OESTERREICHISCHE NATIONALBANK
EUROSYSTEM

WORKING PAPER 213

Bank Lending and the European Sovereign Debt Crisis

Filippo De Marco

The *Working Paper series of the Oesterreichische Nationalbank* is designed to disseminate and to provide a platform for discussion of either work of the staff of the OeNB economists or outside contributors on topics which are of special interest to the OeNB. To ensure the high quality of their content, the contributions are subjected to an international refereeing process. The opinions are strictly those of the authors and do in no way commit the OeNB.

The Working Papers are also available on our website (http://www.oenb.at) and they are indexed in RePEc (http://repec.org/).

Publisher and editor *Oesterreichische Nationalbank*
Otto-Wagner-Platz 3, 1090 Vienna, Austria
PO Box 61, 1011 Vienna, Austria
www.oenb.at
oenb.info@oenb.at
Phone (+43-1) 40420-6666
Fax (+43-1) 40420-046698

Design *Communications and Publications Division*

DVR 0031577

ISSN 2310-5321 (Print)
ISSN 2310-533X (Online)

Editorial

On the occasion of the 65th birthday of Governor Klaus Liebscher and in recognition of his commitment to Austria's participation in European monetary union and to the cause of European integration, the Oesterreichische Nationalbank (OeNB) established a "Klaus Liebscher Award". It has been offered annually since 2005 for up to two excellent scientific papers on European monetary union and European integration issues. The authors must be less than 35 years old and be citizens from EU member or EU candidate countries. Each "Klaus Liebscher Award" is worth EUR 10,000. The two winning papers of the thirteenth Award 2017 were written by Jean-Marie Meier and by Filippo De Marco. The latter paper is presented in this Working Paper while Jean-Marie Meier's contribution is contained in Working Paper 214.

May 29, 2017

Bank Lending and the European Sovereign Debt Crisis

Filippo De Marco*

May, 2017

Abstract

I investigate whether bank exposures to sovereign debt during the European debt crisis affected the real economy. I show that bank marked–to–market (MTM) losses on sovereign debt led to a credit tightening that had negative real effects on small and young firms, even in countries not under stress. Since banks do not usually MTM their holdings of sovereign bonds, I explore the transmission channels of sovereign losses on credit supply. I show that sovereign losses reduced bank short–term funding from US money market funds rather than affecting equity or working through alternative channels.

Keywords: Sovereign debt; real effects; credit supply; bank funding; regulatory capital.

JEL: G21, E22

---

*Bocconi University, Department of Finance and IGIER, email: filippo.demarco@unibocconi.it. I am grateful to Pierluigi Balduzzi, Laura Bonacorsi, Emanuele Brancati, Elena Carletti, Paolo Colla, Ricardo Correa, Francisco Covas, John Driscoll, Carlo Favero, Simon Gilchrist, Seung Jung Lee, Xuyang Ma (discussant), Marco Macchiavelli, Florian Nagler, Alexander Popov, Ellis Tallman, Egon Zakrajsek and other seminar participants at Boston College, Federal Reserve Board, 2014 BU–BC Green Line Macro Meeting, 2014 WEAI Graduate Student Workshop in Denver, Bank for International Settlements (BIS), Bocconi University, European Bank for Reconstruction and Development (EBRD), European Central Bank (ECB), University of Leicester, Bank of England (BoE), *3rd* UniCredit MBF Workshop in Pavia, *2nd* CEPR Spring Symposium in Financial Economics (Imperial) for helpful comments and suggestions. A special thank goes to Fabio Schiantarelli, Susanto Basu and Philip Strahan for their constant guidance and advice. I would also like to thank the Federal Reserve Board for kindly providing access to LPC Dealscan data. All remaining errors are my own.

Introduction

Bank holdings of risky sovereign debt are substantial: in 2010 the largest banks in Europe had a combined exposure of €750 bn (Figure 1) to the sovereign debt of Greece, Ireland, Italy, Portugal and Spain (GIIPS). In 2010–2012, rising yields on GIIPS sovereign bonds reduced the market value of bank holdings of sovereign debt. At the same time, the growth rate of bank credit available to GIIPS firms rapidly declined and loan interest rate spreads increased vis–à–vis those in Germany (Figures 2 and 3), suggesting that the sovereign debt crisis had a negative effect on the supply of credit (Popov and Van Horen (2014)).

However, according to data from the European Banking Authority (EBA), GIIPS sovereign bond holdings were mostly (85%) placed in the banking book (Figure 4), where they were held–to–maturity (HTM). Thus, did bank marked–to–market (MTM) losses lead to a credit tightening that had negative real effects on non–financial firms? And, if so, why did the deterioration in the market value of sovereign debt matter for credit supply in the first place since sovereign bond holdings were not MTM? This paper tackles both these questions.

The paper contains three main sets of results. First, using a unique dataset of bank holdings of sovereign debt from the EBA matched with firm–level data from AMADEUS Banker, I show that bank MTM losses on European sovereign debt in 2010–2012 had negative real effects on European firms that were more likely to be financially constrained. In particular, small or young firms whose bank(s) was(were) hit by a one standard deviation increase in MTM losses–over–total assets (0.6%) had asset, cash, short–term liabilities and investment growth about 1/10 standard deviation lower than medium–sized or older firms, respectively. Since these results may also be driven by lower credit demand, rather than supply, I show that there are negative real effects even for firms headquartered in countries not under stress (Austria, France, Germany and the Netherlands) that borrowed exclusively from non–GIIPS banks that were in turn exposed to GIIPS debt. Therefore, the results are unlikely to be driven by lower credit demand from GIIPS firms alone.

Second, I show that the negative real effects followed from a tightening of credit from the affected banks, both in terms of lower quantities and higher interest rates. In fact, aggregate bank balance sheet lending, both domestic and foreign, fell more for banks with high MTM sovereign losses. After matching the EBA sovereign exposure data with syndicated loans from LPC Dealscan, I also show that these banks charged higher interest rates, even after controlling for firm fixed–effects, *i.e.* comparing the loans made to the *same* firm by syndicate of banks with different sovereign exposures.

Finally, I analyze the transmission channels as to why sovereign losses matter for credit supply. There are two main channels: the *capital channel* and the *funding channel.* According to the first, banks with large sovereign losses suffer an equity loss and then deleverage. This is similar to the standard argument in the empirical banking literature (Chava and Purnanandam (2011), Peek and Rosengren (1997)).[1] The second channel indicates instead that banks with high sovereign losses have a hard time rolling–over their short–term funding, as market participants would react to high potential, yet unrealized, losses. Since bank sovereign bond holdings are not usually MTM, the first channel may not have been at work in the context of the European sovereign debt crisis, as most paper losses were not realized on bank books. However, if MTM sovereign losses affect the availability of short–

[1] Theoretical models for deleveraging following a shock in the context of sovereign debt are provided in Bocola (2014), Brunnermeier et al. (2015) and Gennaioli et al. (2014a)).

term funding, then banks more exposed to this type of funding would cut lending to the real economy. In the third main set of results in the paper, I provide two key pieces of evidence that indicate that the second channel is more important than the first.

First, I show that banks that were relying heavily on short–term funding or with higher cost of funding as implied in the 2011 Stress Test scenario, cut lending, both domestic and foreign, by more than other banks the higher the potential sovereign losses. On the other hand, banks with low capitalization, defined in a variety of ways (regulatory capital, both stressed and nonstressed, leverage ratio or market equity as a fraction of total assets) were not more significantly affected than other banks.

Second, analyzing the funding channel further, I document, using data from the Securities and Exchange Commission (SEC) form N–MFP, that short–term funding from US Money Market Mutual Funds (MMMFs) contracted significantly more for banks with high MTM sovereign losses. In particular, since US MMMFs funding is denominated in US dollars, I find that only unsecured, short–term paper (Certificates of Deposits, CD and Commercial Paper, CP) were affected by bank MTM losses on European sovereign debt, while repos backed by high–quality collateral denominated in US dollars were not. Figure 5 and 6 show that this pattern is discernible even from the aggregate data: banks with high (*i.e.* above the median) sovereign losses experienced a much larger decline in unsecured funding than banks with low sovereign losses, whereas there is no difference for USD secured funding across the two groups.[2]

[2] It is likely that banks exposed to risky sovereign debt suffered a similar run on euro–denominated wholesale funding too. For example, Boissel et al. (2016) show that repos backed by GIIPS collateral on average faced higher repo rates during the crisis. However, I cannot directly test whether euro–denominated sources of wholesale funding were affected by bank–specific sovereign losses, as participation in the repo trading platform is anonymous.

This paper contributes to the broad literature assessing how shocks to banks' balance sheets affect lending, both at home and abroad (Chava and Purnanandam (2011), Jimenéz et al. (2012), Peek and Rosengren (1997) and Popov and Udell (2012)). A particular strand of the literature examines whether the real effects of credit shocks are heterogeneous across borrowers, with small and bank–dependent firms being more affected (Chodorow–Reich (2014), Montoriol-Garriga and Wang (2011)). Within this literature, Beck et al. (2017), Berger et al. (2016), Cotugno et al. (2013) argue that stronger bank–firm relationship could reduce credit rationing during a crisis. The findings in this paper confirm that the effects of the sovereign–crisis–induced credit crunch are heterogeneous across borrowers and tend to be more severe for financially constrained firms, *i.e.* small and young firms.

Moreover, there is a recent area of research, both theoretical and empirical, that studies the relationship between sovereign and banking crises. Some papers have focused on the cross–financial linkages between the two (Acharya and Steffen (2015), Augustin et al. (2014), Bedendo and Colla (2015)) or the relationship between sovereign risk and bank bailouts (Acharya et al. (2014)), while others on the effects of the sovereign debt crisis on lending and the real economy. Gennaioli et al. (2014 a,b) analyze the effects of sovereign *defaults* worldwide on bank lending. My paper is different in that, other than Greece, there has been no sovereign default in Europe during the crisis. In this paper, the focus is rather on whether MTM losses on sovereign debt, not realized losses, affected credit and the real economy. In a set of contemporaneous studies, Altavilla et al. (2016), Bofondi et al. (2017), Correa et al. (2016) and Popov and Van Horen (2014) look at the effects of the sovereign debt crisis on bank lending from European banks. Moreover, Acharya et al. (2015), Balduzzi et al. (2015) and Bottero et al.

(2017) analyze the real effects of the sovereign debt crisis using syndicated loan data for European firms or survey and credit register data for Italy, respectively.

The main contributions of this study compared to the existing literature on bank lending and the European debt crisis are the following. First, this paper studies the real effects of shocks to sovereign debt in a multi–country sample (Balduzzi et al. (2015) and Bottero et al. (2017) focus on Italian firms only) of Small and Medium Enterprises (SMEs) at the European level (Acharya et al. (2015) only analyze large European firms that take part in syndicated deals). Second, I shed light on the mechanisms as to why sovereign losses matter for bank credit. I claim that risky sovereign bond exposures matter because they increase banks' cost of funding, rather than decrease the value of equity. Acharya et al. (2015) also explore the mechanisms on why European firms experienced a credit crunch. They find two channels, *crowding out/risk-shifting* and *hit on balance sheet* channels, that explain the contraction in credit supply and subsequent negative real effects. Their results are complementary to mine, as I focus on the specific mechanisms as to why sovereign losses matter for credit (what they label *hit on balance sheet* channel).[3] Moreover, I also show that the *illiquidity* channel (DeYoung et al. (2015)), cannot explain why MTM sovereign losses are a particular transmission mechanism for the sovereign shock on credit supply in the case of the European debt crisis.

