Real Effects of the Sovereign Debt Crisis in Europe: Evidence from Syndicated Loans

Viral V. Acharya, Tim Eisert, Christian Eufinger, and Christian Hirsch[*]

ABSTRACT

In this paper, we explore the impact of the European Sovereign Debt Crisis and the resulting credit crunch on the corporate policies of firms. Existing theory suggests that sovereign crises can affect the real economy in complex ways based on the nature of the interaction between bank and sovereign health. We show that banks' exposures to impaired sovereign debt and risk-shifting behavior of undercapitalized banks are of first-order importance for explaining the negative real effects suffered by European firms, while moral suasion by governments to buy more domestic sovereign debt does not seem to have played a major role. In particular, we present firm-level evidence showing that the lending contraction of banks affected by the crisis depresses the investment, job creation, and sales growth of firms with significant business relationships to these banks. These firms increase their precautionary motives to save cash out of free cash flows and rely more on cash holdings than bank lines of credit for their liquidity management during the crisis, a typical behavior of financially constrained firms. Our estimates suggest that the credit crunch explains between one fifth and one half of the overall negative real effects in the sample.

JEL classification: G01, G21, G28, E44.

Starting in 2009, countries on the periphery of the eurozone drifted into a severe sovereign debt crisis as concerns about the deterioration of credit quality made it increasingly difficult for the affected countries to refinance and service existing debt. Since the deterioration in the sovereigns' creditworthiness fed back into the financial sector (Acharya, Drechsler, and Schnabl (2014); Acharya and Steffen (2015)), lending to the private sector contracted substantially in Greece, Ireland, Italy, Portugal, and Spain (the GIIPS countries). For example, in Ireland, Spain, and Portugal, the overall lending volume of newly issued loans fell by 82%, 66%, and 45% over the 2008-2013 period, respectively.[1] This contraction in loan supply led to a sharp increase in the uncertainty for borrowing firms as to whether they would be able to access bank funding in the future. As Pietro Fattorini, the owner and manager of a 23-year old Italian company, puts it: "It's like starting to drive on the motorway without knowing if you'll find gas stations on the way."[2]

This statement suggests that the contraction in bank lending negatively affected the corporate policies of borrowing firms and thus might have been one important contributor to the severity of the European Sovereign Debt Crisis. However, there is still no conclusive evidence as to (i) how important the bank lending channel was for the severity of the crisis as opposed to the overall macroeconomic shock; (ii) whether the credit crunch had any real effects for the borrowing firms in Europe since firms facing a withdrawal of credit from one financing source might have been able to get funding from a different source (Adrian, Paolo, and Shin (2013); Becker and Ivashina (2014a)); and (iii) what actually caused the decline in bank lending.

Against this background, our paper makes two important contributions to the literature. First, we show that the decline in bank lending during the European Sovereign Debt Crisis was indeed an important contributor to the severity of the crisis. In particular, we present firm-level evidence that the loan supply contraction of banks affected by the sovereign debt crisis made firms with a higher dependence on these banks financially constrained. These firms display an increased precautionary motive to save cash out of free cash flow relative to unaffected firms, and also rely more on cash holdings relative to lines of credit for their liquidity management. As a result of the limited access to bank financing, we show that firms connected to banks affected by the crisis encountered strong negative real outcomes; their investments, employment growth, and sales growth became depressed. Our estimates suggest that the credit crunch explains between one fifth and one half of the overall negative real effects in the sample.

Second, to the best of our knowledge, we are the first to explore the possibly complex set of channels through which the European Sovereign Debt Crisis caused a reduction in bank lending, as well as the associated negative real effects for borrowing firms. We document that the negative real effects of the European Sovereign Debt Crisis that can be attributed to the bank lending channel are primarily associated with (i) banks from GIIPS countries facing increased risk of losses on their significant domestic sovereign bondholdings, and (ii) the resulting incentive of undercapitalized banks from GIIPS countries to engage in risk-shifting behavior by buying even more domestic

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[1] "SMEs in peripheral Eurozone face far steeper borrowing rates" by Patrick Jenkins, Financial Times, October 10, 2013

[2] "Italian Banks' Woes Hurt Small Firms" by Giovanni Legorano, Wall Street Journal, December 1, 2013

sovereign bonds, thereby crowding out corporate lending.

Our sample is based on loan information data obtained from Thomson Reuters LPC's DealScan, which provides extensive coverage of bank-firm relationships throughout Europe. We augment this dataset by hand-matching firm-specific information from Bureau van Dijk's Amadeus database and bank-specific information from various sources. The sample includes firms from all European countries that were severely affected by the sovereign debt crisis (the GIIPS countries) and firms incorporated in Germany, France, and the U.K. (the non-GIIPS countries) which are the countries with the largest number of syndicated loans among the European countries that were not significantly affected by the sovereign debt crisis. Our sample period covers the years 2006 until 2012.

Our dataset provides three key advantages for studying the economic impact of the sovereign debt crisis and the resulting lending supply contraction on European firms. First, the fact that the sample is pan-European and includes a geographical breakdown of the firms' subsidiary revenues enables us to more precisely disentangle the adverse effects on the real economy caused by the macroeconomic demand and the bank credit supply shock. Second, our sample enables us to rule out the possibility that a reduction in bank lending by domestic banks is substituted by bank credit from foreign financial institutions. Third, and most importantly, the bank-specific information together with data on bank-firm relationships allows us to determine which channels drive the contraction in bank lending, and thus cause the negative real effects for borrowing firms.

There are at least three potential channels through which the sovereign debt crisis might have affected bank lending and, in turn, the corporate policies of borrowing firms: one passive and two active. The passive channel is the hit on a bank's balance sheet. The active channels are risk-shifting and moral suasion. The passive channel suggests that the dramatic increase in risk of GIIPS sovereign debt directly translates into losses for banks due to their large sovereign bondholdings, as shown by the recent European Banking Authority's (EBA's) EU-wide stress tests and capital exercises. To cope with these losses, banks had to deleverage and thus might have reduced lending to the private sector (e.g., see Bocola (2014) for a theoretical model of this mechanism).

In the first active channel, the risk-shifting motive arises since weakly-capitalized banks from GIIPS countries might have had an incentive to increase their risky domestic sovereign bondholdings even further. The reason for this is that this asset class offers a relatively high return and at the same time has a very high correlation with the banks' existing portfolio (Diamond and Rajan (2011); Crosignani (2014)). The latter is important since a proper "risk-shifting asset" only generates large losses in states of the world in which the bank is in default anyway, which is true for domestic sovereign debt as European banks usually have large domestic government debt holdings (in the case of GIIPS banks often exceeding 100% of their core capital). In addition, eurozone regulators consider these bonds to be risk-free (i.e., attach zero risk weights) and removed the concentration limits for sovereign debt exposures, which allows large bets without having to put up equity capital. This risk-shifting mechanism might have led to a crowding-out of lending to the private sector and thus might have negatively impacted the real economy.

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In the second active channel, according to the moral suasion motive, a government might have explicitly or implicitly pressured domestic banks to increase their domestic sovereign bondholdings in case it found it difficult to refinance its debt (e.g., Becker and Ivashina (2014b)), which also might have crowded out lending to the real sector.

To assess whether the European Sovereign Debt Crisis affected the real economy in Europe through the bank lending channel, we start by taking into account all potential bank lending channels (i.e., balance sheet hit, risk-shifting, and moral suasion) by using a bank's country of incorporation as a proxy for how affected the bank was by the crisis. All three channels are related to the bank's country of incorporation as (i) banks' generally have large domestic sovereign bondholdings, implying a large exposure to *domestic* sovereign risk (balance sheet hit channel) and (ii) banks might willingly or due to government pressure increase their *domestic* sovereign debt holdings even further, which potentially crowds out corporate lending (risk-shifting and moral suasion channels).

Based on a bank's country of incorporation, we divide banks into two groups: (i) GIIPS banks, which are banks headquartered in GIIPS countries and (ii) non-GIIPS banks, that is, banks from Germany, France, and the U.K. To consistently estimate the real effects for borrowing firms of having pre-crisis relationships with banks affected by the sovereign debt crisis, we compare in our main specification the change in the corporate policies after the beginning of the crisis across firms from the same country and industry but which differ in their dependence on GIIPS banks. In particular, we include industry-country-year fixed effects to capture any time-varying shocks to an industry in a given country that may have affected the credit demand of borrowing firms, their access to credit, or their real outcomes. Moreover, we include foreign bank country-year fixed effects to absorb any unobserved, time-varying heterogeneity that may arise because a firm's dependency on banks from a certain country might be influenced by whether this firm has business in the respective country. Consider as an example a German firm borrowing from a Spanish and a German bank. For this firm, we include a Spain-year fixed effect to capture the firm's potential exposure to the macroeconomic downturn in Spain during the European Sovereign Debt Crisis. Furthermore, we control for unobserved, time-constant firm heterogeneity and observable time-varying firm characteristics that affect the firms' corporate policies, loan demand, or loan supply.

Our results document that during the sovereign debt crisis, firms with a high dependence on banks incorporated in GIIPS countries exhibit behavior that is typical for financially constrained firms. That is, they have lower leverage, demonstrate a significantly positive propensity to save cash out of their cash flows, and rely more on cash holdings relative to bank lines of credit for their liquidity management. These results are not observed for firms that are not dependent on GIIPS banks, nor for highly GIIPS bank-dependent firms in the period prior to the sovereign debt crisis. We then explore how these financially constrained firms adjusted their corporate policies. We find that firms that had significant business relationships with GIIPS banks decreased investment more, and experienced less job creation and sales growth compared to firms that were less dependent on GIIPS banks.

These findings do not seem to be driven by how firms and banks formed business relationships in the pre-crisis period. Comparing firms with high and low dependency on GIIPS banks suggests that firms in the two groups are comparable in terms of the outcome variables and other observable dimensions in the pre-crisis period, confirming that the parallel trend assumption holds. Furthermore, there are no significant pre-crisis differences between GIIPS and non-GIIPS banks that could explain our results. Lastly, we can rule out that syndicates that include GIIPS banks are of lower quality in the pre-crisis period.

To ensure the robustness of our results, we alternatively identify the real effects caused by the decrease in loan supply by tracking the change in corporate policies of firms that are not directly affected by the macroeconomic shock in the periphery of the eurozone or any other part of the world. In particular, we focus our analysis on non-GIIPS firms that had a pre-crisis relationship to a GIIPS bank, but which do not have business exposure to GIIPS or other non-EU countries.[3] To this end, we collect information on the revenues of all foreign and domestic subsidiaries of the borrowing firms in our sample. Furthermore, to rule out that a firm's dependency on GIIPS banks is positively correlated with its non-observed business exposure to GIIPS countries, we only consider non-GIIPS firms for which the GIIPS bank relationships can be explained by reasons that are not related to the geographical distribution of the firms' business exposure. In particular, we only consider firms that inherited their relationship to a GIIPS bank through bank mergers or acquisitions or which had a lending relationship to a foreign bank that has historically a large presence in the respective country.[4]

All results continue to hold for this alternative identification strategy, confirming that indeed the bank lending channel is an important contributor to the negative real effects for European borrowing firms during the sovereign debt crisis. In addition, this result shows that even European firms that were not directly affected by the crisis had to face indirect consequences if they had strong ties to banks that were affected by the sovereign debt crisis. This finding thus highlights that the extensive cross-border lending in Europe can amplify the shock transmission across the eurozone.

