4.48
Portugal	Banco Espirito Santo	4,767	0.40	3.69
Spain	BBVA	49,331	0.51	2.09
Spain	Banca March	1,032	0.00	0.00
Spain	Banco Popular Espanol	10,674	0.34	2.09
Spain	Banco de Sabadell	11,659	0.11	0.90

Appendix Table 2 - cont'd

Country	Bank name	Volume syndicated lending (mil. Euro)	GIIPS Exposure (min)	GIIPS Exposure (max)
Spain	Bankia SA	19,964	0.02	1.11
Spain	Bankinter	5,285	0.00	0.01
Spain	Caja Espana	2,793	0.03	0.57
Spain	Caja de Ahorros del Mediterraneo	3,329	0.05	0.31
Spain	Caja de Ahorros y Monte de Piedad	1,097	0.43	1.69
Spain	La Caixa	18,862	0.32	1.25
Spain	Novacaixagalicia	5,687	0.24	1.45
Spain	Santander	78,021	0.21	1.90
Sweden	Nordea	36,251	0.02	0.13
Sweden	SEB	24,586	0.19	2.02
Sweden	Svenska Handelsbanken	14,035	0.00	0.00
Sweden	Swedbank First Securities	8,197	0.00	0.00
United Kingdom	Barclays	79,882	0.62	2.11
United Kingdom	HSBC	126,114	0.49	2.48
United Kingdom	Lloyds Banking Group	44,924	0.01	0.04
United Kingdom	RBS	101,831	0.41	2.38