The rest of the paper is organized as follows. Section 1 describes the data and the construction of the bank specific sovereign losses, while Section 2 outlines the empirical methodology. Section 3 presents the regression results

[3] The result that US MMMFs pulled funding away from European banks is not novel per se (Acharya et al. (2016), Chernenko and Sunderam (2014), Ivashina et al. (2015)), however I am showing that especially the European banks with higher MTM losses have a hard time rolling over short–term, unsecured funding (Figure 5).

and Section 4 discusses the possible channels. Section 5 concludes.

1 Data

The dataset is the combination of several data sources at the bank–level, loan–level, firm–level for 2010–2012 on the exposures to sovereign debt from 21 different countries of 90 European banks that have participated in 7,952 syndicated deals taken out by 5,710 firms, that have relationships with 1.2 million firms from 19 different European countries. Security–level information on three different types of securities (CD, CP and repos) issued by 35 European banks to 382 US MMMFs come from SEC N–MFP form. I will now briefly describe each data source in more detail.

The bank sovereign exposure come from the EBA "EU–wide Stress Test" and "Recapitalization Exercises". These exercises contain information on the sovereign debt exposure to each of the 30 members of the European Economic Area (EEA 30) at different maturities for all the participating banks. However, due to data availability on benchmark sovereign bond yields from Bloomberg and Datastream, the sample consists of 21 countries out of the original EEA 30 and only for maturities longer than or equal to 2 years .[4] Since the key variable of interest throughout the paper is the amount of MTM sovereign losses at the bank level, the sample period is dictated by the availability of the EBA data from 2010Q1 to 2012Q2. Some

[4] I obtain benchmark sovereign yields from Bloomberg for 17 countries: Austria (AT), Belgium (BE), Germany (DE), Denmark (DK), Spain (ES), Finland (FI), France (FR), Greece (GR), Hungary (HU), Ireland (IE), Italy (IT), Netherlands (NL), Norway (NO), Poland (PO), Portugal (PT), Sweden (SE) and the United Kingdom (UK). From Datastream I add 4 additional countries: Czech Republic (CZ), Romania (RO), Slovakia (SK) and Slovenia (SI). The 2010 and 2011 Stress Tests sample consists of 90 European banks, while in the 2011-2012 Recapitalization Exercises the sample is restricted to around 60 banks, because smaller, non–cross border institutions were excluded. Moreover, the 2010 Stress Test (2010Q1 data) does not have a breakdown by maturity, so I will extrapolate the maturity structure for 2010Q1 exposure from the 2010Q4 data.

of the EBA regulatory exercises also contains other bank–level information that I will exploit throughout the paper. In particular, I will be using the following measures: capital ratios under the stress scenario; average funding costs, both actual and under stress, at the bank level; credit exposures broken down by country and sector of the counter–party (public institutions, corporates, retail, etc.).

Bank balance sheet data come from Bankscope and are matched to EBA data at the group (consolidated) level for balance sheet controls but at the unconsolidated level for loans (as in Gennaioli et al.(2014b)). A series for foreign loans is obtained using the unconsolidated loans from the international subsidiaries of cross–border groups (there are 37 cross–border banks out of the original 90 banks of the EBA sample, with a total of 121 subsidiaries. Further details on the data construction are provided in the Internet Appendix – Part A).

The EBA sample is then merged with LPC DealScan that contains loan–level information on interest rate spreads. Each syndicated loan (*packageid*) is structured into different loan tranches (*facilityid*). Interest rate spreads are available at the facility level, but in order to make sure that differences in interest rates charged to the same firm are driven by characteristic of the syndicate, rather than by different facilities within the same deal, the relevant unit of observation for my purposes is the syndicated loan (see Internet Appendix – Part B for further details).

Moreover, EBA data are matched with firm balance sheet data from AMADEUS Banker, which also contains information on the name of the banks associated to each firm on AMADEUS. The data has been collected from chambers of commerce and firm registries in European countries and complemented with phone interviews with the firm representatives. The data only allows to match firms and banks and it contains no information on the date of the loan(s), the quantity or interest rate (see Giannetti and Ongena (2012) and the Internet Appendix – Part C for a more detailed description of the data). The matched sample contains 1.2 million firms over 19 European countries between 2010 and 2012.

Finally, monthly security level holdings data of US MMMFs come from the SEC N–MFP form (Chernenko and Sunderam (2014)) from November 2010 to December 2012 for 35 EBA banks (at the parent level) that I collapse at the bank–investment type level. I classify securities into three types: CD, CP and repos backed by high–quality securities denominated in USD.[5]

Table 1 provides some summary statistics for the final dataset at the bank–level (Panel A), loan level (Panel B), firm level (Panel C) and bank–security type level (Panel D). Panel A also examines differences in average characteristics between the banks less exposed to GIIPS debt (below the median) and those more exposed (above the median). Less exposed banks are on average larger, but they are fundamentally similar in terms of funding, and profitability at the beginning of the crisis (2009 and 2010). Interestingly, while in terms of regulatory capital ($Tier1/RWA$) the two groups are largely similar, in terms of actual leverage ($Equity/Ta$), more exposed banks do appear to be more levered. Since European sovereign bonds enjoy a zero–risk weight, the difference between regulatory and actual capital may precisely be driven by bank sovereign exposures. More exposed banks, as expected, becomes less profitable (1.1% lower $Profits/TA$ ratio) and experience lower growth rate of lending (6% lower) at the peak of the crisis, in 2011.

Panel B provides some summary statistics for the EBA–Dealscan merge.

[5] There are three main types of repos in the N–MFP data: those backed by US government agency securities, repos backed by US Treasuries and repos backed by other securities.

Although here is a total of 7,952 syndicated deals taken out by 5,710 firms over the sample period from EBA banks, in the regressions I keep only those firms that took at least two loans over the sample period. Thus the sample will be composed of 3,492 loans taken out by 1,493 firms, of which 1,022 have exactly two loans and 307 have three, while the remaining 164 firms have more than three. Syndicated loans are large, with a mean (median) of $743 mil. ($339 mil.), have an average maturity of 5 years, average all-in drawn spread over the reference rate (Libor or Euribor) of 285 basis–points and attract an average (median) of 3.4 (2) participant banks.

Panel C shows some descriptive statistics for the firm–level variables in the EBA–AMADEUS matched sample used in the regression analysis, all winsorized at 1%. Most firms are quite small (median total assets of €730,000), but all the dependent variables (investment, growth rate of cash, sales, short–term liabilities and employment) have a wide range of variability.

Finally, Panel D contains a description of the securities issued by EBA banks to US MMMFs collapsed at the bank level. Unsecured dollar funding (CD and CP) is available for 35 banks, while secured dollar funding (repos) is only available for 10 banks. Both sources provide funding for 1.5% of total assets on average. Over the sample period analyzed (Nov2010–Dec2012) on average the growth rate of all these funding sources is negative, although more so for unsecured funding (-7% and -5% for CD and CP respectively) than for repos (-0.5%).

1.1 The Bank–specific Sovereign Shock

I construct a bank–specific sovereign shock for bank b at time t, $SovShock_{b,t}$ as:

$$SovShock_{b,t} = \sum_{s=1}^{S} \sum_{m=2Y}^{15Y} Duration_{s,m,t} \times \Delta yield_{s,m,t} \times \frac{Exposure_{b,s,m,t-1}}{Total\ Assets_{b,t-1}}$$

where s is the sovereign country whom bank b is exposed to; m is the residual debt maturity, in years, and t is the end of year t, from 2010 to 2012. Essentially, this shock represents the MTM value of bank b sovereign debt holdings during year t. Although banks do not necessarily need to MTM these exposures, especially if they are in the HTM banking book, this measure is meant to capture expected losses on sovereign bonds and identify the banks most vulnerable to the sovereign shock from the point of view of an outside investor.

$Duration_{s,m,t}$ is the *modified duration* and it measures the percentage change in the price of a bond for a unit change in the yield–to–maturity ($yield$).[6] Finally, by summing over each country of exposure s and each maturity m, $SovShock_{b,t}$ calculates the losses (gains) from the devaluation (revaluation) of all sovereign bonds as a percentage of total assets.

Table 2 reports the empirical distribution of the shock year by year. Banks incur into substantial losses in 2010 and 2011: banks at the 75^{th} and 90^{th} percentile had, respectively, losses accounting between 0.2–0.6% and 1.6%–2% of total assets.[7] These numbers are high: considering that the

[6] Sovereign bonds are coupon bonds and to compute the exact duration one would need to know the actual coupon value. However, since this information is not available in the EBA data, I have to assume that sovereigns are either *zero–coupon* bonds or *par* bonds. Since the duration is a decreasing function of the coupon, my preferred measure to calculate the duration is the par bond, that underestimates banks' MTM losses, but the main results are not qualitatively affected by this assumption (see the robustness test in Table 4 in the Internet Appendix – Part D)

[7] $SovShock_{j,t}$ is positive if there are losses and negative if there are gains, because

median capital–over–asset ratio of around 5% over 2009-2011, losses in the top decile have the potential to wipe out almost half of the book value of equity. Banks facing these heavy losses are mostly headquartered in the GIIPS countries, but in the top quartile we also also find some banks domiciled in Belgium (Dexia), Germany (Commerzbank and Hypo Real Estate) and Luxembourg (BCEE). These losses are partly reversed in 2012 as sovereign yields fall in the second part of the year, as a result of the ECB interventions (see Acharya et al. (2016)).

2 The Empirical Methodology

The baseline empirical specification is the following:

$$\begin{aligned}\Delta Y_{f,c,t} &= \beta_1 SovShock_{b,t} + \beta_2 SovShock_{b,t} \times FinConstr_f \\ &+ \gamma_1' X_{b,t-1} + \gamma_2' X_{b,t-1} \times FinConstr_f + \lambda_f + \lambda_{i,c,t} + \epsilon_{f,c,t} \qquad (1)\end{aligned}$$

where $\Delta Y_{f,c,t}$ is a firm–level outcome of interest (investment, asset growth, cash growth, short–term liabilities growth) for firm f in country c in year t; $SovShock_{b,t}$ are the MTM sovereign losses of bank b (averaged across all banks lending to firm f if more than one is present). The effect of the sovereign losses is allowed to vary by financial constraints ($FinConstr_f$) at the borrower level. The literature has identified size and age to be important determinants of financial constraints: younger and smaller firms tend to be more financially constrained. Size is defined using firm's total assets and age as the years from the firm's incorporation date. Thus, I interact $SovShock_{b,t}$ with a dummy $Small_f$ ($Young_f$) equal to one for firms below the first tercile of the distribution, €300,000 (9), and 0 otherwise; and a dummy $Large_f$

---

duration is defined as $-dP/dyield$.