To assure that the negative real effects are caused by a reduction in loan supply, we analyze whether the negative effects of having a connection to GIIPS banks are less pronounced for firms that were either very likely able to substitute the reduction in loan supply with other means of financing or for which the decrease in loan supply did not lead to a financing shortage as they recorded an even larger decrease in loan demand. Indeed, we only find significant real effects that can be attributed to banks' lending behavior for firms that were unlikely be able to tap alternative funding sources, that is, non-listed firms, unrated firms, and firms that were not able to acquire a new bank lending relationship. Furthermore, we find that firms with more exposure to the macroeconomic shock in the periphery of the eurozone (thus relative low loan demand) suffered

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[3]For example, a German company without significant business activity in GIIPS or non-EU countries that had a pre-crisis lending relationship with a Spanish bank.

[4]Roughly 90% of lending relationships between non-GIIPS firms without subsidiaries in GIIPS or other non-EU countries and GIIPS banks can be explained by these two reasons.

less real effects through the bank lending channel compared to firms that had less or no business exposure to the affected regions (thus relative high loan demand). These results again confirm that the limited access to funding due to lending relationships to banks affected by the European Sovereign Debt Crisis played a major role in causing negative real effects for the affected borrowing firms.

We use a partial equilibrium analysis to quantify the importance of the credit supply shock. By estimating the counterfactual real outcome if a firm had a lower exposure to affected banks, we can get an estimate of the magnitude of the real effects that were caused by the loan supply disruptions of GIIPS banks. Our results suggest that in the case of GIIPS firms, between one third and one half of the overall negative real effects in our sample can be attributed to banks' lending behavior. For non-GIIPS firms, we can explain between one fifth to one quarter of the aggregate reduction in the real outcome variables. Not surprisingly, we can explain less of the overall evolution for non-GIIPS firms since many borrowers in non-GIIPS countries have no exposure to GIIPS banks.

Given that firms that had a pre-crisis lending relationship with a bank affected by the European Sovereign Debt Crisis suffered significant negative real effects, we then test what actually caused the contraction in bank lending and ultimately the negative real effects for borrowing firms. To this end, we determine for each bank in our sample to which degree it was "affected" by the sovereign debt crisis, where affected is defined, in line with the three potential channels through which the European Sovereign Debt Crisis might have affected bank lending, as having (i) an above median exposure to sovereign risk (balance sheet hit), (ii) a below median capitalization or rating (risk-shifting), or (iii) an above median influence of governments (moral suasion).

To collect evidence for the hit on the balance sheet channel, we use data from the EBA's EU-wide stress tests and capital exercises and calculate each bank's risk exposure to the sovereign debt crisis. Furthermore, we obtain information about the banks' health from SNL Financial (leverage) and Bloomberg (ratings) to analyze whether GIIPS banks with low capital buffers engaged in risk-shifting by buying additional domestic sovereign debt and cutting corporate lending. Finally, we use data about government interventions, government bank ownership, and government board seats to measure the influence of governments on their domestic banks and test whether real effects can also be attributed to the moral suasion channel.

Both active channels, the risk-shifting and the moral suasion channel, are consistent with an increase in domestic sovereign bondholdings over the crisis period, which makes their disentanglement particularly challenging. Therefore, we first explore whether and which banks changed their sovereign debt holdings after the outbreak of the European Sovereign Debt Crisis. We find that weakly-capitalized GIIPS banks significantly increased their holdings of domestic sovereign debt, whereas moral suasion does not seem to be an important driver for the change in the banks' domestic sovereign debt holdings. This indicates that risk-shifting might have played an important role for the cutback in lending, while moral suasion did not.

To formally test the importance of the different channels for the reduction in bank lending, we apply a modified version of the Khwaja and Mian (2008) estimator, which exploits multiple bank-

firm relationships before and during the sovereign debt crisis to control for loan demand and other observed and unobserved borrowing firm characteristics. However, since syndicated loans usually have relatively long maturities and we do not observe changes within the same loan over time (e.g., credit line drawdowns), a large number of observations in our sample have no significant year-to-year change in the bank-firm lending relationships. Therefore, we have to resort to aggregating firms into clusters to generate enough time-series heterogeneity in bank lending, which then allows us to control for observed and unobserved firm characteristics that are shared by firms in the same cluster. In particular, we form firm clusters based on (i) the country of incorporation, (ii) the industry, and (iii) the firm rating.

Our results show that banks with larger sovereign risk in their portfolios reduce lending and charge higher loan spreads in the crisis period more than banks with lower sovereign risk exposure. Furthermore, the findings show that weakly-capitalized GIIPS banks cut their lending to the real sector and charge higher spreads than well-capitalized GIIPS banks, irrespective of whether risk-shifting incentives are proxied with leverage or rating. With regard to the moral suasion channel, none of the three proxies indicates that moral suasion influenced bank lending during the sovereign debt crisis.

Given this evidence on the importance of the different channels on bank lending, we then check whether these channels also play an important role in causing the real effects for borrowing firms. For each firm in our sample, we determine how dependent the firm is on affected banks, where affected is again defined according to the three possible channels. In line with our bank lending regressions, our results confirm that the negative real effects of the sovereign debt crisis, which can be attributed to the bank lending channel, are mainly caused by the hit on banks' balance sheets resulting from their large holdings of impaired sovereign debt and their incentive to engage in risk-shifting behavior by buying risky sovereign bonds. Moral suasion, on the other hand, does not seem to significantly impact the corporate policy of firms in our sample period.

In summary, we shed light on the complex interaction between bank and sovereign health and its impact on the real economy. In particular, we show that there are significant spillovers from periphery sovereigns to the local real economy, as well as cross-border spillovers to firms in non-GIIPS countries that are transmitted through the bank lending channel. Therefore, we document that, while the eurozone greatly benefits its members by deepening the degree of financial integration, the extensive cross-border bank lending also can facilitate the transmission of shocks across the eurozone when the banking sector experiences an aggregate shock such as the periphery sovereign crisis and remains undercapitalized.

I.   Related Literature

In general, our paper contributes to the literature on how shocks on banks' liquidity or solvency are transmitted to the real economy. Starting with Bernanke (1983), several researchers have taken

on this theme.[5]

In particular, our paper adds to the literature on the consequences of the European Sovereign Debt Crisis on bank lending. Existing theory suggests that sovereign crises can affect the real economy through several channels in complex ways based on the nature of the interaction between bank and sovereign health. According to Acharya, Drechsler, and Schnabl (2014), distress in the financial sector might induce governments to bailout weak banks, which, in turn, increases sovereign credit risk. An increase in sovereign risk, however, lowers the value of both government guarantees and the banks' bondholdings, thereby again weakening the financial sector. Bocola (2014) shows that higher sovereign risk not only tightens the banks' funding constraints, but also raises the risks associated with lending to the corporate sector, both leading to a decrease in credit supply to firms. Farhi and Tirole (2014) allow for both sovereign debt forgiveness and financial sector bailouts. With this setup, the authors show that banks might have an incentive to engage in collective risk-shifting by buying domestic bonds, which might not be prohibited by their domestic governments if there is a possibility of sovereign debt forgiveness. Uhlig (2014) shows that governments in risky countries have an incentive to allow their banks to load up on domestic sovereign debt if these bonds can be used for repurchase agreements with a common central bank.

Regarding the empirical evidence, De Marco (2014) and Popov and Van Horen (2014) find that after the outbreak of the European Sovereign Debt Crisis, non-GIIPS European banks that had significant exposures to GIIPS sovereign bonds reduced lending to the real economy and increased loan rates more than non-exposed banks. Similar to our study, De Marco (2014) and Popov and Van Horen (2014) also use data on syndicated lending. Bofondi, Carpinelli, and Sette (2013) confirm this finding using bank-firm matches from the Bank of Italy's Credit Register data. Finally, Becker and Ivashina (2014b) conclude that banks shifting from firm lending to increasing their domestic sovereign bondholdings is aggravated by the moral suasion of European governments. These studies, however, do neither analyze the consequences of the contraction in bank lending during the sovereign debt crisis for the real economy, nor determine which channels actually cause the significant negative effects for the real economy.

Most importantly, our paper adds to the natural experiment literature on the real effects of bank lending supply shocks at the firm-level, which is a challenging task as it requires data on bank-firm relationships, as well as firm-level information. Therefore, there have only been very few papers addressing this research question. Regarding the recent 2008-09 financial crisis, Chodorow-Reich (2014) uses the DealScan database and employment data from the U.S. Bureau of Labor Statistics Longitudinal Database to show that firms that had pre-crisis relationships with banks that struggled during the crisis reduced employment more than firms that had relationships with healthier lenders. Similarly, Bentolila, Jansen, Jiménez, and Ruano (2013) match employment data from the Iberian Balance sheet Analysis System and loan information obtained from the Bank of Spain's Central Credit Register to document that during the recent financial crisis, Spanish

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[5]For a comprehensive overview over the "natural experiment" literature on shocks that induce variation in the cross-section of credit availability, see Chodorow-Reich (2014).

firms that had relationships with banks that obtained government assistance recorded a larger job destruction than firms that were only exposed to healthy banks. Finally, Cingano, Manaresi, and Sette (2013) use the Bank of Italy's Credit Register database to provide evidence that firms which borrowed from banks with a higher exposure to the interbank market experienced a larger drop in investment and employment levels in the aftermath of the recent financial crisis.

However, the impact of sovereign debt crisis on bank lending is much more complex compared to the bank lending supply shock caused by the 2008-09 financial crisis, which mainly impaired the banks' financial health. As shown by the theoretical literature, aside from its impact on bank health, a sovereign debt crisis might additionally lead to a crowding-out of corporate lending as it creates incentives for banks to increase their risky domestic sovereign bondholdings. Moreover, governments might feel the need to pressure domestic banks to buy even more domestic sovereign debt, which might also crowd out corporate lending. To our knowledge, our paper and a concurrent paper by Balduzzi, Brancati, and Schiantarelli (2014) are the only papers that investigate the real effects of the European Sovereign Debt Crisis. Using survey data on micro and small Italian firms, Balduzzi, Brancati, and Schiantarelli (2014) find that firms with connections to banks with high CDS spreads invest less, hire fewer workers, and reduce the growth of bank borrowing. In contrast, we use data from syndicated loans, which is mainly used by large corporations. Therefore, our estimates serve as a lower bound for the adverse effects of the bank credit supply shock in Europe, since these effects are supposedly even more pronounced for smaller firms given their inability to substitute bank financing with other funding sources.

Furthermore, Balduzzi, Brancati, and Schiantarelli (2014) do not investigate through which channels the European Sovereign Debt Crisis actually caused a contraction in bank lending and the resulting real effects for borrowing firms. Therefore, and most importantly, our paper is the only one that sheds light on this open question. In particular, we are the first to document that the negative real effects of the sovereign debt crisis are due to both risk-shifting behavior and a reduction in bank health from exposures to impaired sovereign debt.

II.   Data

We use a novel hand-matched dataset that contains bank-firm relationships in Europe, along with detailed firm and bank-specific information. Information about bank-firm relationships are taken from Thomson Reuters LPC's DealScan, which provides a comprehensive coverage of the European syndicated loan market. In contrast to the United States, bank financing is the key funding source for firms, as banks provide more then 70% of debt for European firms and only very few bonds are issued in Europe (see Standard&Poor's (2010) and Dombret and Kenadjian (2015)).

Figure 7 in the online appendix highlights that especially syndicated loans are an important financing source for European non-financial corporations as on average between 2005 and 2009 roughly 20% of all extended loans to these firms were syndicated loans. We collect information on syndicated loans to non-financial firms from all GIIPS countries. In addition, to be better able to

disentangle the macro and bank lending supply shock, we include firms incorporated in Germany, France, and U.K. (non-GIIPS countries), which are the countries with the largest number of syndicated loans among the European countries that were not significantly affected by the sovereign debt crisis. Consistent with the literature (e.g., Sufi (2007)), all loans are aggregated to a bank's parent company. Our sample period covers the pre-crisis years starting in 2006 and ending in 2012, such that we have a symmetric time window around the beginning of the European Sovereign Debt Crisis.

We augment the data on bank-firm relationships with firm-level accounting data taken from Bureau van Dijk's Amadeus database. This database contains information about 19 million public and private companies from 34 countries, including all EU countries. DealScan and Amadeus do not share a common identifier. To merge the information in these databases, we hand-match firms to the DealScan database. Amadeus groups firms into different size categories ranging from "Small" to "Very Large". Perhaps not surprisingly, firms in the intersection of Amadeus and DealScan are either classified as "Large" or "Very Large". For firms to be classified as large, they have to satisfy at least one of the following criteria: operating revenue of at least 10 million Euro, total assets of at least 20 million Euro, at least 150 employees, or the firm has to be publicly listed. The respective criteria for very large companies are: at least 100 million Euro operating revenue, at least 200 million Euro total assets, or at least 1000 employees. Table XI in the online appendix compares firms in the intersection of Amadeus and DealScan and the remaining firms from GIIPS countries and Germany, France, and U.K. in the category of "Very Large" companies in Amadeus. The comparison shows that the firms in our sample are significantly larger and have a higher ratio of tangible to total asset, but are comparable along other observable firm characteristics. Furthermore, we hand-match our sample to the Capital IQ database to obtain detailed data on the whole debt structure for a subsample of our firms, including detailed information on total outstanding and undrawn credit lines.

In addition, we augment the dataset with bank-level information from various sources. We get data about the sovereign debt holdings of European banks from the EBA's EU-wide stress tests and capital exercises. Furthermore, we obtain information about the banks' health from SNL Financial (leverage) and Bloomberg (ratings). To get data about governmental influence on European banks, we obtain data about government interventions compiled from information disclosed on the official EU state-aid websites.[6] Finally, we compile government bank ownership data from Bankscope, and extract the fraction of directors affiliated with the respective government from the BoardEx database. The exact definitions of all variables are summarized in Table I.

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[6]The data can be obtained from: `http://ec.europa.eu/competition/elojade/isef/index.cfm?clear=1&policy_area_id=3`.

III. Financial and Real Effects of the European Sovereign Debt Crisis

Our objective is to examine the association between a bank's exposure to the European Sovereign Debt Crisis and the resulting corporate policy of its borrowing firms. We expect that firms that are more dependent on banks significantly affected by the sovereign debt crisis are more financially constrained and thus behave differently both in terms of financial and real decisions compared to less affected firms.

A. Methodology

We start with broadly assessing whether the European Sovereign Debt Crisis affected the real economy through the bank lending channel. Therefore, to first capture all channels through which banks were affected, we use a bank's country of incorporation as a measure for its exposure to the sovereign debt crisis. In particular, we divide banks into two groups: (i) GIIPS banks, which are banks headquartered in GIIPS countries given that these countries are most affected by the European Sovereign Debt Crisis and (ii) non-GIIPS banks, that is, banks from Germany, France, and the U.K., which are the countries with the largest number of syndicated loans among the European countries that were not significantly affected by the sovereign debt crisis.

There are at least three reasons for choosing a bank's country of incorporation as a proxy for its exposure to the European Sovereign Debt Crisis. First, banks' bond portfolios are generally biased towards *domestic* sovereign bondholdings, implying that there is a strong positive relation between a bank's country of incorporation and its exposure to the sovereign debt of that country (hit on balance sheet). Second, GIIPS banks have an incentive to buy additional risky *domestic* debt (risk-shifting) and, third, GIIPS governments potentially pressure domestic banks to increase their *domestic* sovereign bondholdings (moral suasion). Please see Section IV for a detailed explanation of the three channels. All three channels could potentially lead to a reduction in the corporate loan supply, either by reducing a bank's debt capacity (hit on balance sheet), or by crowding-out corporate lending (risk-shifting and moral suasion). In Section IV, we then provide detailed evidence on which of these channels are of first-order importance for the negative real effects incurred by the borrowing firms.

To measure a firm's dependency on GIIPS banks in a given year, we determine the fraction of the firm's total outstanding syndicated loans that is provided by GIIPS lead arrangers. Therefore, the *GIIPS Bank Dependence* of firm i in country j, and industry h in year t is defined as:

$$GIIPS\ Bank\ Dependence_{ijht} = \frac{\sum_{l \in L_{ijht}} \%GIIPS\ Lead\ Arranger\ in\ Syndicate_{lijht} \cdot Loan\ Amount_{lijht}}{Total\ Loan\ Amount_{ijht}}, \quad (1)$$

where L_{ijht} are all of the firm's loans outstanding at time t. Our choice to measure *GIIPS Bank Dependence* based on lead arrangers is motivated by the central role that these banks play in originating and monitoring a syndicated loan (Ivashina (2009)). Therefore, when a lead arranger

either chooses or is forced to cut back its lending activities, we expect this to significantly impact the borrowing firm. We follow Ivashina (2009) and identify the lead arranger according to definitions provided by Standard & Poor's, which for the European loan market are stated in Standard & Poor's Guide to the European loan market (2010). Therefore, we classify a bank as a lead arranger if its role is either "mandated lead arranger", "mandated arranger", or "bookrunner".

The change in a borrowing firm's financial and real variables after the start of the European Sovereign Debt Crisis is determined by a firm's pre-crisis lending relationships (our main variable of interest), its observable and unobservable firm characteristics, and an unobserved idiosyncratic component uncorrelated with the observable and unobservable firm characteristics. To consistently estimate the financial and real effects for borrowing firms of having a pre-crisis relationship with banks affected by the sovereign debt crisis, we thus need statistical independence between a firm's pre-crisis lending relationships, in particular, its exposure to GIIPS banks, and the unobserved firm characteristics that affect either their financial or real outcomes. Therefore, in our empirical analysis, we control for a rich set of firm characteristics to remove any confounding factors and avoid an omitted-variable bias.

In particular, we include firm fixed effects to capture unobserved time-invariant firm heterogeneity and firm-level control variables to capture other determinants of the firms' corporate policies, loan demand, and loan supply. These controls include firm size, leverage, net worth, the fraction of tangible assets, the interest coverage ratio, and the ratio of EBITDA to total assets. For the analysis of the firms' the cash flow sensitivity of cash we also include a firm's cash flow and its capital expenditures.

Furthermore, GIIPS countries went through a severe recession starting in 2010 (2009 in the case of Greece) while non-GIIPS countries were significantly less affected by economic downturns. To alleviate concerns that our results are driven by different aggregate demand fluctuations in our sample countries and/or in particular industries within our sample countries, we add interactions between industry, year and country fixed effects to remove the possibility of spurious results due to time-varying shocks to an industry in a given country that may have affected the credit demand of borrowing firms as well as their real outcomes.

Perhaps our biggest challenge is the concern that a firm's dependency on GIIPS and non-GIIPS banks might be determined by whether this firm has business in the respective countries. For example, a German firm might choose to borrow from a Spanish bank because it has business in Spain. If this is the case, we would potentially overestimate the negative real effects that can be attributed to the bank lending channel since our results could then be driven by the possibility that a firm's business exposure to affected countries impacts both, its *GIIPS Bank Dependence* and the negative real effects.

To address this concern, and ensure orthogonality between a firm's *GIIPS Bank Dependence* and its unobserved characteristics, our main specification also includes foreign bank country times year fixed effects. Consider as an example a German firm borrowing from a Spanish and a German bank. Besides the industry-country-year fixed effect, we include for this firm a Spain-year fixed

effect to capture the firm's potential exposure to the macroeconomic downturn in Spain during the European Sovereign Debt Crisis.

In the following, we present descriptive statistics and explore whether our identification assumptions are plausible. In Panel A of Table II, we show the pre-crisis differences of the corporate policies across firms with a *GIIPS Bank Dependence* above and below the sample median. For simplicity, we label an exposure above (below) the sample median in the following high (low) *GIIPS Bank Dependence*.[7] The fact that there is no systemic difference between the real outcomes of firms with high and low *GIIPS Bank Dependence* before the European Sovereign Debt Crisis indicates that reasons how banks and firms match cannot explain the real outcomes for borrowing firms in a bivariate OLS context.

Panel B of Table II presents descriptive statistics for the firm-level control variables, split into firms with high and low *GIIPS Bank Dependence* in the pre-crisis periods. Firms with high *GIIPS Bank Dependence* tend to be larger, have more tangible assets, a higher leverage, and lower interest coverage ratios. To test these observed differences more formally, we follow Imbens and Wooldridge (2009) and report the normalized difference of the two subsamples that are defined as the averages by treatment status, scaled by the square root of the sum of the variances, as a scale-free measure of the difference in distributions. This measure avoids the mechanical increase in sample size, that one typically observes when reporting *t*-statistics. Imbens and Wooldridge (2009) suggest as a rule of thumb that the normalized difference should not exceed an absolute value of one quarter. We also report standard t-statistics for the difference in means between the two groups. As can be seen in Panel B of Table II, only total assets is close to (but still below) this threshold (t-tests reveal significant differences for total assets and tangibility) while all others are well below this threshold, suggesting that firms in the two groups are comparable along most observable dimensions.

The descriptive statistics also help to rule the possibility of spurious results due to an endogenous matching of firms and banks in the pre-crisis period that is driven by firm quality. If low quality firms were more likely to enter into business relationships with GIIPS banks before the European Sovereign Debt Crisis, our results could be driven by the fact that these firms are less resilient against the shock of the crisis. However, the fact that there is no systematic difference between the corporate policies and real outcomes of firms with high and low *GIIPS Bank Dependence* before the European Sovereign Debt Crisis and that the correlation between *GIIPS Bank Dependence* and the firm control variables is in general very low alleviates this concern. Table XII in the online appendix shows that the fraction of bank financing relative to total debt is not systematically different between firms with high and low *GIIPS Bank Dependence*, which alleviates the concern that firms that have a higher dependency on GIIPS banks might be in general more bank-dependent. If this would have been the case, these firms would be more financially constraint during a banking crisis compared to less bank-dependent firms not because they suffer from a shock to their banks' health but because it is harder for them to acquire funding in general.

Furthermore, to ensure that the negative real effects for borrowing firms are actually caused

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[7]Note that of course the sample median varies for the different subsamples analyzed in the paper.

by the shock of the European Sovereign Debt Crisis on GIIPS banks, we have to rule out two alternative explanations for how firms' pre-crisis lending relationships could have affected loan outcomes and, in turn, the firms' financial and real decisions.