(Old_f) equal to one for firms above the second tercile of the distribution, €1.8 mil. (16), and 0 otherwise. The model is fully saturated, as I also interac all other bank–level controls with the proxies for financial constraints. λ_f and $\lambda_{i,c,t}$ are the firm– and 4digit industry–country–year fixed–effects . The very granular level of the 4 digit NAICS code (310 industries) allows to control for local demand conditions which are also allowed to vary over country and time (for a total of 28,705 fixed–effects).[8] The bank level controls (*Tier 1 ratio, Leverage ratio, log(Total Assets), Pre–Tax Profits/Total Assets, Customer Deposits/Total Assets, Non–Performing Loans/Total Assets and Cash/Total Assets*) and the firm–level controls (*Net Worth/Total Assets* and *CashFlow/Total Assets*) are lagged by one year.

The richness of the multi–country level of the data in AMADEUS Banker allows to run this regression separately for firms domiciled in non–stressed countries (Germany, France, Austria and the Netherlands) that borrow exclusively from non–GIIPS banks. These firms are presumably not directly affected by the negative credit demand shock in the periphery. A negative effect of sovereign losses for small firms in this case is a strong indication of a negative supply effect. It also indicates that bank–dependent borrowers are not able to easily switch between alternative sources of funding (Becker and Ivashina (2014)).

To provide evidence that MTM sovereign losses did affect lending I run the following regression at the bank–level:

$$\Delta Loans_{b,c,t} = \beta_1 SovShock_{b,t} + \gamma' X_{b,t-1} + \eta_b + \lambda_{c,t} + \epsilon_{b,c,t} \qquad (2)$$

[8]The sample is restricted to those country–4digit industry pairs that have at least two firms in each bucket per year. On average (median) there are 1,1198 (93) firms in each bucket, although there is a large heterogeneity by country: Poland has only 50 firms on average (7 median) per year in each country–4digit industry bucket while Germany has 1,1876 (266).

$\Delta Loans_{b,c,t}$ is the annual growth rate of loans granted by bank b in country c (either domestic or foreign) at the end of year t; η_b is the bank fixed-effect; $\lambda_{c,t}$ is the country–year fixed–effect that accounts for country-specific credit demand; $X_{b,t-1}$ is a vector of bank balance sheet characteristics at the beginning of the period . The main coefficient of interest in (2) is β_1: I expect $\beta_1 < 0$, so that losses from the holdings of sovereign debt, all else equal, should have a negative impact on credit growth.

Moreover I investigate whether the credit crunch also affected loan prices. Specifically, in equation (3) I have:

$$Spread_{b,f,q} = \beta_1 SovShock_{b,q} + \gamma' X_{b,q-4} + \delta LoanContr_{b,f,q} + \lambda_f + \lambda_{i,q} + \epsilon_{b,f,q} \tag{3}$$

where $Spread_{b,f,q}$ is the all-in drawn spread over the Libor or Euribor of the loan extended by syndicate b to firm f at quarter q. $\lambda_{i,q}$ is a (2–digit) industry–quarter effect, while λ_f is a firm fixed–effect for the borrower. Thus, the sample only includes firms that have more than one syndicated loan between 2009 and 2012 and it compares the interest rate charged to the *same* firm by syndicate of banks with different level of sovereign exposures. $X_{b,q-4}$ are the bank–level controls used in the baseline regression lagged at the beginning of the year and $LoanContr_{b,f,q}$ are controls for the type of loan (log($amount$), log($maturity$), $NumberBanks$, $DebtRating$, $Currency$ and $LoanPurpose$). Finally, $SovShock_{b,q}$ is constructed at a quarterly frequency, holding the sovereign exposure fixed at the beginning of the year and letting the (average) yield vary in each quarter. Here, I expect $\beta_1 > 0$: banks with higher losses from sovereign bonds are going to charge higher interest rates on their loans to make up for lost profitability.

3 Results

3.1 Real Effects

In principle, a negative credit supply shock does not necessarily need to have real negative consequences on borrowers if firms can easily switch between alternative sources of funding (Becker and Ivashina (2014)). However, this may be especially hard to accomplish for small or young firms, which are more likely to be financially constrained. This section explores whether this is the case for a large sample 1.2 million SMEs from 19 different countries.

Table 3 – Panel A presents the results for the full sample of firms that have at least information on age and total assets, but not restricting the sample to those that have additional balance sheet controls such as net worth and cash flows (EBITDA). I present these results, although they do not control for firm characteristics, to get as close as possible to the universe of bank–firm relationships present in AMADEUS Banker (800,000 firms out of 1.2 million matches). First of all, columns (1)–(4) show that there is a wide degree of heterogeneity in the response to banks' sovereign losses, depending on the size of the firm. While small firms significantly contract assets and liabilities, medium–sized and large firms appear not to be affected if their bank(s) have higher losses. In particular, if a small firm is hit by a one–standard deviation shock (0.66%) at its main bank(s) then total asset growth decreases by 2.3% compared to medium–sized firms. This is about 1/10 of the standard deviation of total assets as show in Table 1 – Panel C: a significant, but not huge economic impact.[9] Short–term liabilities, which include bank loan overdrafts, contract by almost three times as much

[9] Note that Bottero et al. (2017) find similar magnitudes of the effect of a one standard deviation increase in sovereign exposure for small Italian firms' investment and employment (1/10 of a standard deviation).

as total assets (-4%, about 1/8 of a standard deviation), consistent with the idea that the decrease in firms' growth is mostly due to banks cutting lending to their small firms customers. This has real, negative consequences on liquid assets and cash (-1.3%) as well as on investment in tangible assets (-0.3%). Columns (5)–(8) in Panel A use an alternative measure of financial constraints at the firm level: the firm's age. The results are qualitatively similar to Panel A as only young firms are negatively hit by sovereign losses in terms of lower asset and liabilities.

Panel B restricts the sample to those firms that have some additional balance sheet information, other than total assets and age: net worth and cash flows (EBITDA). Conditioning on these firm level controls as a fraction of total assets, the number of firms in the sample drops significantly, from around 800,000 to about 500,000 firms. However, the results are very similar to Panel A, with the only notable difference being that there is no discernible effect on firms' investment rate (column (6)), at any age group, in the restricted sample including the additional firm characteristics.

The results discussed above from Table 3 – Panel A and B come from the entire EBA-AMADEUS Banker matched sample, including firms from the peripheral countries. Thus it is possible that weak credit demand from GIIPS countries may confound the estimated effect of the supply shock. One way to address this concern is to test whether the results are robust if we only consider firms located in the so–called "core" countries (Austria, France, Germany and the Netherlands). Credit demand from small firms in the "core" countries is unlikely to be correlated with the sovereign shock that troubled the peripheral economies. Moreover, I focus only on firms that borrow exclusively from non–GIIPS banks, whose supply of credit is only going to be affected by the sovereign debt crisis through their direct exposure to GIIPS sovereign debt, not because of lower credit demand. Table 3 – Panel C shows that the results are qualitatively similar to those before: short–term liabilities contracts more at small and young firms than at medium–sized and middle–aged firms and cash and tangible investment fall. Large and old firms instead are relatively unaffected. In particular, the effect of sovereign losses from non–GIIPS banks to "core" firms is especially strong for investment, as even medium–sized and middle–aged firms are negatively affected.

Table 4 utilizes both proxies for financial constraints, size and age, jointly in the same regression. I do so to test whether one particular proxy dominates the other. Columns (1)–(4) run the specifications on the full sample with firm controls and including GIIPS countries. The results indicate that age is the dominant proxy, as young firms experience a larger reduction in total assets, cash and short–term liabilities than other firms after a one standard deviation shock to sovereign losses. Actually size no longer matters: controlling for the effect of sovereign losses on young firms, small firms are not more negatively affected by sovereign losses than other firms. The only exception happens when the dependent variable is investment: in this case, small firms are more negatively affected than young firms. This echoes the results in Table 3 – Panel B where there was no negative effect of sovereign losses on investment at any age group, but small firms were still affected. Finally, columns (5)–(8) repeat the exercise for "core" firms only and again it appears that the firm's age is the dominant financial constraint.

3.2 Credit Supply

Here I provide evidence that the real effects documented in the previous section were caused by a reduction in credit supply at the affected banks, both in terms of lower quantities and higher interest rates.

Table 5 reports the results for the bank–level lending regression in (2) for domestic and foreign loan. For a 1% increase in the sovereign losses–over–asset ratio, the growth rate of loans would decrease by around 3.7% (column (1)) and for a one standard deviation increase, the growth rate of loans is expected to decrease by 6% (column (2)). To alleviate the concern that β_1 is biased because of weak credit demand in GIIPS countries, I split the losses of $SovShock_{b,t}$ between GIIPS exposure ($SovGIIPS_{b,t}$) and non–GIIPS exposure ($SovnonGIIPS_{b,t}$) in column (3): only losses coming from GIIPS exposure are significantly correlated with domestic lending. Column (4) further splits the GIIPS and non–GIIPS losses between GIIPS and non–GIIPS banks, for a total of four interactions. The key message is that the coefficient on $SovGIIPS \times nonGIIPSbanks$ is also negative and significant: it implies that there is an effect on domestic lending also in countries not under stress, if the non–GIIPS bank is exposed to GIIPS debt. This is akin to the results in Table 3 – Panel B. Moreover Column (5) excludes from the sample 19 non–GIIPS banks (10 are located in Germany) that have direct credit exposure to GIIPS countries which again may confound some of the estimates. The results still hold. Finally, columns (6)–(8) run the analysis for foreign loans from the unconsolidated statements of the international subsidiaries of the cross–border institutions present in the EBA sample. Column (7) highlights that, as with domestic loans, only losses coming from GIIPS exposures have a significant and negative effect on lending, for both GIIPS and non–GIIPS banks. Column (8) excludes all the subsidiaries located in the GIIPS countries since identifying credit supply shocks in these countries is more problematic, as credit demand is also affected: the results still hold.

Another dimension of tightened credit supply is an increase in loan interest rate. If, controlling for credit demand, we see equilibrium interest rates on loans rising, then it must be because of a negative credit supply shock. In these regressions I am comparing the interest rate charged by syndicate of banks with different level of sovereign exposure to the *same* firm: this ensures that the effect of sovereign losses on interest rates is indeed coming from credit supply rather than demand.

Table 6 presents the results. In column (1) the coefficient implies that syndicates with a one standard deviation increase in sovereign–debt–to–total–assets (0.15%) charge 40 bps. more in interest compared to syndicates with no sovereign losses even if they lend to the *same* firm. Since the average all–in drawn spread is 270 bps., this means that a one standard deviation increase in sovereign losses increases the interest rate spread by about one–sixth of its average value. This is an economically relevant effect. Column (2) controls for some loan characteristics (maturity, size, number of banks in the syndicate), along with dummies for the purpose of the loan, the currency and the firm's senior debt rating according to Moody's.[10] $InvestmentGrade$ is equal to 1 for ratings between Aaa and Baa3, 0 otherwise; $Junk$ is equal to one for ratings between Ba1 and C, 0 otherwise. The firm's rating is available only for around 40% of the observations, hence the third omitted category in the regression in column (2) is represented by the non rated firms.