First, GIIPS banks might have been already less healthy than non-GIIPS banks in the pre-crisis period. This would not have necessarily affected firms borrowing from GIIPS bank in the pre-crisis period. However, a lower bank health might have made GIIPS banks less resilient against the crisis. In this case, the real effects for borrowing firms would not solely be caused by the negative impact of the European Sovereign Debt Crisis on banks, but, in addition, by the fact that GIIPS banks were less able to cope with the consequences of the crisis. To address this possibility, Panel E of Table II presents descriptive statistics for various bank quality measures, split into GIIPS and non-GIIPS banks in the pre-crisis period. We report the normalized difference and t-statistics below the table. The results show that GIIPS banks are smaller and have significantly higher equity ratio compared to non-GIIPS banks, while impaired loans to equity, and the Tier 1 ratio are not significantly different across the two subgroups of banks. Furthermore, the higher equity capitalization does not seem to be due to a higher asset risk level of GIIPS banks as also the average 5-year CDS spreads are not significantly different between the two groups of banks. Therefore, we can reject the possibility that the negative real effects for borrowing firms are caused by a lower pre-crisis quality and, in turn, lower crisis resilience of GIIPS banks. If anything, GIIPS banks seem to be in better shape than non-GIIPS banks before the crisis.

Second, we have to rule out the possibility that the negative real effects are caused by ex-ante differences in the quality of the loan syndicates. If, for some reason, better non-GIIPS banks have avoided entering into loan syndicates with GIIPS banks, GIIPS banks would have been left with ex-ante worse non-GIIPS banks. For example, despite the fact that firms with high and low *GIIPS Bank Dependence* do not differ significantly, there could be ex-ante information asymmetries between non-GIIPS banks and firms regarding the resilience of GIIPS banks against a future crisis. Hence, in contrast to borrowing firms, better non-GIIPS banks might have foreseen the consequences of the European Sovereign Debt Crisis for GIIPS banks. This would imply that syndicates with GIIPS lead arrangers would be of lower quality to begin with, which could drive our results. To alleviate this concern, we divide non-GIIPS banks into two groups: banks with an above median fraction of deals with GIIPS banks and those with a below median fraction of deals with GIIPS banks. Comparing these two groups of banks, we find that they do not differ in terms of capital ratios and that non-GIIPS banks that are issuing a high fraction of loans with GIIPS banks have a lower fraction of impaired loans (see Panel F of Table II). CDS spreads again do not differ between these two groups of banks. Hence, the negative real effects for borrowing firms do not seem to be caused by an ex-ante lower quality of syndicates that include GIIPS banks.

B.   *Empirical Results for Main Specification*

This section presents results for the effect of a firm's *GIIPS Bank Dependence* on its financial and real outcomes. For the analysis, we divide our sample into two periods: one before the sovereign

debt crisis (2006-2008 for Greece, 2006-2009 for all other countries) and one during sovereign debt crisis (2009-2012 for Greece, 2010-2012 for all other countries).[8] This yields a symmetric time window around the beginning of the European Sovereign Debt Crisis. We construct an indicator variable, *Crisis*, which is equal to one if the financial information reported in Amadeus falls in the respective crisis period.

We begin by exploring the effect of the sovereign debt crisis on several firm outcomes graphically.[9]. In Panels A-C in Figure 1, we plot the time series of the average employment growth rates, the investment levels, and sales growth rates, respectively, for firms with a high and low *GIIPS Bank Dependence*, which is defined in Eq. (1). Figure 1 suggests that, while the pre-crisis trend is similar for the two groups of firms, a higher *GIIPS Bank Dependence* leads to larger negative real effects during the crisis period. For example, employment growth rates for borrowing firms with a high *GIIPS Bank Dependence* do not recover during the crisis period while employment rates for firms with a lower *GIIPS Bank Dependence* show an increase. Similar results can be found for the other dependent variables.

To formally investigate whether borrowing firms with significant business relationships to GIIPS banks became financially constrained during the sovereign debt crisis, we follow Almeida, Campello, and Weisbach (2004). They show that firms that expect to be financially constrained in the future respond by saving more cash out of their cash flow today, whereas financially unconstrained firms have no significant link between their cash flow and the change in cash holdings. For the cash flow sensitivity of cash, we thus employ the following specification for firm i in country j, and industry h in year t:

$$
\begin{aligned}
\Delta Cash_{ijht+1} \;=\; & \alpha + \beta_1 \cdot GIIPS\ Bank\ Dependence_{ijh,min\{t,t_{lj}\}} + \beta_2 \cdot Crisis_{jt} \cdot Cash\ Flow_{ijht} \\
& + \; \beta_3 \cdot GIIPS\ Bank\ Dependence_{ijh,min\{t,t_{lj}\}} \cdot Crisis_{jt} \\
& + \; \beta_4 \cdot GIIPS\ Bank\ Dependence_{ijh,min\{t,t_{lj}\}} \cdot Cash\ Flow_{ijht} \\
& + \; \beta_5 \cdot GIIPS\ Bank\ Dependence_{ijh,min\{t,t_{lj}\}} \cdot Crisis_{jt} \cdot Cash\ Flow_{ijht} \\
& + \; \beta_6 \cdot Cash\ Flow_{ijht} + \gamma \cdot X_{ijht} + Firm_{ijh} + Industry_h \cdot Country_j \cdot Year_{t+1} \\
& + \; ForeignBankCountry_{k \neq j} \cdot Year_{t+1} + u_{ijht+1}.
\end{aligned}
\tag{2}
$$

where t_{lj} refers to the last pre-crisis year (2008 for Greece, 2009 for other countries). Note that we keep the *GIIPS Bank Dependence* constant at its pre-sovereign debt crisis level for each crisis year to address the concern that firms with bad performance during the crisis lost the opportunity

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[8]In 2009, Greek bond yields started to diverge from the yields of other eurozone members and the Greek 5-year sovereign CDS spread escalated from 100 basis points in May 2009 to 250 points by the end of the year. During 2010 investors also started to lose confidence in Italy, Ireland, Portugal, and Spain. For these countries, the CDS spreads more than doubled between March and May 2010. It is important to note that our results are robust to choosing alternative definitions of the crisis period, that is, setting the start of the crisis period in Greece to 2010 and/or the start of the crisis period in Ireland and Portugal to 2009.

[9]Note that we control for observable firm characteristics such as industry, country, leverage, size, and net worth in the figures.

to get funding from non-GIIPS banks and thus could only rely on GIIPS banks.[10] Otherwise, our results could be biased since badly performing firms then have a higher *GIIPS Bank Dependence* due to the lack of alternative funding sources, and we could not attribute the effects we find to the credit crunch.

The unit of observation is a firm-year. Our key variables of interest in regression Eq. (2) is the firms' cash flow sensitivity of cash during the crisis period (β_5 in Eq. (2)). If firms with a high *GIIPS Bank Dependence* become financially constrained during the sovereign debt crisis, we expect that they save more cash out of their generated cash flows to build up a liquidity buffer against the possibility of not being able to obtain additional funding in the future, that is, we expect β_5 in Eq. (2) to be positive.

For the firms' employment growth and sales growth rates as well as their net debt and investment levels we estimate the following panel regressions:[11]

$$
\begin{aligned}
y_{ijht+1} \quad = \quad & \alpha + \beta_1 \cdot GIIPS\ Bank\ Dependence_{ijh,\min\{t,t_{lj}\}} \\
& + \quad \beta_2 \cdot GIIPS\ Bank\ Dependence_{ijh,\min\{t,t_{lj}\}} \cdot Crisis_{jt} \\
& + \quad \gamma \cdot X_{ijht} + Firm_{ijh} + Industry_h \cdot Country_j \cdot Year_{t+1} \\
& + \quad ForeignBankCountry_{k \neq j} \cdot Year_{t+1} + u_{ijht+1}.
\end{aligned}
\tag{3}
$$

The unit of observation is again a firm-year. Our key variables of interest in regression Eq. (3) is the firms' *GIIPS Bank Dependence* during the crisis period (β_2 in Eq. (3)). If firms were adversely affected by the sovereign debt crisis through the bank lending channel, then we expect β_2 in Eq. (3) to be negative.

The results of our main specification of how *GIIPS Bank Dependence* is affecting firms' financial and real decisions are presented in Table III. Column (1) provides results for net debt ((current + non-current liabilities - cash)/total assets). The coefficient of the interaction of *GIIPS Bank Dependence* with the *Crisis* dummy (β_2 in Eq. (3)) is negative, indicating that during the sovereign debt crisis, firms with higher exposure to GIIPS banks reduced external debt financing more than other firms. A one standard deviation higher *GIIPS Bank Dependence* during the crisis period leads to a reduction in net debt of 1.5 percentage points.[12]

Column (2) of Table III presents results for the degree to which firms save cash out of their cash flow. The coefficient of the triple interaction of *GIIPS Bank Dependence* with cash flow and the Crisis dummy (β_5 in Eq. (2)) is statistically significant at the 5% level. This positive coefficient implies that a higher *GIIPS Bank Dependence* induces firms to save more cash out of their cash flow for precautionary reasons. Note that there is no significant relation between the *GIIPS Bank Dependence* of a borrowing firm and its propensity to save cash out of its cash flow in the pre-crisis

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[10]As indicated by the term $\min\{t,t_{lj}\}$. We obtain qualitatively similar results if we use the average (2005 to 2009) pre-crisis *GIIPS Bank Dependence* of each firm (please see Panel C of Table XIII in the online appendix). The reason is that lending relationships are quite sticky (see Section III.D for more details).

[11]Since roughly 90% of our observations have no information on R&D expenses in Amadeus, we cannot investigate the impact of GIIPS bank dependence on R&D.

[12]Results are qualitatively similar if we use the leverage ratio instead of net debt as the dependent variable.

period. Furthermore, firms in general do not show the typical behavior of financially constrained firms during the crisis, as can be seen from the insignificant interaction term of cash flow with the crisis dummy. More precisely, a one standard deviation higher *GIIPS Bank Dependence* of borrowing firms during the crisis implies that these firms save 3 cents more per euro of cash flow. This compares well to the magnitudes found by Almeida, Campello, and Weisbach (2004), who show that financially constrained firms save on average 5-6 cents per dollar of cash flow, while financially unconstrained firms have no significant relation between cash flow and the change in cash holdings. Taken together, these results indicate that firms with a high *GIIPS Bank Dependence* become financially constrained during the crisis.

Acharya, Almeida, Ippolito, and Perez (2014) show that firms with higher liquidity risk are more likely to use cash rather than bank credit lines for liquidity management because the cost of credit lines increases with liquidity risk. This is due to the fact that banks retain the right to revoke access to liquidity precisely in states where the firms need liquidity due to, for example, a liquidity shortfall because of negative cash flows. Since banks themselves faced a substantial liquidity shock during the sovereign debt crisis, we expect that firms with a high *GIIPS Bank Dependence* could lose access to their bank credit lines either because the credit lines are not prolonged or cut off. These firms should thus increasingly rely on cash rather than on lines of credit to manage their liquidity.