Ideally, to fully control for any firm–specific credit demand, the firm fixed–effect should be time–varying. Unfortunately, I do not have enough firms that satisfy this criterion, since only 300 firms borrow more than once

[10] It would be preferable to control for the firm's loan ratings, not its senior debt rating, but that is available only for 10% of the observations.

in the same year. However, in columns (3) and (4) of Table 6 I take an alternative approach, similar to the one used in Acharya et al. (2015), and I divide the firm fixed–effect into three sub–effects: one for investment grade firms, one for "junk" firms and one for non–rated firms. The results are very similar to the ones using firm fixed–effect only, if anything the magnitude and significance are larger. Although admittedly most of the firms are unrated (60% of the observations), this type of fixed effect strengthens the idea that the result are driven by a supply, rather than a demand effect.

Table 2 in the Internet Appendix – Part B repeats the analysis of Table 6 in the paper but restricting the sample to lead arrangers only. The results are barely affected.

4 The channels

There are two main hypotheses as to why sovereign exposures matter for credit supply: the *capital channel* and the *funding channel*. In this section I discuss both hypotheses and test them in the data.

According to the first, losses on the sovereign bond portfolio are a negative equity shock that would either push banks closer to the minimum level of regulatory capital or below the target level as required by the market. Then, since raising equity is a relatively costly source of finance (Myers and Majluf (1984)), banks would find deleveraging optimal (Bocola (2014), Brunnermeier et al. (2015) and Gennaioli et al. (2014a)). Even if book or regulatory equity is in general not affected by the market valuation of sovereign bonds, expected future sovereign losses today can still have an impact on market equity. For example, market participants might be worried about the future solvency of the institution and the management may decide to deleverage in response. Thus, banks that are more vulnerable to market pressures, *i.e* those with low levels of market capitalization or high leverage ratios, may be reducing lending when they are more exposed to sovereign debt.

The *funding channel*, on the other hand, suggests that losses on sovereign bonds matter for credit supply because they impair banks' ability to refinance on the wholesale market. Market participants would not be willing to roll–over short–term funding, especially if unsecured, to banks with large MTM losses. However, the nature of the sovereign shock would make even GIIPS–collateralized secured funding hard to get, as the haircut, the repo rate and the eligibility in the collateral pool depend on the market value of sovereign bonds (Boissel et al. (2016)). My measure of banks' MTM sovereign losses can be interpreted as a measure of vulnerability to the funding shock, for both unsecured and secured funding collateralized with risky sovereign debt.

Table 7 explores the capital and the funding channel in greater detail. The dependent variable in all regressions is the growth rate of domestic loans. All columns interact the sovereign shock with a dummy equal to one if each variable measuring the capital channel is below the 25^{th} pct or the variable measuring the funding channel is above the 75^{th} pct, and equal to zero otherwise. All the relevant double interactions with the other bank balance sheet variables are also included, but not shown. The intuition behind these regressions is that if banks with low capitalitazion (or high dependence on short–term funding) experience a larger decline in lending the higher the sovereign losses, it is likely that the capital (or funding) channel is at work.[11]

Column (1) interacts the sovereign shock with a dummy variable for low

[11] The results are robust if I interact with the continuous variable rather than dummy variables based on percentiles, see Table 5 in the Internet Appendix – Part D.

regulatory (Tier 1) capital, while column (2) explores the capital channel using the Tier 1 ratio under the Stress Test adverse scenario. Column (3) uses the actual *leverage ratio*, defined as Common equity over Total Assets, rather than RWA. Column (4) uses yet another definition of capital: market equity capitalization as a fraction of total assets. In all these cases the baseline effect remains significant and negative but the interaction term is not, indicating that another channel is causing the reduction in lending.

Column (5) turns to the funding channel. Here the interaction is with a dummy $highShort–TermFund_{b,t}$ that takes value on if the bank is above the 75^{th} pct. in short–term funding over total funding and zero otherwise.[12] The interaction term is large, negative and significant (-4%), implying that for banks with a higher dependence on short term funding there is an additional negative effect of sovereign losses on bank lending. Columns (6) uses the average cost of funding in the adverse scenario from the 2011 Stress Tests as an alternative definition for the funding channel. The results are similar. Moreover, since the contemporaneous dependence on short term funding is endogenous, I use the dependence on short term funding before the crisis, at the end of 2006, to see if banks that "normally" fund themselves with short–term debt have been differentially impacted by the sovereign debt crisis in column (7). I still find an additional negative kick for banks highly dependent on short term funding. Finally, column (8) tests the joint hypothesis that both the regulatory capital and funding channels are working at the same time. It appears that the funding channel largely dominates the capital channel. Similar results hold when the funding channel is tested jointly with other measures for the capital channel (see Table 6 in the Internet

[12] Bankscope provides a variable called *Other Deposits and Short–Term Funding* that captures all short term funding not classifiable as customer deposits. This includes both secured and unsecured wholesale funding sources.

Appendix – Part D).

At last, similar results also hold for foreign loans: only parent banks that are highly exposed to short–term funding, not those with low capital level, decrease foreign lending through their international subsidiaries (Table 7 in the Internet Appendix – Part D).

4.1 Funding Channel: US MMMFs funding

In the previous section, I have been implicitly assuming that banks with high MTM losses on sovereign debt have a higher cost of funding than other banks and, as a result, they reduce lending by more. In this section I show that in fact bank short–term funding is affected by the sovereign shock.

In particular, I analyze bank–security type level data of USD funding from MMMFs to European banks (SEC N–MFP form). In particular, I test whether US MMMFs reduced their holdings of securities issued by European banks with high sovereign losses. These banks would then decrease lending supply because they are exposed to the funding shock. Figure 5 suggests that US MMMFs did not roll–over unsecured funding to European banks in 2011, especially for banks with high (*i.e.* above the median) sovereign losses. On the other hand, Figure 6 shows that secured funding was not affected by the amount of bank sovereign losses. In fact, since US MMMFs only accept high–quality collateral denominated in US dollars (Treasuries and government agencies) the deterioration of the market value of European sovereign debt did not matter for this source of funding.[13]

Table 8 presents the results. The dependent variable is the percentage change in the monthly volume of funding to bank b from all US MMMFs

[13] The end–of–quarter seasonality is a well known fact of US repo funding (Acharya et al. (2016)). Potential explanations include the tax payment dates of the fund or regulatory arbitrage.

funds for three types of securities: CD, CP and repos. Banks with a one standard deviation increase in MTM sovereign losses have lower monthly growth rate of all types of securities that US MMMFs hold (column (1)). While there is no effect for secured, repo funding backed by high–quality USD collateral, such as Treasuries and agency bonds (column (2)), unsecured funding decreases substantially (column (3)). This makes sense because MTM losses affect the quality of European sovereign debt used as collateral, not USD collateral per se. US MMMFs are not willing to lend to European banks with high potential losses on an unsecured basis, but they would accept high–quality USD assets as collateral. In particular, for a one standard deviation increase in sovereign losses, column (4) shows that the CD growth rate decreases by about 20% (one–third of a standard deviation of the dependent variable) and CP in column (4) by around 10% (one–sixth of a standard deviation). Note that none of the bank–level controls is significant. For example, it is not the case that US MMMFs decreased their holdings of securities from banks with high leverage, but only of those from banks with high sovereign losses.

Importantly, while there are only about 35 banks in the EBA–N–MFP matched sample, most banks do not belong to GIIPS countries and I can restrict the sample to non–GIIPS banks only in columns (6)–(8). The results in the last three columns show that even non–GIIPS banks with large sovereign losses have problems rolling–over short–term unsecured funding.

4.2 Alternative Channels

There are some alternative hypotheses that could explain the negative correlation between sovereign exposures and credit: the *crowding out* channel and the *illiquidity* channel.

According to the first, in a crisis period banks would shift lending away from the private sector towards risky governments. This may be particularly true for undercapitalized banks that would "gamble for resurrection" (Acharya and Steffen (2014), Acharya et al. (2015)). More in general, this view is also consistent with the risk–taking channel of monetary policy (Jiménéz et al. (2014)).

The *illiquidity* channel instead posits that not only the price, but also the liquidity, of bonds held in bank books matters for credit supply. In fact, since market liquidity and yields may be positively correlated, banks may be unable to liquidate the bonds they hold at fair value, preventing them to make room on the balance sheet to fund additional lending (DeYoung et al. (2015)). A reasonable way for banks to ration loan supply in this case would be to increase the interest rate charged on loans.

Table 9 tests the presence of the above channels in the data. Columns (1)–(4) deal with the *crowding out* channel. The dependent variable in these regressions is the yearly percentage change in the share of risky (GIIPS) sovereign bonds at the bank level. Acharya et al. (2015) find that syndicates with highly levered GIIPS banks provided lower lending volumes at higher interest rates during the sovereign crisis. At the same time, undercapitalized GIIPS banks increase the exposure to domestic government debt (hence *crowding out* lending). They also find evidence that an additional channel, using CDS–weighted exposure to sovereign debt, contributed to the fall in lending (*hit on balance sheet*). While I also find that GIIPS banks, on average, loaded up on risky sovereign debt throughout the crisis (column (1)), especially if they are undercapitalized (column (2)), it is not the case that GIIPS banks with *higher sovereign losses* were loading up on risky sovereign debt (column (3)). Column (4) and (5) further interact the sovereign losses with bank leverage, to test whether lowly capitalized banks with high sovereign losses are "gambling for resurrection" by buying more risky sovereign bonds. If anything it appears that highly capitalized *non–GIIPS* banks bought more GIIPS debt the higher the sovereign losses (column (4)) and that GIIPS banks with high sovereign losses and above median capitalization reduced their exposure, while those with below median capitalization left it unchanged (column (5)). Thus overall the data suggest that, although on average lowly capitalized GIIPS banks did buy more domestic GIIPS debt (*crowding out/risk–shifting* channel as in Acharya et al. (2015)), it is not those with higher sovereign losses that are responsible for the increase. The main result in this paper could in fact be interpreted as an interaction of Acharya et al. (2015)'s *hit on balance sheet* channel with a risk-shifting by undercapitalized banks (that I label *capital* channel) or with dependence on short-term funding (the *funding* channel).[14]

Finally, column (5) tests whether the illiquidity channel is present. As a measure of illiquidity of sovereign bond markets I use the bid–ask spread from Bloomberg. I will then interact my measure of sovereign losses with the quarterly change in the bid–ask spread for each sovereign the bank is exposed to.[15] The sovereign shock hence becomes $\sum_{s=1}^{S}\sum_{m=2Y}^{15Y} Duration_{s,m,t} \times \Delta yield_{s,m,t} \times \frac{Exposure_{b,s,m,t-1}}{Total\ Assets_{b,t-1}} \times \Delta Bid - Ask_{s,10Y,t}$, where the exposure is now weighted by the bid–ask spread of the relative sovereign bond market. First of all, at the country level the change in the yield is strongly positively correlated with the increase in illiquidity as measured by a widening of the

[14] In order to provide further evidence that MTM sovereign losses work over and above the risk-shifting by lowly capitalized GIIPS banks, I show in the Internet Appendix D – Table 8 that the baseline result on lending also works if one allows the effect of leverage to vary across GIIPS and non-GIIPS banks (that is, if one controls for the *crowding out* channel as in Acharya et al. (2015)).