To test this implication, we follow Acharya, Almeida, Ippolito, and Perez (2014) and hand-match our sample to the Capital IQ database. This enables us to obtain data on the whole debt structure for a subsample of our firms including detailed information on total outstanding and undrawn credit lines. We construct two measures for the liquidity composition of borrowing firms from these data. First, we consider the fraction of the total amount of outstanding credit lines over the sum of the amount of total outstanding credit line and cash. Second, we construct a measure that captures the fraction of undrawn credit lines (i.e., the amount of a firm's credit line that is still available and can be drawn in case of liquidity needs) over undrawn credit lines and cash. In Panels A and B of Figure 2, we plot the time series of the average total and undrawn credit lines. We show that there is a clear change in firm liquidity management during the sovereign debt crisis. Column (3) of Table III reports results for a firm's overall credit line, whereas column (4) reports results for the undrawn credit lines. Across both specifications, we find that firms with a higher *GIIPS Bank Dependence* are less able to rely on secure funding from lines of credit.[13]

To summarize, our results on the firms' financial policy indicate that firms with a high *GIIPS Bank Dependence* show the typical pattern of financially constrained firms during the sovereign debt crisis. They rely more on cash holdings for their liquidity management because the possibility of getting liquidity from their bank lines of credit becomes more uncertain. Hence, if firms became financially constrained during the sovereign debt crisis due to the lending behavior of their main banks, then these firms should also have responded by adjusting their real activities.

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[13]Given the smaller number of observations in this analysis, we cannot use it in our various sample splits in Section III.D. Moreover, we have to drop foreign bank country*year fixed effects for this analysis due to limited number of observations.

Therefore, we next examine how the sovereign debt crisis impacted the corporate policies of firms. We estimate panel regressions (see Eq. (3)) where y_{ijht+1} measures employment growth (Δ log $Employment$), investment ($CAPX/Tangible\ Assets$), or sales growth (Δ log $Sales$), respectively.[14] Table III presents the results. Consistent with the suggestive evidence from Figure 1, Columns (5)-(7) show that firms with a high $GIIPS\ Bank\ Dependence$ had a significantly lower employment growth rate, cut investment by more, and experienced a larger sales growth reduction than firms that were less dependent on GIIPS banks. More precisely, a one standard deviation higher $GIIPS\ Bank\ Dependence$ of borrowing firms during the sovereign debt crisis leads to a 4.1 percentage point reduction in employment growth, a 6 percentage point decrease in capital expenditures, and a 4.9 percentage point decrease in sales growth.

As a robustness check, we provide two alternative definitions for our key independent variable. First, we measure a firm's exposure to affected banks through their "indirect sovereign debt holdings through their lenders". More precisely, we use the weighted average sovereign credit spread in year t, where the weights are given by firms' "indirect sovereign debt holdings", that is, for each firm, we measure the exposure it has to sovereign risk through the sovereign debt holdings of the banks it received a loan from. We then replace the interaction term of $GIIPS\ Bank\ Dependence$ and $Crisis$ in Eqs. (2) and (3). Results are presented in Panel A of Table XIII. Second, we replace the fraction of syndicated loans provided by GIIPS banks with the fraction of total debt that is provided by GIIPS banks in the form of syndicated loans. This alternative definition helps us to more precisely account for the difference in overall bank dependence of firms. Using this alternative measure helps us to reconfirm the validity of our earlier findings that firms with high and low $GIIPS\ Bank\ Dependence$ do not differ in terms of their overall dependence on banks. Panel B of Table XIII presents the results for this alternative way of measuring the dependence on GIIPS banks. In both panels all results remain economically and statistically significant.

To provide further robustness that, high and low GIIPS Bank dependent firms were comparable in terms of the outcome variables in the pre-crisis period, we conduct a placebo test where we define the placebo crisis period as either ranging from 2006 to 2007 or from 2006 to 2008. Results are reported in Table XIV in the online appendix. None of the interaction terms is significant for the placebo crisis definitions, indicating that GIIPS Bank dependent firms did not show significantly different trends in the pre-sovereign debt crisis period.

C.   Alternative Identification Strategy using Firms' Business Exposure

In our main specification, we ensure the statistical independence between a firm's $GIIPS\ Bank$ $Dependence$ and its unobservable firm characteristics by controlling for a firm's business exposure to its foreign lenders' home countries via fixed effects. In this section, we alternatively identify the real effects caused by the decrease in loan supply by tracking the change in corporate policies of non-GIIPS firms that had a pre-crisis relationship to a GIIPS bank. The strategy is similar to the

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[14]Amadeus does not report capital expenditures. We construct a proxy for investments using the following procedure: $\frac{Fixed\ Assets_{t+1} - Fixed\ Assets_t + Depreciation}{Fixed\ Assets_t}$. We set $CAPX$ to 0 if negative.

18

one applied by Peek and Rosengren (1997), who also use domestic firms (in their case U.S. firms) that had borrowed from foreign banks (in their case Japanese banks) to isolate supply effects of the bank lending channel. However, compared to their approach, we take two additional precautionary steps to ensure that the results are not driven by the possibility that domestic firms that borrowed from a foreign bank are also more likely to have business exposure to the respective country and are thus potentially also affected by the macroeconomic downturn in this country.

First, we restrict our sample to firms that are not directly affected by the macroeconomic shock in the periphery of the eurozone or any other part of the world. In particular, we restrict our sample to non-GIIPS firms without subsidiaries in a GIIPS or any other non-EU country (e.g., a German firm without subsidiaries). To this end, we collect information on all foreign and domestic subsidiaries of the borrowing firms in our sample, along with information about the revenues generated by their subsidiaries.[15]

To enhance our understanding of how the firm-bank relationships between non-GIIPS firms without GIIPS subsidiaries and GIIPS banks emerged, we investigate the history of these lending relationships prior to our sample period. Two main explanations for the existence of these firm-bank relationship stand out, which can jointly explain roughly 90% of the lending relationships. First, many non-GIIPS firms inherited their relationship to a GIIPS bank through bank mergers or acquisitions (explains roughly 68% of non-GIIPS firms - GIIPS bank links). That is, the firm had a relationship to a domestic bank that was later acquired by a foreign GIIPS bank. Consider as an example the German catering firm "Die Menu Manufaktur Hofmann", a firm located in Southern Germany that delivers food to canteens of hospitals, corporations, etc. Figure 3 shows that its business activities are limited to Germany and Austria. Prior to our sample period, this company obtained a loan from the Bavarian-based Bayerische Hypo- und Vereinsbank AG, which was later acquired by the Italian bank UniCredit in 2005. After 2005 all its syndicated loans were originated by UniCredit. Second, the Bank of Ireland has historically a large presence in the U.K. (explains roughly 22% of non-GIIPS firms - GIIPS bank links). For example in 2006 it was the fifth largest bank in terms of the number of deals in the U.K. (ranked only after the four largest British banks). Therefore, a large fraction of the firm-bank relationships between non-GIIPS firms without GIIPS subsidiaries and GIIPS banks were established due to reasons that were not related to the geographical distribution of the firms' business exposure.

As a second precautionary step, we thus restrict our analysis to non-GIIPS firms whose lending relationship to a GIIPS firm can be explained by one of these two main explanations. That is, that they either inherited their pre-crisis lending relationship with a GIIPS banks due to an acquisition or that they pre-crisis borrowed from a GIIPS bank that is very active in the respective country's credit market on a regular basis. Applying these two preventive measures alleviates the concern that a non-GIIPS firm's dependency on GIIPS banks might be determined by whether this firm has business in the periphery of the eurozone and thus ensures statistical independence between a

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[15]Ideally, we would also like to control for the export/import dependence of our firms and their subsidiaries to specific countries. These data, however, are only available for a very small subsample of our firms in Amadeus, rendering it impossible to also control for export/import dependence.

firm's *GIIPS Bank Dependence* and its unobservable firm characteristics.

In Panels A-C of Figure 4, we plot the time series of the average employment growth rates, the investment levels, and sales growth rates, respectively, of the firms in this subsample. The figure shows that also for non-GIIPS firms without GIIPS subsidiaries, firms with a higher *GIIPS Bank Dependence* suffered larger negative real effects during the crisis period, while their pre-crisis trend was comparable to firms that were less dependent on GIIPS banks. This suggestive evidence is consistent with the evidence presented in Panels A-C in Figure 1.

For the formal analysis, we apply specifications that are very similar to our main specifications from Eqs. (2) and (3). The only difference is that due to the reduced sample size, we cannot control for both industry-country-year fixed effects and foreign bank country-year fixed effects at the same time in the subsidiary analysis. We therefore include industry-year and foreign bank country-year fixed effects, assuming that industry-specific shocks in non-GIIPS countries were similar. Panel A of Table IV provides multivariate results for the evidence presented in Figure 4. As the table shows, all results continue to hold, confirming that the decline in lending of banks, which are adversely affected by the sovereign debt crisis, has negative real effects for borrowing firms. Panel C of Table II shows that firms in this subsample do not differ across *GIIPS Bank Dependence*, which again rules out that there is an endogenous matching of firms and banks in the pre-crisis period that is driven by firm quality.

D.   Supply and Demand Factors of Bank Lending

If the real effects documented in Section III.C were actually caused by a reduction in loan supply from banks affected by the European Sovereign Debt Crisis, we would expect that the negative real effects from having a high *GIIPS Bank Dependence* were less pronounced for firms that were less prone to becoming financially constrained. In particular, we should observe smaller or no significant real effects of having a business relationship to a bank affected by the crisis (i) for firms that, relative to the decrease in loan supply, recorded an even larger decrease in loan demand and (ii) for firms that were very likely able to substitute the reduction in loan supply with other means of financing. Therefore, to assure that our results are indeed driven by a reduction in loan supply, in this section, we compare the negative real effects incurred by these different subsets of firms.

We start with testing whether firms that had a relative low demand for bank loans during the sovereign debt crisis suffered less real effects through the bank lending channel compared to firms that had a high demand for loans. In particular, firms that were heavily exposed to the negative macroeconomic shock in the periphery of the eurozone had presumably a very low or no demand for additional bank loans as a firm's demand for bank financing is strongly influenced by its investment and growth opportunities. For these firms, the reduction in loan supply due to an eventual business relationship to a bank affected by the crisis should be overcompensated by the reduction in loan demand and thus should be without effect. As a result, while of course having suffered very significant real effects due to the negative macroeconomic shock, these firms should

not have suffered additional negative real effects from facing a drop in loan supply due to their eventual business relationships to banks affected by the crisis.

To check this, we use the revenue information for all foreign and domestic subsidiaries of the borrowing firms in our sample to determine each firm's geographical revenue distribution. As shown by Panel A of Table IV, non-GIIPS firms that had no observable business exposure to GIIPS countries did display strong negative real effects of having a high *GIIPS Bank Dependence*. In contrast, according to the above-mentioned arguments, we would expect that the real effects of having a high *GIIPS Bank Dependence* are significantly less pronounced for non-GIIPS firms that had business exposure to GIIPS countries (e.g., a German firm with subsidiaries in Italy or Spain) and thus had a lower demand for bank loans. To test this prediction, we rerun the regression also applied in Section III.C, that is, we control for industry*year and foreign bank country*year fixed effects to absorb possible unobserved macro shocks. Indeed, looking at Panel B of Table IV, these firms seem less financially constrained when having a high *GIIPS Bank Dependence* and, in line with this result, we find weaker negative effects for employment and no negative effects for investments and sales growth.

As an additional robustness check, we do the same exercise for GIIPS firms and split them according to their business exposure to non-GIIPS countries. GIIPS firms that were less exposed to the crisis because they have a large fraction (highest tertile) of their revenue generated by non-GIIPS subsidiaries (e.g., a Spanish firm that has a significant fraction of its revenues generated by a German subsidiary) should have had a higher demand for loans compared to GIIPS firms that generate their revenue mainly in GIIPS countries. Hence, we expect to see larger negative real effects of having a high *GIIPS Bank Dependence* for the former group of firms compared to the latter group. Panel C of Table IV shows that indeed GIIPS firms with a high fraction of their revenue generated by foreign non-GIIPS subsidiaries suffered significant real effects of having a pre-crisis lending relationship with GIIPS banks. As expected, when looking at Panel D of Table IV, we find weaker effects for GIIPS firms with a majority of their business in GIIPS countries (e.g., a Spanish firm without subsidiaries) both in terms of economic and statistical significance.

Next, along the same lines, we investigate whether firms that were more likely able to substitute a possible reduction in loan supply with other means of financing suffered less real effects from having a high *GIIPS Bank Dependence* then firms that are more bank-dependent. In particular, we split our sample into listed and non-listed firms as well as rated and unrated firms. The underlying assumption is that non-listed and unrated firms have fewer alternative sources of funding, since they are less able to raise additional public equity or issue bonds, implying that these firms are more bank-dependent (Sufi (2007)). Moreover, there is less publicly available information for these firms, requiring more monitoring and information collection on the banks' side. Overall, in case bank-related loan supply factors play a role during the crisis, non-listed and unrated firms should thus be much more affected when having a high dependency on GIIPS banks than listed and rated firms, which have potentially other sources of funding available.

Panel A of Table V presents the results for the subsample of listed firms, whereas results for

non-listed firms are presented in Panel B of Table V. As can be seen from the table, our results continue to hold for non-listed firms; however, we do not find any evidence that listed firms show the typical behavior of a financially constrained firm or that they have significantly negative real effects during the crisis period. The results for the sample split between rated and unrated firms are shown in Panel C and Panel D. The panels show that all our results are driven by firms without access to the public bond market. Only for unrated firms we find significant real effects that can be attributed to banks' lending behavior. Therefore, in line with the findings of Becker and Ivashina (2014b), firms with access to alternative funding sources thus seem to be able to substitute the lack of bank financing, whereas non-listed and unrated firms cannot easily alter their funding sources and thus suffer significant real effects when having a high dependency on banks affected by the sovereign crisis.

Besides being better able to substitute a reduction in loan supply with funds from alternative financing sources, larger and public firms should also find it easier than smaller and private firms to borrow from other banks than their previous relationship lender. Therefore, we investigate in the following in greater detail the evolution of bank relationships during the crisis period and test whether the real effects of having a high *GIIPS Bank Dependence* are more pronounced for firms that were not able to acquire a new bank relationship during the crisis.

Previous work (e.g., Chodorow-Reich (2014)) documents that bank relationships in the syndicated loan market are sticky, suggesting that most firms do not switch banks. Indeed, we find in our sample as well that for roughly 75% of firms the *GIIPS Bank Dependence* does not change throughout the sample period. As expected, mostly listed firms with better access to alternative funding sources and thus potentially higher bargaining power are able to switch banks. In contrast, roughly 70% of firms with constant bank relationships are non-listed firms, as shown by Panel C of Table VI. Panel A of Table VI shows that all results continue to hold for the subsample of firms that do not switch banks, whereas we do not find significant effects for firms that switch banks as shown by Panel B.

Taken together, these results again confirm that the limited access to funding due to lending relationships to banks affected by the European Sovereign Debt Crisis played a major role in causing the negative real effects for the affected borrowing firms.

Therefore, two important contributions of this study are the documentation of (i) strong spillovers from high-spread euro area sovereigns to the local real economy through the bank lending channel and (ii) significant cross-border spillovers from the sovereign debt crisis in GIIPS countries to firms in non-GIIPS countries that are also transmitted through the bank lending channel. Therefore, while the euro greatly benefits its members by deepening the degree of financial integration, the extensive cross-border bank lending has also facilitated the transmission of shocks across the eurozone.

E. Aggregate Effects

With some additional assumptions, we can use the firm-level results for the different subsamples from Table IV to inform the debate regarding the aggregate effects of the loan supply shock of the European Sovereign Debt Crisis. The strategy to estimate aggregate effects is similar in spirit to the procedure used in Chodorow-Reich (2014). In a nutshell, we will estimate for each borrower what his performance would have been if he had borrowed from the least affected syndicate, which in our case is a syndicate without GIIPS banks in the lead arranger position. Before we detail our procedure, it is important to emphasize that the analysis performed in this section is a partial equilibrium analysis, that is, we assume that the overall real effect equals the sum of the real effects at the firm level. Moreover, it is important to acknowledge that we assume that the least affected syndicate did not shift its lending supply function. In what follows, we explain our strategy to estimate aggregate effects using employment growth rates as an example. We perform the same analysis for investment and sales growth rates.

We start by defining the counterfactual employment growth rate of $Firm_{ijh}$ if it had borrowed entirely from non-GIIPS banks.

$$
\begin{aligned}
\widetilde{y_{ijht}} \;=\;& \widehat{y_{ijht}} - \beta_1 \cdot GIIPS\ Bank\ Dependence_{ijh,\min\{t,t_{l_j}\}} \\
-\;& \beta_2 \cdot GIIPS\ Bank\ Dependence_{ijh,\min\{t,t_{l_j}\}} \cdot Crisis_{jt},
\end{aligned}
\tag{4}
$$

where $\widehat{y_{ijt}}$ denotes the fitted value from the respective regression. In the case of employment, we then use the counterfactual employment growth rate to calculate the counterfactual employment level $\widetilde{Emp_{ijt}}$ and similarly the fitted value employment level $\widehat{Emp_{ijt}}$. The total losses due to the bank lending shock during the crisis period are then given by

$$
Total\ Losses \;=\; \sum_{ijht} [\widetilde{Emp_{ijht}} - \widehat{Emp_{ijht}}].
\tag{5}
$$

The fraction of the sample net employment change during the crisis that is caused by banks' lending behavior is then given by

$$
\frac{\sum_{ijt} [\widetilde{Emp_{ijht}} - \widehat{Emp_{ijht}}]}{\sum_{ijt} [Emp_{ijht-1} - Emp_{ijht}]}.
\tag{6}
$$

In reporting our results, we focus on the two subsamples of firms, where we are best able to disentangle the macroeconomic shock from the bank lending shock. Looking at the results for GIIPS firms with a high fraction of revenue generated by non-GIIPS subsidiaries first, we find that overall employment fell by 5.6% during the European Sovereign Debt Crisis period. Our effect accounts for 53.6% of this decline, that is, firms would have cut employment by 53.6% less, had they borrowed from syndicates without GIIPS Banks acting as lead arrangers. Similarly, investment fell by 13% of which 43.2% can be explained by banks' lending behavior. For the evolution of sales, we find an overall decrease of 3.6% over the European Sovereign Debt Crisis period of which we can

explain 37%.

Considering the sample of non-GIIPS firms without subsidiaries in GIIPS or other non-EU countries, we find that overall employment decreased by 1.6% during the European Sovereign Debt Crisis period. We can attribute 25% of this decline to the bank lending supply shock. Similarly, investment fell by 2% of which we can explain 24.8% with a contraction in bank lending. Finally, sales decreased by 2% and we are able to explain 21.4% of this reduction in sales by the loan supply shock.

There are two things to note about these magnitudes. First, perhaps not surprisingly, the reduction in employment, investment, and sales was smaller in non-GIIPS countries, which were less affected by the European Sovereign Debt Crisis, than in GIIPS countries. Second, we can explain less of the overall reduction in employment, investment, and sales in non-GIIPS countries. The main reason for this is that a considerable number of non-GIIPS firms without subsidiaries in GIIPS or other non-EU countries have zero exposure to GIIPS banks, implying that for them $\widetilde{y_{ijt}}$ equals $\widehat{y_{ijt}}$. Put differently, for a substantial number of non-GIIPS firms in this subsample there are no loan supply disruptions caused by GIIPS banks implying, that, overall, we can explain less of the overall macroeconomic evolution.

IV.   Active and Passive Transmission Channels

Given that firms that had a pre-crisis lending relationship with a bank affected by the European Sovereign Debt Crisis suffered significant negative real effects, in this section, we shed more light on how exactly sovereign credit risk translated into the bank lending contraction and the resulting negative real effects for borrowing firms. Compared to financial crises, which only impaired the banks' financial health, the impact of sovereign crises on bank lending is much more complex. There are at least three potential channels through which banks might have been affected by the European Sovereign Debt Crisis: one passive and two active.

The passive channel works through the dramatic increase in credit risk of GIIPS sovereign debt during the sovereign debt crisis. Recent data published by the EBA show that banks generally had large direct holdings of domestic government debt. Therefore, the increase in risk of GIIPS sovereign debt directly translated into losses that weakened the asset side of GIIPS banks' balance sheets and as a result made these banks riskier (Acharya and Steffen (2015)). This can lead to losses for the banks via three channels: (i) banks sell government bonds realizing a loss (ii) bonds are in the trading book and therefore marked to market (iii) bonds are pledged to ECB which makes margin calls in case the value of the collateral falls. Table XV in the online appendix shows that indeed there is a significant positive relationship between banks' GIIPS sovereign debt holdings and their CDS spreads over the crisis period. To cope with these losses, GIIPS banks might have deleveraged and reduced lending to the private sector (Bocola (2014) explores this mechanism in a theoretical model). We call this the "hit on balance sheet channel". This effect is amplified by the significant withdrawal of wholesale funding by U.S. money market funds (Ivashina, Scharfstein,

and Stein (2015)).

To get a better idea of how strongly a bank is affected by the risk of its domestic sovereign portfolio, we construct a similar measure as in Popov and Van Horen (2014), and measure the dependency on domestic sovereign risk of bank b in year t as follows:

$$Domestic\ Sovereign\ Debt\ Risk_{bt} = \frac{Domestic\ Sov.\ Bondholdings_{bt} \cdot Domestic\ Sov.\ CDS_t}{Total\ Assets_{bt}}. \quad (7)$$

Given that the sovereign bondholdings are multiplied with the respective CDS spreads, this measure accounts for the amount of domestic sovereign bondholdings of the respective bank, as well as for the risk associated with these holdings. We classify a bank as affected if its CDS-weighted holdings of domestic sovereign debt are above the sample median.

The two active channels are the risk-shifting channel and the moral suasion channel. The risk-shifting motive arises since, as default risk of GIIPS countries increases, highly levered GIIPS banks have an incentive to increase their domestic sovereign bondholdings (Diamond and Rajan (2011); Crosignani (2014)). The reason for this behavior is as follows. In case a bank wants to engage in risk-shifting, it is looking for an asset that is correlated with its other sources of revenue and that, at the same time, offers a comparatively high expected return. In particular, the asset should only generate losses in states of the world in which the bank is in default anyway. Since banks usually have large holdings of domestic government debt (e.g., the holdings of domestic sovereign bonds of Unicredit and Intesa in mid-2011 amounted to 121 percent and 175 of their core capital, respectively[16]), they would fail anyway as soon as their domestic government is not able to repay its sovereign debt. Furthermore, during the European Sovereign Debt Crisis, the sovereign debt of GIIPS countries promised a high return, thereby making this asset class very attractive for risk-shifting purposes. In addition, according to the "Capital Requirements Directive" (CRD), European regulators consider that sovereign bonds are risk-free (i.e., attach zero risk weights); thus, banks do not need to hold any capital against potential losses on government bonds. On top of that, European regulators removed the concentration limits for sovereign debt exposures, while a bank's exposure to a single borrowing firm is limited to 25% of its Tier 1 capital. For these reasons, sovereign debt allows larger bets compared to other asset classes, in particular corporate loans. Furthermore, for risk-shifting purposes, corporate loans have in addition the disadvantage that they have an idiosyncratic risk component, while the banks' domestic sovereign debt holdings all default in the same states of the world.