[15] To maximize data coverage I use only the bid–ask spread for bonds with 10 year maturity. I exclude Hungary, Poland and Malta for which no data is available.

bid–ask spreads ($\rho \approx 0.9$). This is true for all countries except for some in the "core" (Germany, Netherlands and Finland), where the sovereign yields *decreased* but the liquidity did not improve. However, the results in column (6) indicate that the interest rate charged on syndicated loans is not higher the higher the sovereign losses and the higher the illiquidity of the sovereign bond market. Therefore, also the illiquidity channel cannot be explaining the main result of the paper.

Overall, among the proposed channels of transmission, only the funding channel is the one that can consistently explain why sovereign losses matter for credit.

5 Conclusions

In this paper, I have shown that the sovereign debt crisis has had negative real effects on European firms that are more likely to be financially constrained, *i.e* young and small firms. This happened because credit supply, both in terms of lower volume and higher interest rate spreads on loans, was affected by bank exposures to sovereign debt. I also shed some light on the mechanisms as to why MTM sovereign losses matter for bank lending. I find evidence for a *funding channel* over a *capital channel*: sovereign losses affect more the growth rate of credit for banks with a higher share of short term funding rather than those with low level of capitalization. This is consistent with investors not rolling over short–term funding to banks affected by the sovereign crisis. In fact, US MMMFs decreased their holdings of unsecured paper issued by European banks if these had high MTM losses.

References

[1] Acharya, V., Drechsler, I. and Schanbl, P., *A Pyrrhic Victory? Bank Bailouts and Sovereign Credit Risk*, forthcoming Journal of Finance, June 2014

[2] Acharya, V. and Steffen, S., *The "Greatest" Carry Trade Ever? Understanding Eurozone Bank Risks*, Journal of Financial Economics, Vol. 115, pp. 215-236, 2015

[3] Acharya, V., Eisert, T., Eufinger C. and Hirsch, C., *Real Effects of the Sovereign Debt Crises in Europe: Evidence from Syndicated Loans*, Working Paper, November 2015

[4] Acharya, V., Pierret, D. and Steffen, S., *Lender of Last Resort versus Buyer of Last Resort - Evidence from the European Sovereign Debt Crisis*, NYU Stern Working Paper, March 2016

[5] Altavilla, C., Pagano, M. and Simonelli, S., *Bank Exposures and Sovereign Stress Transmission*, ESRB Working Paper No.11, 2016

[6] Augustin, P., Boustanifar, H., Breckenfelder, J. and Schnitzler, J., *Sovereign Credit Risk and Corporate Borrowing Costs*, ECB Working Paper, October 2014

[7] Balduzzi, P., Brancati, E. and Schiantarelli, F., *Financial Markets, Banks' Cost of Funding, and Firms' Decisions: Lessons from Two Crises*, Boston College WP 824, December 2015

[8] Bank of International Settlements (BIS), *European Bank Funding and Deleveraging*, Quarterly Review, March 2012

[9] Bedendo, M. and Colla, P., *Sovereign and Corporate Credit Risk: Evidence from the Eurozone*, Journal of Corporate Finance, Vol. 33, pp.34-52, 2015

[10] Beck, T., Degryse, H.,De Haas, R. and Van Horen, N., *When arm's length is too far: Relationship banking over the business cycle*, Journal of Financial Economics (forthcoming), 2017

[11] Becker, B. and Ivashina V., *Cyclicality of credit supply: Firm level evidence* Journal of Monetary Economics 62, pp. 7693, 2014

[12] Berger, A., Bouwman, C. and Kim, D., *Small Bank Comparative Advantages in Alleviating Financial Constraints and Providing Liquidity Insurance over Time*, University of South Carolina WP, 2016

[13] Bocola, L., *The Pass-Through of Sovereign Risk*, Journal of Political Economy (forthcoming), 2014

[14] Bofondi, M., Carpinelli, L., Sette, E., *Credit Supply during a Sovereign Debt Crisis*, Journal of the European Economic Association (forthcoming), 2017

[15] Boissel, C., Derrien, F., Örs, E., Thesmar, D., *Systemic Risk in Clearing Houses: Evidence from the European Repo Market*, Journal of Financial Economics (forthcoming), 2016

[16] Bottero, M., Lenzu, S. and Mezzanotti, F., *Sovereign debt exposure and the bank lending channel: impact on credit supply and the real economy*, Bank of Italy WP, 2017

[17] Brunnermeier, M. et al., *The Sovereign-Banking Diabolic Loop and ESBIES*, American Economic Review P&P 106.5 (Forthcoming), 2015

[18] Chava, S. and Purnandam, A., *The effect of banking crisis on bank-dependent borrowers*, Journal of Financial Economics, Vol. 99, pp. 116-135, 2011

[19] Chernenko, S. and Sunderam, A., *Frictions in Shadow Banking: Evidence from the Lending Behavior of Money Market Mutual Funds*, Review of Financial Studies, Vol. 27, No. 6, pp. 1717-1750, 2014

[20] Chodorow-Reich, G., *The Employment Effects of Credit Market Disruptions: Firm-level Evidence from the 2008-09 Financial Crisis* Quarterly Journal of Economics 129 (1), pp.1-59, 2014

[21] Correa, R., Sapriza, H. and Zlate, A., *Liquidity Shocks, Dollar Funding Costs, and the Bank Lending Channel during the Sovereign Debt Crisis*, Federal Reserve Bank of Boston, Working Paper RPA 16-4, September 2016

[22] Cotugno, M., Monferra, S. and Sampagnaro, G., *Relationship lending, hierarchical distance and credit tightening: Evidence from the 200709 financial crisis*, Journal of Banking and Finance, Vol 27, pp. 1372-1385, 2013

[23] DeYoung, R., Gron, A., Torna, G. and Winton, A., *Risk Overhang and Loan Portfolio Decisions: Small Business Loan Supply Before and During the Financial Crisis*, Journal of Finance (forthcoming), 2015

[24] Drechsler, I., Drechsel, T., Marques–Ibanez, D. and Schnabl, P., *Who Borrows from the Lender of Last Resort?* , Journal of Finance (forthcoming), 2014

[25] European Central Bank, *Euro Money Market Study*, 2012

[26] Gennaioli, N., Martin, A., Rossi, S., *Sovereign Defaults, Domestic Banks and Financial Institutions* Journal of Finance, Vol. 69 Issue 2, pp. 819-866, 2014a

[27] Gennaioli, N., Martin, A., Rossi, S., *Banks, Government Bonds, and Default: What do the Data Say?* Working Paper, November 2014b

[28] Giannetti, M. and Ongena, S., *"Lending by Example": Direct and Indirect Effects of Foreign Banks in Emerging Markets*, Journal of International Economics 86 (1), pp. 167–180, 2015

[29] Iyer, R., Lopes, S., Peydro, J. and Schoar, A., *The Interbank Liquidity Crunch and the Firm Credit Crunch: Evidence from the 2007–209 Crisis* Review of Financial Studies, Vol. 27 (1) pp. 347-372, 2014

[30] Ivashina, V., Scharfstein, D. and Stein, J., *Dollar Funding and the Lending Behavior of Global Banks*, Quarterly Journal of Economics 130 (3), pp. 1241–1281, 2015

[31] Kalemli–Ozcan, S., Laeven, L. and Moreno, D., *Debt Overhang in Europe: Evidence from Firm–Bank–Sovereign Linkages* Working Paper, March 2015

[32] Jimenéz, G., Ongena, S., Peydró, J, Saurina, J., *Credit supply versus demand: Bank and firm balance-sheet channels in good and bad times*, European Banking Center Discussion Paper, Tilburg University, 2012

[33] Jimenéz, G., Ongena, S., Peydró, J, Saurina, J., *Hazardous Times for Monetary Policy: What do 23 Million Loans Say About the Impact of Monetary Policy on Credit Risk-Taking?* Econometrica, 82 (2), pp. 463-505, 2014

[34] Myers, S. and Majluf, N., *Corporate financing investment decisions when firms have information that investors do not have*, Journal of Financial Economics, Vol. 13 pp. 187-221, 1984

[35] Montoriol-Garriga, J. and Wang, C., *The great recession and bank lending to small businesses*, Federal Reserve Bank of Boston WP 11–16, 2011

[36] Murfin, J., *The Supply-Side Determinants of Loan Contract Strictness*, Journal of Finance, Vol. 67 No.5, October 2012

[37] Peek J. and Rosengren, E., *The International Transmission of Financial Shocks: The Case of Japan*, American Economic Review, Vol. 87, No. 4, pp. 495-505, 1997

[38] Popov, A. and Van Horen, N., *Exporting Sovereign Stress: Evidence from Syndicated Bank Lending During the Euro Area Sovereign Debt Crisis*, Review of Finance, pp. 1-42, 2014

[39] Popov, A. and Udell, G., *Cross-border banking and the international transmission of financial distress during the crisis of 20072008*, Journal of International Economics, Vol. 87, pp. 147-161 2012

Table 1: Summary Statistics

Panel A – Bank level (Difference in Bank Characteristics by GIIPS exposure)

	Obs.	Mean	Std.Dev.	2009		2010		2011	
				diff.	t-stat	diff.	t–stat	diff.	t–stat
TotAss (€bn.)	232	388.08	576	330.0	3.05	347.2	3.34	190.7	1.17
Dep/TA	230	0.432	0.16	-0.064	-1.84	-0.086	-2.74	0.044	1.13
STFund/TA	234	0.109	0.089	0.009	0.44	0.012	0.64	0.02	0.89
Tier1/RWA	228	0.116	0.039	0.012	2.44	0.014	1.86	0.005	0.58
Equity/TA	232	0.05	0.028	0.026	4.28	0.027	4.55	0.021	3.67
Prof/TA	232	-0.097	1.978	-0.001	-1.43	0.002	1.46	0.011	2.39
NPL/Loans	225	6.95	5.51	-0.47	-0.88	-0.438	-0.56	-1.33	-0.96
Δ Loans domestic	233	-0.011	0.1	0.008	0.29	0.022	0.73	0.062	3.74

Panel B – Loan level (EBA–Dealscan matched sample): 2010Q1-2012Q4

DealScan-EBA Sample: firms with >2 loans

	Obs.	Mean	Std.Dev.	10^{th}	50^{th}	90^{th}
N of banks per package	3,492	3.29	3.31	1	2	7
N of packages by firm	3,492	2.85	1.42	2	2	4
Loan Amount ($ mil.)	3,492	971.4	1,816	97	482	2,000
All–in drawn spread (bps.)	2,608	272.3	144.8	112	250	455
Maturity (months)	3,427	51.61	31.63	12	51	78

Panel C – Firm level (EBA–Amadeus Banker matched sample): 2010–2012

	Obs.	Mean	Std.Dev.	25^{th} pct.	50^{th} pct.	75^{th} pct.
log(TA)	2,613,329	13.67	2.292	12.239	13.556	14.978
Age	2,479,435	18.92	15.47	8	15	24
Δ log(TA)	2,613,329	0.008	0.262	-0.098	0.004	0.117
Investment/TA[1]	2,346,707	0.0002	0.07	-0.026	-0.005	0.003
Δ log(Cash)	2,513,982	0.015	0.313	-0.134	0.010	0.171
Δ log(S–T debt)	2,174,310	0.013	0.356	-0.1756	0.011	0.208
Net Worth/TA[2]	2,612,374	0.315	0.64	0.13	0.369	0.654
EBITDA/TA	1,300,093	0.078	0.230	0.016	0.069	0.147

[1] Change in Tangible Fixed Assets over Total Assets

[2] Net Worth is Shareholders' funds (Assets-Liabilities)

Panel D – Security type level (EBA–N-MFP matched sample): Nov2010–Dec2012

	Obs.	Mean	Std.Dev.	25^{th} pct.	50^{th} pct.	75^{th} pct.
CD/TA	590	0.009	0.0012	0.002	0.005	0.013
Fin CP/TA	581	0.006	0.007	0.001	0.003	0.01
Repo/TA	242	0.014	0.0101	0.007	0.014	0.02
Δ log(CD)	583	-0.072	0.626	-0.198	-0.009	0.130
Δ log(Fin CP)	575	-0.054	0.609	-0.203	0.000	0.156
Δ log(Repo)	237	-0.005	0.356	-0.165	0.002	0.165

Table 2: Distribution of $SovShock_{b,t}$

Pct.	Loss (if positive)		
	2010	2011	2012
10^{th}	-0.954%	-0.236%	-1.407%
25^{th}	0.009%	-0.038%	-0.760%
50^{th}	0.224%	0.038%	-0.417%
75^{th}	0.601%	0.206%	-0.135%
90^{th}	1.671%	2.076%	-.056%
95^{th}	2.395%	5.572%	-.015%
Mean	0.641%	0.775%	-0.603%
Std.Dev.	1.480%	2.507%	0.703%
Obs.	89	90	61

Table 3: Real Effects

Panel A – All firms no firm controls

	Δ log (TA) (1)	Inv. /TA (2)	Δ log (Cash) (3)	Δ log (S–TDebt) (4)	Δ log (TA) (5)	Inv. /TA (6)	Δ log (Cash) (7)	Δ log (S–TDebt) (8)
SovShock/sd	0.464*	0.0755	0.485	0.927	-0.152	-0.0636	-0.182	-0.339
	(0.238)	(0.0505)	(0.310)	(0.569)	(0.316)	(0.0446)	(0.422)	(0.526)
SovShock/sd×$Small_f$	-2.316***	-0.324***	-2.386***	-4.529***				
	(0.726)	(0.0783)	(0.923)	(0.996)				
SovShock/sd×$Large_f$	0.496	-0.0225	0.328	1.155**				
	(0.476)	(0.0631)	(0.531)	(0.477)				
SovShock/sd×$Young_f$					-1.817***	-0.257**	-2.547***	-2.072***
					(0.476)	(0.104)	(0.698)	(0.664)
SovShock/sd×Old_f					0.0974	-0.0284	0.148	0.654
					(0.114)	(0.0394)	(0.205)	(0.492)
N	2432995	2162674	2416974	2172600	2314665	2050006	2299661	2068753
N of firms	898616	803385	892808	806736	851943	758972	846506	765128

Panel B – All firms with firm controls

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
SovShock/sd	0.104	0.0889	0.0708	0.460	-0.445	-0.0313	-0.560	-0.168
	(0.225)	(0.0576)	(0.290)	(0.487)	(0.415)	(0.0542)	(0.540)	(0.491)
SovShock/sd×$Small_f$	-1.262**	-0.303***	-1.224*	-4.667***				
	(0.545)	(0.0852)	(0.714)	(1.340)				
SovShock/sd×$Large_f$	-0.240	-0.104	-0.561	1.886***				
	(0.621)	(0.0655)	(0.762)	(0.542)				
SovShock/sd×$Young_f$					-1.194***	0.0486	-1.777***	-3.154***
					(0.344)	(0.0748)	(0.525)	(1.060)
SovShock/sd×Old_f					0.214	-0.0352	0.287	0.711
					(0.174)	(0.0463)	(0.306)	(0.594)
N	1436777	1326602	1430861	1336565	1348585	1240970	1342910	1255268
N of firms	546969	506245	544530	510090	511124	471457	508768	476710

Panel C - Core firms borrowing from non–GIIPS banks (with firm controls)

SovShock/sd	-0.0314	-0.150*	0.309	0.846	-0.0209	-0.132**	-0.258	0.764
	(0.247)	(0.0877)	(0.304)	(0.538)	(0.189)	(0.0574)	(0.363)	(0.523)
SovShock/sd×$Small_f$	-1.671***	-0.169*	-2.304***	-2.048***				
	(0.400)	(0.0988)	(0.474)	(0.529)				
SovShock/sd×$Large_f$	0.466**	0.104	0.290	0.746				
	(0.236)	(0.0785)	(0.310)	(0.510)				
SovShock/sd×$Young_f$					-0.969***	0.0562	-0.939**	-1.966***
					(0.205)	(0.0572)	(0.394)	(0.493)
SovShock/sd×Old_f					0.244	0.0345	0.630*	1.582***
					(0.175)	(0.0680)	(0.322)	(0.458)
N	376870	365383	372987	310801	364061	353111	360206	302572
N of firms	138490	133937	136787	114083	133800	129445	132106	110979

Standard errors in parentheses
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Note: The dependent variables are respectively: the growth rate of total assets, investment rate as a fraction of total assets, cash growth, and short–term liabilities growth. Panel A includes all firms in the EBA–Amadeus Banker matched sample (see Internet Appendix – Part C for a list of countries) with no firm controls, while Panel B includes them. *SovShock* is the average of the bank–specific sovereign loss for all banks b lending to firm f normalized by its standard deviation (0.66%); other bank balance sheet variables (Tier 1 capital over RWA; Equity over total assets (leverage ratio); bank size ($\log(TotalAssets)$); operating profits, customer deposits, cash and other cash equivalents and non–performing loans all normalized by total assets) are also averaged. $Small_f$ ($Young_f$) is a dummy equal to one for firms below the first tercile of the distribution of assets (age) in each group (all firms and core firms) and 0 otherwise; $Large_f$ is a dummy equal to one for firms above the second tercile of the distribution and 0 otherwise. Firm level controls are: net worth and cash flow (EBITDA) over total assets. Regression models are fully saturated, including all relevant double interaction between dummies and bank characteristics. Standard errors are two–way clustered at bank and firm level.

Table 4: Real Effects: both young and small

	All firms				Core firms, non–GIIPS banks only			
	Δ log (TA) (1)	Inv. /TA (2)	Δ log (Cash) (3)	Δ log (S–TDebt) (4)	Δ log (TA) (5)	Inv. /TA (6)	Δ log (Cash) (7)	Δ log (S–TDebt) (8)
SovShock/sd	-0.279	0.0216	-0.303	0.777	-0.157	-0.0903	-0.192	0.574
	(0.375)	(0.0542)	(0.527)	(0.586)	(0.218)	(0.0758)	(0.399)	(0.600)
SovShock/sd×$Young_f$	-1.276***	0.158*	-2.085***	-2.882***	-0.954***	-0.00542	-0.893**	-1.985***
	(0.355)	(0.0814)	(0.536)	(1.016)	(0.162)	(0.0463)	(0.399)	(0.462)
SovShock/sd×Old_f	0.469**	-0.00213	0.696**	0.825	0.153	-0.0249	0.570*	1.594***
	(0.188)	(0.0468)	(0.309)	(0.543)	(0.218)	(0.0632)	(0.323)	(0.524)
SovShock/sd×$Small_f$	0.00692	-0.132**	0.212	-3.017***	0.271	-0.0821	0.0744	-0.658
	(0.429)	(0.0650)	(0.546)	(0.524)	(0.288)	(0.109)	(0.285)	(0.453)
SovShock/sd×$Large_f$	-0.645	-0.0908	-1.261	0.177	-0.301	-0.0540	-0.699**	0.219
	(0.599)	(0.0565)	(0.832)	(0.618)	(0.201)	(0.0870)	(0.321)	(0.440)
N	1348585	1240970	1342910	1255268	364061	353111	360206	302572
N of firms	511124	471457	508768	476710	133800	129445	132106	110979
Firm controls	yes	yes	yes	yes	yes	yes	yes	yes

Standard errors in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Note: The dependent variables are respectively: the growth rate of total assets, investment rate as a fraction of total assets, cash growth, and short–term liabilities growth. *SovShock* is the average of the bank–specific sovereign loss for all banks b lending to firm f normalized by its standard deviation (0.66% for all firms and 0.34% for core firms); other bank balance sheet variables (Tier 1 capital over RWA; Equity over total assets (leverage ratio); bank size (log($TotalAssets$)); operating profits, customer deposits, cash and other cash equivalents and non–performing loans all normalized by total assets) are also averaged. $Small_f$ ($Young_f$) is a dummy equal to one for firms below the first tercile of the distribution of assets (age) in each group (all firms and core firms) and 0 otherwise; $Large_f$ is a dummy equal to one for firms above the second tercile of the distribution and 0 otherwise. Firm level controls are: net worth and cash flow (operating revenue) over total assets. Regression models are fully saturated, including all relevant double interaction between dummies and bank characteristics. Standard errors are two–way clustered at bank and firm level.

Table 5: Domestic and Foreign Lending and the Sovereign Shock
$\Delta Loans_{b,c,t} = \beta_1 SovShock_{b,t} + \eta_b + \lambda_{c,t} + \gamma' X_{b,t-1} + \epsilon_{b,c,t}$

	Domestic Loans					Foreign Loans		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
SovShock	-3.757**							
	(1.342)							
SovShock/sd		-6.074**				-8.379***		
		(2.170)				(2.443)		
SovGIIPS/sd			-5.936***					
			(2.133)					
SovnonGIIPS/sd			-0.665					
			(1.749)					
SovGIIPS× GIIPSbanks/sd				-7.528***	-8.573**		-9.845***	-11.31***
				(2.669)	(3.325)		(3.462)	(2.598)
SovGIIPS× nonGIIPSbanks/sd				-3.342***	-2.871*		-0.763	-1.147
				(1.302)	(1.512)		(1.187)	(1.309)
SovnonGIIPS× GIIPSbanks/sd				-2.067*	-1.018		2.424	1.281
				(1.123)	(1.374)		(1.198)	(1.341)
SovnonGIIPS× nonGIIPSbanks/sd				0.164	5.600		3.900	6.823
				(2.373)	(12.47)		(11.91)	(15.94)
N	217	217	217	217	177	327	327	317
N of banks	89	89	89	89	74	121	121	107
Bank FE	yes	yes	yes	yes	yes	yes	yes	yes
Country×year FE	yes	yes	yes	yes	yes	yes	yes	yes
Bank controls: Tier1/RWA(+)***, Equity/TA(+), Log(TA)(-), Profits(+)***, NPL(-)***, Dep(-), Cash(+)								

Cluster robust *s.e.* in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Note: the dependent variable is the growth rate of domestic loans (columns (1-5)) and foreign loans (columns (6)-(8)). Bank controls are: Tier 1 capital over RWA; Equity over total assets (leverage ratio); bank size ($\log(TotalAssets)$)operating profits, customer deposits, cash and other cash equivalents and non–performing loans all normalized by total assets. All variables are measured at the beginning of the period $(t-1)$. $SovShock_{j,t}$ is the bank–specific sovereign loss normalized by total assets too. $SovGIIPS$ and $SovnonGIIPS$ are the bank–specific sovereign losses on GIIPS and non–GIIPS exposure respectively. $GIIPSbanks$ and $nonGIIPSbanks$ are dummies for whether the bank is located in the GIIPS or not. Each coefficient has been divided by the standard deviation in each group, which are: 1.6% for $SovGIIPS$ and 0.2% for $SovnonGIIPS$ in column (3); 1.4% for $SovGIIPS \times GIIPSbanks$ and 0.12% for $SovGIIPS \times nonGIIPSbanks$; 0.2% for $SovnonGIIPS \times GIIPSbanks$ and 1.2% for $SovnonGIIPS \times GIIPSbanks$ in columns (4)–(8). Column (5) excludes all non–GIIPS banks with a positive credit exposure to GIIPS countries. Column (8) excludes all subsdiaries located in GIIPS countries. All std.err. have been clustered at the bank level.