One might argue that, for risk-shifting purposes, banks might have an incentive to buy the GIIPS sovereign debt that generates the highest yields, which during the European Sovereign Debt Crisis was Greek sovereign debt. However, even though there probably is a positive correlation between the default probability of Greek and other GIIPS sovereign debt, the relationship is far from being perfectly correlated. Since non-Greek GIIPS banks hardly had any exposure to Greek sovereign debt during the European Sovereign Debt Crisis (in fact already at the beginning of the

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[16] "Europe's Banks Struggle With Weak Bonds" by Landon Thomas Jr., NYTimes.com, August 3, 2011.

European Sovereign Debt Crisis in early 2010 periphery banks had 90% of their GIIPS sovereign bond holdings from their own sovereign; this number rose to 97% by the end of 2012 (Crosignani (2014))), it is very unlikely that non-Greek GIIPS banks would fail in case Greece defaults on its sovereign debt. Therefore, for these banks, domestic dominates Greek sovereign debt with regard to its suitability as a risk-shifting asset. This incentive of GIIPS banks' to engage in risk-shifting by loading up on risky domestic sovereign debt might have led to a crowding-out of lending to the private sector during the sovereign debt crisis.

We apply two different measures to identify which banks are weakly-capitalized and thus more prone to risk-shifting behavior. First, we consider a GIIPS bank to be weakly-capitalized if its ratio between total equity to total assets (obtained from SNL Financial) at the end of 2009 is below the sample median. Second, as a robustness check, we use the banks' rating before the sovereign debt crisis (i.e., at the end of 2009) as an alternative measure of bank health. To determine the rating cutoff, we follow Drechsler, Drechsel, Marques-Ibanez, and Schnabl (2014) and use the ratings (obtained from Bloomberg) from the main rating agencies (Moody's, Standard & Poor's, and Fitch). We then assign a numerical value to each rating: 1 for AAA, 2 for AA+, and so on. We then compute the median rating for each bank. This rating measure has the advantage that it is based on assessments by market participants, rather than on accounting-based measures.

The second active channel that might have led to a crowding-out of corporate lending is the moral suasion channel (see Becker and Ivashina (2014b)). As the sovereign debt crisis peaked, governments in GIIPS countries faced severe problems in refinancing their debt. In these cases, governments may turn to their domestic banks and force them to purchase domestic sovereign debt.

We use three proxies to measure the degree to which banks are prone to moral suasion of their sovereigns. First, following Acharya and Steffen (2015), we use data about government interventions compiled from information disclosed on the official EU state-aid websites to classify banks into intervened and non-intervened banks.[17] The idea is that intervened banks are more prone to moral suasion as the influence of governments on these banks is arguably larger than for non-intervened banks. We classify banks as affected if a bank received some form of financial aid by the government. Second, we follow Iannotta, Nocera, and Sironi (2013) and compile government bank ownership data from Bankscope. As shown in De Marco and Macchiavelli (2014), government ownership seems to have an influence on banks' domestic sovereign bondholdings as banks with a high government ownership share hold, in general, significant more domestic sovereign debt compared to other banks. We construct an indicator variable "High Fraction of Government Ownership", which is equal to one if the share owned by the government for a given bank in a certain year is above the median of the distribution. Lastly, government control over banks can also be measured by government board representation. We follow Becker and Ivashina (2014b) and extract the fraction of directors affiliated with the government from the BoardEx database. For our empirical analysis, we construct an indicator variable equal to one if the fraction of government affiliated directors exceeds the

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[17]The data can be obtained from: `http://ec.europa.eu/competition/elojade/isef/index.cfm?clear=1&policy_area_id=3`.

median.

A. Change in Banks' Sovereign Holdings

Both active channels, the risk-shifting and the moral suasion channel, are consistent with an increase in domestic sovereign bondholdings over the crisis period, which makes their disentanglement particularly challenging. Therefore, we start with exploring whether and which banks changed their sovereign debt holdings after the outbreak of the European Sovereign Debt Crisis.

In Figure 5, we plot the evolution of GIIPS (Panel A) and domestic (Panel B) sovereign debt exposure over time for banks incorporated in non-GIIPS countries (left part of graph) and GIIPS countries (right part of graph). The blue solid line shows the evolution of the sum of the respective banks' sovereign bondholdings scaled by the sum of banks' total assets at the end of the respective year. The red dashed line shows the sum of sovereign bondholdings multiplied by the sovereign's CDS spread as a fraction of the sum of total assets.

Figure 5 shows that most of the GIIPS sovereign bondholdings held by GIIPS banks are domestic, implying a very high correlation between measures of bank affectedness based on overall GIIPS sovereign bondholdings and domestic sovereign bondholdings. In addition, Figure 5 indicates that the riskiness of GIIPS sovereign bondholdings spiked in the crisis period, which severely affected the health of GIIPS banks due to their large domestic sovereign bondholdings, as shown by the significant positive relationship between banks' GIIPS sovereign debt holdings and their CDS spreads over the crisis period (see Table XV in the online appendix).

Furthermore, Panel A of Figure 5 shows that, while non-GIIPS banks slightly decreased their GIIPS sovereign debt exposure between 2009 and 2011, GIIPS banks kept their GIIPS sovereign debt holdings constant. Regarding the domestic sovereign debt holdings, Panel B of Figure 5 documents that both GIIPS and non-GIIPS banks hold their domestic sovereign exposure constant in our sample period. Hence, this preliminary evidence is not consistent with the risk-shifting and moral suasion hypotheses.

However, even though GIIPS banks on average have not significantly increased their domestic sovereign bondholdings, as shown in Panel B of Figure 5, we cannot rule out that the risk-shifting channel and the moral suasion channel played an important role for banks' lending behavior and the resulting real effects of borrowing firms. The fact that, on average, the domestic sovereign bondholdings of GIIPS banks do not change is also consistent with distressed banks (i.e., those with high risk-shifting incentives) increasing their holdings, while other banks decrease their domestic sovereign bondholdings. Similarly, only those GIIPS banks that are very dependent on their governments might be pressured to increase their domestic sovereign bondholdings, while less dependent banks might not. To investigate these possibilities, we analyze the respective subsets of GIIPS banks separately.

We start with the risk-shifting channel and plot the evolution of the domestic sovereign debt exposure over time separately for well-capitalized (low leverage) and weakly-capitalized (high leverage) GIIPS banks. As can be seen from Panel A of Figure 6, weakly-capitalized GIIPS banks

increased their holdings of domestic sovereign debt significantly by roughly 4 percentage points of total assets. This indicates that risk-shifting might have played a role for the cutback in lending of highly leveraged banks. To test the robustness of this finding, we use the banks' rating before the sovereign debt crisis (i.e., at the end of 2009) as an alternative measure of bank health. In Panel B of Figure 6, we plot the evolution of the domestic sovereign debt exposure for high-rated GIIPS banks (left part of graph) and low-rated GIIPS banks (right part of graph), where we consider a GIIPS bank to be low-rated if its median rating is below the A+ threshold. Results remain qualitatively unchanged, which again supports the risk-shifting hypothesis. To test whether this increase of domestic sovereign debt holdings of banks prone to risk-shifting is also statistically significant, Table XVI in the online appendix presents regression results where the dependent variable is the change in a bank's domestic sovereign debt holdings over the period from 2009 to 2011. As can be seen from Panels A and B, indeed both high leverage and low rating GIIPS banks significantly increased their holdings of domestic sovereign debt.

Next, we analyze whether GIIPS banks increased their domestic sovereign bondholdings due to pressure from their governments. Panels C to E of Table XVI in the online appendix show that for none of the moral suasion proxies (i.e., the government intervention, the government bank ownership, and the government control measure) there are significant effects on the change in a bank's domestic sovereign debt holdings.

B. Lending

Given this first evidence that risk-shifting seemed to play in important role for the increase in domestic sovereign debt holdings, while moral suasion did not, we now investigate the importance of the three channels, that is, hit on balance sheet, risk-shifting, and moral suasion, for the contraction of lending supply by banks in our sample period formally.

B.1. Methodology

To test the importance of the different channels for the reduction in bank lending, we apply a modified version of the Khwaja and Mian (2008) estimator, which exploits multiple bank-firm relationships before and during the sovereign debt crisis to control for loan demand and other observed and unobserved borrowing firm characteristics.

While we observe a large number of firms borrowing from multiple banks, we face some constraints in data availability, that render it unfeasible to use the original setup of Khwaja and Mian (2008). First, in contrast to their approach, our dataset contains information only at the time of the origination of the loan, which does not allow us to observe changes over time for a particular loan (e.g., on credit line drawdowns). Second, the syndicated loans in our sample generally have long maturities. Taken together, these two facts imply that a large number of observations in our sample experience no significant year-to-year change in bank-firm lending relationships. This requires us to modify the Khwaja and Mian (2008) estimator and aggregate firms into clusters to generate enough time-series bank lending heterogeneity to meaningfully apply the estimator to our

data. In particular, we track the evolution of the lending volume and loan spreads from a specific bank to a certain firm cluster.

To this end, we form firm clusters based on the following three criteria, which capture important drivers of loan demand, as well as the quality of firms in our sample: (1) the country of incorporation; (2) the industry; and (3) the firm rating. The main reason for aggregating firms based on the first two criteria is that firms in a particular industry in a particular country probably share a lot of firm characteristics and were thus likely affected in a similar way by macroeconomic developments during our sample period. Our motivation behind forming clusters based on credit quality follows from theoretical research in which credit quality is an important source of variation driving a firm's loan demand (e.g., Diamond (1991)). To aggregate firms into clusters, we assign ratings estimated from interest coverage ratio medians for firms by rating category provided by Standard & Poor's.[18] This approach exploits the fact that our measure of credit quality, which is based on accounting information, is monotone across credit categories (Standard&Poor's (2006)). We follow Standard & Poor's and assign ratings on the basis of the three-year median interest coverage ratio of each firm, where the median is calculated from the period preceding the sovereign debt crisis.

We use the following panel regression to estimate the annual change in loan volume provided by bank k in country j to firm cluster m in year t:

$$
\begin{aligned}
\Delta Volume_{kmt+1} \ = \ & \alpha + \beta_1 \cdot GIIPS\ Bank_{kj} \cdot Crisis_{jt} \\
+ \ & \beta_2 \cdot Affected\ Bank_{kj} \cdot Crisis_{jt} \\
+ \ & \beta_3 \cdot Affected\ GIIPS\ Bank_{kj} \cdot Crisis_{jt} \\
+ \ & \gamma \cdot X_{kjt} + Firm\ Cluster_m \cdot Year_{t+1} \\
+ \ & Firm\ Cluster_m \cdot Bank_{kj} + u_{kmt+1}.
\end{aligned}
\tag{8}
$$

The unit of observation in this regression is a bank-year-firm cluster. Besides controlling for observable bank characteristics (log of total assets, capital ratio, ratio of impaired loans to equity) we add firm-cluster times year fixed effects. This allows us to control for any observed and unobserved characteristics that are shared by firms in the same cluster and that might influence loan outcomes. Moreover, we interact firm-cluster and bank fixed effects. By doing this, we exploit the variation within the same firm cluster and bank over time. This not only controls for any unobserved characteristics that are shared by firms in the same cluster, or bank heterogeneity, but also for relationships between firms in a given cluster and the respective bank.