Table 6: Interest Rate Loan Spreads: All lenders

	(1)	(2)	(3)	(4)
SovShock/sd	39.54**	38.79**	44.32**	47.11***
	(16.20)	(15.30)	(17.43)	(16.46)
$\log(Maturity)$		-25.11*		-26.05*
		(14.13)		(14.54)
$\log(LoanAmount)$		-18.00*		-23.24**
		(9.248)		(9.635)
Number of banks		1.355		3.173
		(2.374)		(2.284)
Investment Grade		-10.74		
		(25.85)		
Junk		30.34		
		(25.22)		
N (of loan packages)	1,573	1,558	1,410	1,395
Bank controls	yes	yes	yes	yes
Loan Purpose and Currency dummies	no	yes	no	yes
Firm FE	yes	yes	no	no
Firm–rating FE	no	no	yes	yes
Industry–Quarter FE	yes	yes	yes	yes

Cluster *s.e.* in parentheses

* $p < 0.10$, **$p < 0.05$, ***$p < 0.01$

Note: The dependent variable is the the all-in drawn spread on loans made by syndicate b to firm f at quarter t in basis points. *SovShock* is the average of the bank–specific sovereign loss for syndicate b at a quarterly frequency and it has been divided by the standard deviation in the EBA–Dealscan matched sample (0.157%). Other balance sheet variables (Tier 1 capital over RWA; Equity over total assets (leverage ratio); bank size ($\log(TotalAssets)$), operating profits, customer deposits, cash and other cash equivalents and non–performing loans all normalized by total assets) are also averaged. All std.err. have been clustered at the syndicate level.

Table 7: The Capital and the Funding Channel

	Capital Channel: Regulatory (1)	Capital Channel: Stressed (2)	Capital Channel: Leverage (3)	Capital Channel: MktCap (4)	Funding Channel: S–T Fund (5)	Funding Channel: FundCost (6)	Funding Channel: 2006Q4 (7)	Both Channels (8)
SovShock	-3.533*	-4.804***	-2.919**	-5.375***	-2.247	-4.459***	-4.765**	-2.594
	(1.822)	(1.487)	(1.437)	(1.702)	(1.517)	(1.337)	(2.177)	(2.157)
SovShock× $lowTier1/RWA$	-0.330							0.496
	(0.793)							(0.926)
SovShock× $lowTier1Stress/RWA$		-0.232						
		(1.074)						
SovShock× $lowEquity/TA$			-3.096					
			(3.318)					
SovShock× $lowMktCap/TA$				-0.923				
				(3.558)				
SovShock× $highShortTermFund$					-5.153***		-4.109**	-4.428***
					(1.266)		(1.682)	(1.638)
SovShock× $highFundCost$						-2.438**		
						(1.083)		
N	217	216	214	141	216	213	209	216
N of banks	89	89	88	54	88	86	83	88
Bank FE	yes	yes	yes	yes	yes	yes	yes	yes
Country×year FE	yes	yes	yes	yes	yes	yes	yes	yes
Bank controls: Tier1(+)***, Profits(+)*** , NPL(-)***, Dep(-), Cash(+)								

Cluster robust *s.e.* in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Note: The dependent variable is the growth rate of domestic loans $\Delta Loans_{b,c,t}$. $lowTier1\ RWA_{b,t}$ takes value 1 if the bank is below the 25^{th} pct. of the level of Tier 1 ratio in year t, 0 otherwise; $lowTier1Stressed/TA_{b,t}$ is equal to 1 if the bank is below the 25^{th} pct. of the level of the regulatory capital under the adverse scenario in the 2010 and 2011 Stress Tests in year t, 0 otherwise (I use the 1-year ahead forecast from the 2010 Stress Test for 2010Q4, and the 1– and 2– year ahead forecast from the 2011 Stress Test for 2011Q4 and 2012Q4.); $lowEquity/TA_{b,t}$ is equal to 1 if the bank is below the 25^{th} pct. of the level of the leverage ratio (Equity/Total Assets) in year t, 0 otherwise; $lowMktCap/TA_{b,t}$ is equal to 1 if the bank is below the 25^{th} pct. of the level market capitalization (averaged over the year) over total assets in year t, 0 otherwise; $highShortTermFund_{b,t}$ takes value 1 if the bank is above the 75^{th} pct. in short–term funding over total funding in year t, 0 otherwise; $highCostFund_{b,t}$ takes value 1 if the bank is above the 75^{th} pct. in cost of funding under the adverse scenario in the 2011 Stress Test in year t, 0 otherwise; other balance sheet variables (Tier 1 capital over RWA; Equity over total assets (leverage ratio); bank size ($\log(TotalAssets)$)operating profits, customer deposits, cash and other cash equivalents and non–performing loans all normalized by total assets) are defined as before. Regression models are fully saturated, including all relevant double interaction between dummies and bank characteristics. Standard errors are clustered at the bank–level.

Table 8: The Funding Channel: US MMMFs

	All Banks					non–GIIPS banks		
	All	Repo	Unsec	CD	CP	Repo	CD	CP
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
SovShock/sd	-0.118***	-0.0586	-0.130***	-0.191***	-0.107**	-0.0586	-0.202***	-0.107**
	(0.0266)	(0.0878)	(0.0368)	(0.0434)	(0.0448)	(0.0878)	(0.0510)	(0.0467)
$Tier1/RWA$	-3.534	-3.328	-4.051	-2.431	-3.703	-3.328	-1.086	-2.732
	(2.797)	(6.665)	(3.427)	(3.587)	(5.707)	(6.665)	(4.143)	(5.621)
$Prof/TA$	-8.962	-30.52	-5.151	-3.395	-12.39	-30.52	-4.937	-13.33
	(10.40)	(41.40)	(11.42)	(13.42)	(14.02)	(41.40)	(19.16)	(15.89)
$Equity/TA$	3.517	19.57	1.429	-0.509	0.547	19.57	-3.825	3.183
	(5.945)	(12.54)	(8.084)	(10.32)	(11.64)	(12.54)	(10.80)	(12.17)
$\log(TA)$	-0.00165	0.661	-0.155	0.135	-0.402	0.661	0.192	-0.373
	(0.239)	(0.564)	(0.329)	(0.447)	(0.424)	(0.564)	(0.666)	(0.443)
$Cash/TA$	-0.182	-0.346	-0.502	-0.694	0.0926	-0.346	-0.690	-0.0379
	(0.736)	(1.585)	(0.960)	(0.984)	(1.061)	(1.585)	(1.034)	(1.092)
NPL/TA	-1.798	-8.787	1.141	1.746	2.051	-8.787	-0.478	0.657
	(5.796)	(13.48)	(7.018)	(9.577)	(7.637)	(13.48)	(13.84)	(8.450)
N	1,371	257	1,114	567	544	257	505	503
N of banks	32	11	32	30	29	11	25	25
Bank FE	yes	yes	yes	yes	yes	yes	yes	yes
Month FE	yes	yes	yes	yes	yes	yes	yes	yes

Cluster robust *s.e.* in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Note: the dependent variables are the percentage change in the monthly volume of funding to bank b from all US MMMFs for three types of securities: CD, CP and repos. Column (1) contains all types of securities, column (2) only repos, column (3) only unsecured sources (CD+CP), columns (4) and (5) have CD and CP respectively; columns (6)–(7) restrict the sample to non–GIIPS banks only. Bank controls are measured at the beginning of the period $(t-1)$. $SovShock_{j,t}$ is divide by the standard deviation in the sample (0.379%). All std.err. have been clustered at the bank level.

Table 9: Alternative Channels and Sovereign Shock

	Δ log($GIIPSExp_t$)					Spread
	(1)	(2)	(3)	(4)	(5)	(6)
$GIIPSbank$	0.0113***	0.874***				
	(0.00290)	(0.221)				
$GIIPSbank\times$ $Equity/TA_{b,t-1}$		-0.0635**				
		(0.0317)				
SovShock$\times GIIPSbank$			-0.0949	-0.178	-0.269*	
			(0.0834)	(0.194)	(0.140)	
SovShock$\times nonGIIPSbank$			0.547	-0.734	0.145	
			(0.334)	(0.514)	(1.213)	
SovShock$\times GIIPSbank$ $\times Equity/TA_{b,t-1}$				0.0169		
				(0.0314)		
SovShock$\times nonGIIPSbank$ $\times Equity/TA_{b,t-1}$				0.369**		
				(0.169)		
SovShock$\times GIIPSbank$ $\times lowEquity/TA_{b,t-1}$					0.257*	
					(0.131)	
SovShock$\times nonGIIPSbank$ $\times lowEquity/TA_{b,t-1}$					-0.024	
					(1.226)	
SovShock/sd						39.80**
						(16.76)
SovShock/sd$\times\Delta BidAsk_{s,t}$						-1.19
						(67.65)
N	188	188	188	188	185	2319
N of banks	81	80	80	80	81	70
Bank Controls	yes	yes	yes	yes	yes	yes
Bank FE	no	no	yes	yes	yes	yes
Year FE	yes	yes	yes	no	no	no
Country$\times$Year FE	no	no	yes	yes	yes	yes
Industry$\times$Quarter FE	no	no	no	no	no	yes
Firm FE	no	no	no	no	no	yes

Cluster robust *s.e.* in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Note: The dependent variable is the yearly change in the fraction of GIIPS sovereign bonds exposure to total assets $(\Delta GIIPS/TA)_{b,t}$ in columns (1)–(5) and the interest rate spread ($Spread_{b,f,q}$) from syndicated loans in column (6). *SovShock* is the bank–specific sovereign loss. *GIIPSbank* (*nonGIIPSbank*) is a dummy equal to one for GIIPS (nonGIIPS) banks. $lowEquity/TA_{b,t-1}$ is a dummy equal to one if the bank has a below the median leverage ratio in the previous year and 0 otherwise. $\Delta BidAsk_{s,t}$ is the quarterly change in the bid–ask spread at the exposure–country level. Bank controls (lagged) as before. All std.err. have been clustered at the bank level.

Figure 1: GIIPS Sovereign Exposures, March 2010

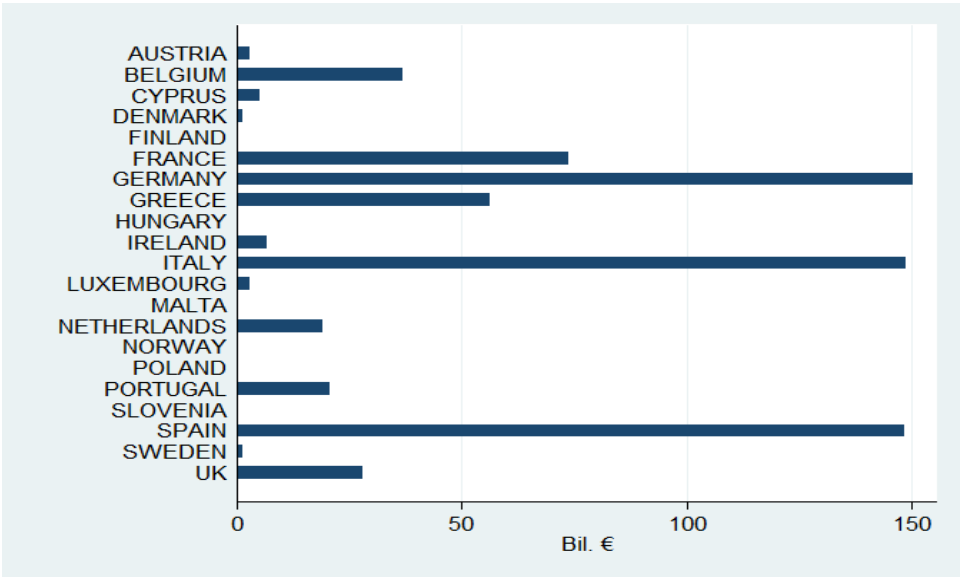
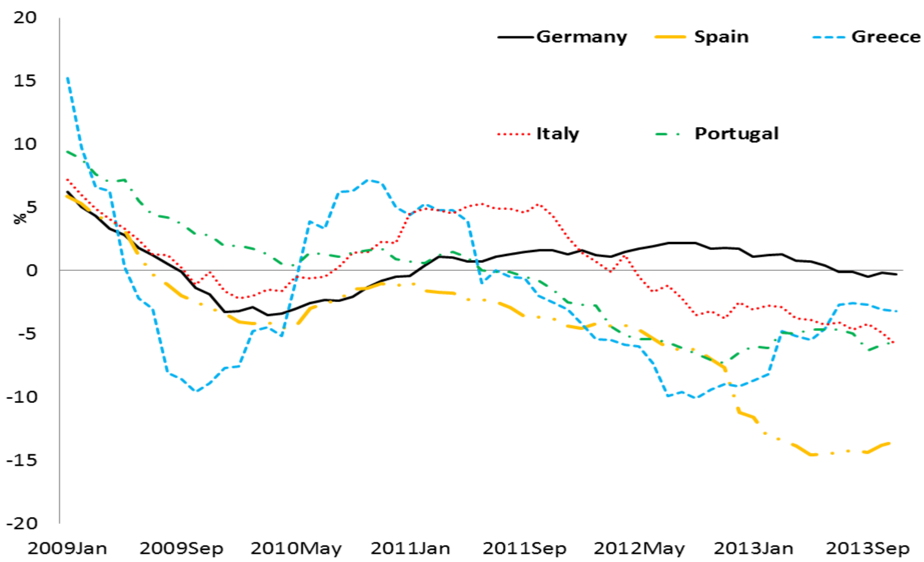
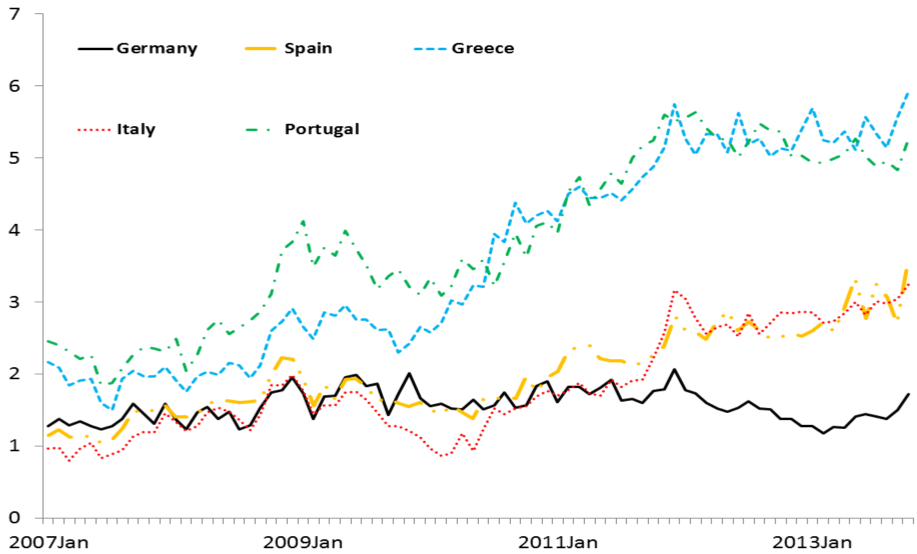


Figure 2: Domestic Loans Growth Rate to Non–Financial Corporations.



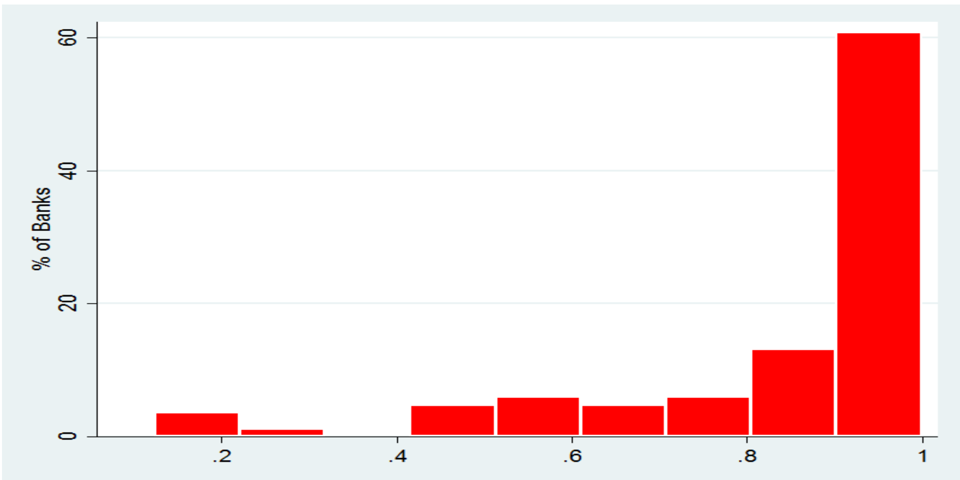
Source: ECB, MFI Aggregate Statistics (New loans to Non–Financial Corporations)

Figure 3: Interest Spread (on ECB Policy Rate) for New Loans to Non–Financial Corporations



Source: ECB, MFI Aggregate Statistics (Narrowly Defined Effective Rates, all maturities and amounts)

Figure 4: Share of Held–To–Maturity (HTM) over Total GIIPS Sovereign Exposure, March 2010



Source: EBA Stress Test 2010 (90 banks). Amounts are aggregated at the bank level summing over all the exposures to GIIPS countries.

Figure 5: US MMMF Unsecured Funding (CD+CP) to EBA banks, Nov2010-Dec2012

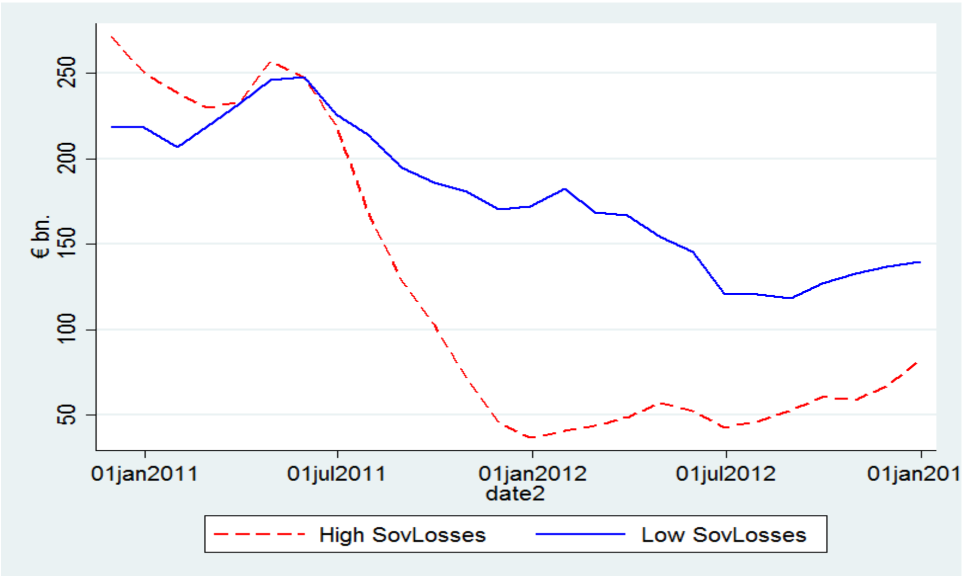
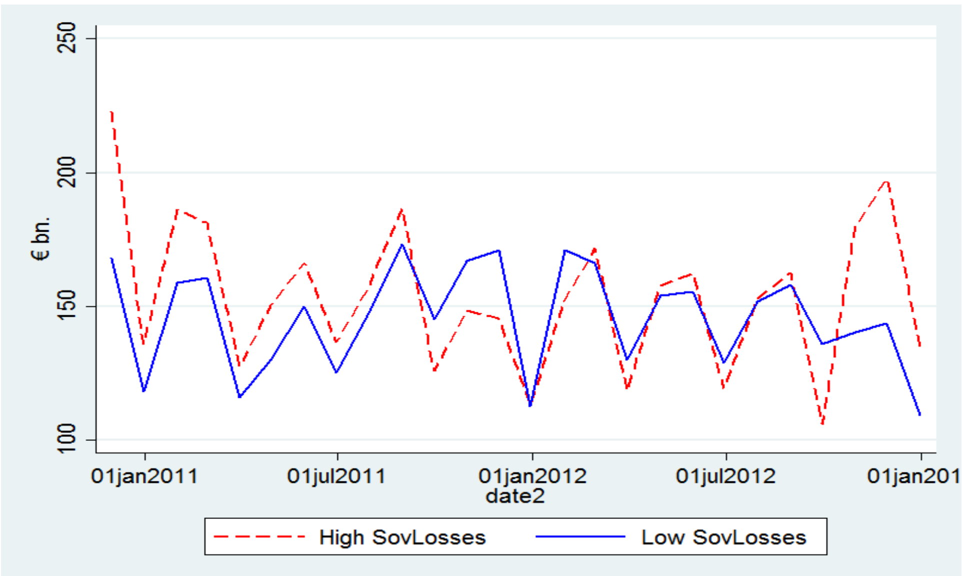


Figure 6: US MMMF Secured Funding (Repo) to EBA banks, Nov2010-Dec2012



Source: N–MFP form

Index of Working Papers:

January 31, 2017	Steve Ambler, Fabio Rumler	212	The Effectiveness of Unconventional Monetary Policy Announcements in the Euro Area: An Event and Econometric Study
May 29, 2017	Filippo De Marco	213	Bank Lending and the European Sovereign Debt Crisis