B.2. Results

Panel A of Table VII presents results for the change in lending volume. The dependent variable accordingly represents the annual change in loan volume provided by a given bank to a given firm cluster.

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[18]Note that only a small fraction of all firms in our sample have a rating from one of the rating agencies.

To check whether the results for the financial and real effects of borrowing firms from Section III are indeed associated with a reduction in bank lending, we start with our broad measure for a bank's affectedness (i.e., the banks' country of incorporation) used to capture all three potential channels. Column (1) presents the results for this proxy. The coefficient is negative and statistically significant, which is consistent with the interpretation that GIIPS banks significantly decreased their lending volume to the real sector during the sovereign debt crisis. This finding thus supports the results presented in Section III that the lending contraction of banks affected by the crisis was an important driver for the negative real effects suffered by their borrowing firms.

In the following, we present the results for the three different channels that may affect the lending behavior of banks to the real sector. Column (2) in Panel A of Table VII shows the results for the hit on balance sheet channel. The coefficient of the sovereign risk dummy variable interacted with the crisis dummy variable is negative and significant. This finding indicates that banks with larger sovereign risk in their portfolios reduced lending during the crisis by a larger fraction than banks with lower sovereign risk exposure.[19] Therefore, the risk associated with the sovereign bondholdings and thus the losses incurred due to the sovereign debt crisis indeed play an important role for the lending behavior of banks.

Next, we test whether the reduction in bank lending is also driven by risk-shifting incentives, that is, whether weakly-capitalized GIIPS banks, which increased their domestic sovereign bondholdings during the sovereign debt crisis, also decreased their corporate lending. The results are presented in columns (3) and (4) in Panel A of Table VII. We find that weakly-capitalized GIIPS banks cut their lending to the real sector more than well-capitalized GIIPS banks, irrespective of how we proxy for risk-shifting incentives. These results indicate that the active increase in domestic sovereign bondholdings, shown in Figures 6, results in a crowding-out of lending to the private sector for weakly-capitalized GIIPS banks.

Finally, we examine whether the moral suasion channel affects bank lending during the sovereign debt crisis. Columns (5) to (7) of Table VII present the results for our three proxies for moral suasion: government interventions, government ownership, and government control over banks. The point estimates of the three proxies for moral suasion interacted with the crisis indicator variable are not significantly different from zero. For example, the interaction of the intervened GIIPS bank variable with the crisis indicator variable is zero in magnitude and not statistically significant. Overall, moral suasion does not appear to play a role for the banks' lending decisions in our sample period.

Panel B of Table VII shows the robustness of our results when we use the change in the spread of newly issued loans instead of the change in volume as the dependent variable. We find qualitatively similar results here. We draw two main conclusions from the results in Table VII. First, our evidence indicates that the balance sheet hit caused by the increase in sovereign risk and the risk-shifting channel are of first-order importance regarding the effect of the sovereign debt crisis on bank lending

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[19]As described before, for most banks the majority of their sovereign bondholdings are domestic, which is why the coefficients for the domestic and GIIPS sovereign risk exposure measures are very similar in magnitude. For brevity, we only report the results for the domestic sovereign risk exposure measures.

behavior. Second, we do not find evidence that moral suasion plays a crucial role for banks' lending decisions. We note that GIIPS banks might have engaged in even greater risk-shifting and/or might have been forced by their governments to buy domestic debt after the end of our sample period, that is, after 2012. Furthermore, GIIPS governments might have implicitly encouraged banks to engage in risk-shifting by putting regulations into place that favor such behavior or the governments might not have faced the need to pressure banks into buying more domestic sovereign debt since the weakly-capitalized banks did so anyway.

C.   Financial and Real Outcomes

C.1.   Methodology

We now examine which of the three channels contributed to the financial and real effects of borrowing firms. We apply regressions similar to the ones from Eqs. (2) and (3). In addition, we construct several variables at the firm-year level, reflecting how much credit comes from affected banks in a given year, where we distinguish between affected and non-affected banks using the same proxies as in Table VII. This leads to the following measure for firm i in country j, and industry h in year t:

$$Affected\ Bank\ Dependence_{ijht} = \frac{\sum_{l \in L_{ijht}} \%Affected\ Banks\ in\ Syndicate_{lijht} \cdot Loan\ Amount_{lijht}}{Total\ Loan\ Amount_{ijht}}, \quad (9)$$

where as before L_{ijht} are all of the firm's loans outstanding at time t. For the firms' employment growth and sales growth rates as well as their net debt and investment levels we estimate the following panel regressions:

$$
\begin{aligned}
y_{ijht+1} = {}& \alpha + \beta_1 \cdot GIIPS\ Bank\ Dependence_{ijh,\min\{t,t_{lj}\}} \\
& + \beta_2 \cdot Affected\ Bank\ Dependence_{ijh,\min\{t,t_{lj}\}} \\
& + \beta_3 \cdot Affected\ GIIPS\ Bank\ Dependence_{ijh,\min\{t,t_{lj}\}} \\
& + \beta_4 \cdot GIIPS\ Bank\ Dependence_{ijh,\min\{t,t_{lj}\}} \cdot Crisis_{jt} \\
& + \beta_5 \cdot Affected\ Bank\ Dependence_{ijh,\min\{t,t_{lj}\}} \cdot Crisis_{jt} \\
& + \beta_6 \cdot Affected\ GIIPS\ Bank\ Dependence_{ijh,\min\{t,t_{lj}\}} \cdot Crisis_{jt} \\
& + \gamma \cdot X_{ijht} + Firm_{ijh} + Industry_h \cdot Country_j \cdot Year_{t+1} \\
& + ForeignBankCountry_{k \neq j} \cdot Year_{t+1} + u_{ijht+1}. \quad (10)
\end{aligned}
$$

The unit of observation is again a firm-year. Our key variable of interest in regression Eq. (10) is the firms' dependence on affected GIIPS banks during the crisis (β_6 in Eq. (10)). If affected GIIPS banks reduced their loan supply during the crisis, we expect that firms with lending relationships to these banks should incur negative real effects, that is, we expect β_6 in Eq. (10) to be negative. Along the same lines, we modify the regression from Eq. (2) to analyze the change in the cash flow sensitivity of cash during the crisis.

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C.2. Results

We begin by reporting results for the passive bank lending channel, that is, whether the increase in sovereign risk that forced banks to deleverage and thus decrease their corporate lending, affected borrowing firms by making them financially constrained. The results are presented in Table VIII. In Panel A, the affected indicator variable is equal to one if a bank's GIIPS sovereign portfolio credit risk exposure is above the sample median. In Panel B, the domestic sovereign portfolio credit risk exposure is used to distinguish between affected and non-affected banks. The interaction term of affected bank indicator and the Crisis variable is negative and significant for all dependent variables. Therefore, Panels A and B show that the hit on the affected banks' balance sheets results in negative financial and real effects for firms that have a lending relationship with these banks.

Next, we examine whether the active bank lending channels, that is, the risk-shifting and the moral suasion channel, led to real effects for borrowing firms. Table IX reports results for the real effects if the affected bank measure is based on the GIIPS banks' leverage (Panel A) or rating (Panel B), respectively. The results for both bank health proxies indicate that the real effects are much stronger for firms that have a lending relationship with a GIIPS bank that is weakly-capitalized and thus not able to cope with losses caused by the sovereign debt crisis. These banks engage in risk-shifting by increasing their risky domestic sovereign bondholdings and thus decrease bank lending even more compared to well-capitalized GIIPS banks that were better able to manage the losses incurred during the sovereign debt crisis and thus had no risk-shifting incentives.

Finally, the results for the moral suasion proxy are presented in Table X. We find that moral suasion does not appear to impact the corporate policies of borrowing firms. Neither government interventions, nor government board seats or government ownership have any explanatory power in the cross section. This is consistent with the fact that moral suasion does not significantly impact the lending behavior of banks in our sample.

V.   Conclusion

In this paper, we show that the European Sovereign Debt Crisis and the resulting credit crunch in the eurozone periphery caused significant negative real effects for borrowing firms in Europe. We find that firms that had a pre-crisis business relationship with banks that suffered from the sovereign debt crisis became financially constrained during the crisis. As a result, these firms had lower employment growth rates, lower levels of investment, and lower sales growth rates. This holds true for both GIIPS and non-GIIPS firms.

Moreover, we shed light on the question of how the European Sovereign Debt Crisis actually caused a contraction in bank lending and the resulting real effects for borrowing firms. We document that the negative real effects that can be attributed to the bank lending channel are primarily associated with (i) banks from GIIPS countries facing losses on their significant domestic sovereign bondholdings, and (ii) the resulting incentives of undercapitalized banks from GIIPS countries to engage in risk-shifting behavior by buying even more risky domestic sovereign bonds, thereby

crowding out corporate lending.

We are thus the first to provide cross-country evidence that negative spillovers from the sovereign to the banking sector were also transmitted into the real economy throughout Europe as well as the first to analyze how this transmission worked. We show that the high interdependence of bank and sovereign health is one important contributor to the severe economic downturn in the southern European countries during the sovereign debt crisis. The findings help to understand the unfolding of the European Sovereign Debt Crisis and yield important insights on how to design a more stable European financial system.

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Table I - Variable Definitions

Dependent Variables (all winsorized at the 5% level)

Variable	*Definition*
Net Debt	$\frac{Current\ +\ Non\text{-}Current\ Liabilities\ -\ Cash}{Total\ Assets}$
$\Delta Cash$	$\frac{Cash_{t+1}-Cash_t}{Total\ Assets_t}$
Employment Growth	$ln(Employment_{t+1}) - ln(Employment_t)$
CAPX	$\frac{Fixed\ Assets_{t+1}-Fixed\ Assets_t+Depreciation}{Fixed\ Assets_t}$, set to 0 if negative
Sales Growth	$ln(Sales_{t+1}) - ln(Sales_t)$

Key Explanatory Variables

Variable	*Definition*
Crisis	Indicator variable equal to one for the period of the sovereign debt crisis (starting in 2009 for Greece, in 2010 for all other countries)
GIIPS Bank Dependence$_{ijht}$	$\frac{\sum_{l\in L_{ijht}}\%GIIPS\ Lead\ Arranger\ in\ Syndicate_{lijt}\cdot Loan\ Amount_{lijt}}{Total\ Loan\ Amount_{ijt}}$
Affected Bank Dependence$_{ijht}$	$\frac{\sum_{l\in L_{ijht}}\%Affected\ Banks\ in\ Syndicate_{lijt}\cdot Loan\ Amount_{lijt}}{Total\ Loan\ Amount_{ijt}}$

Affected Bank Measures

Variable	*Definition*
CDS Weighted GIIPS Sov. Bondholdings	Banks with an above median ratio of $\frac{\sum_j Sov.\ Bondholdings_{jt}\cdot CDS_{jt}}{Total\ Assets_t}$, for all $j\in$ GIIPS
CDS Weighted Domestic Sov. Bondholdings	Banks with an above median ratio of $\frac{Domestic\ Sov.\ Bondholdings_t\cdot Domestic\ Sov.\ CDS_t}{Total\ Assets_t}$
High Leverage	Banks with a below median ratio of $\frac{Total\ Equity}{Total\ Assets}$
Low Rating	Banks with a rating of A+ or worse
Gov. Intervention	Banks that received government support during the sovereign debt crisis
High Fraction Gov. Own.	Banks with an above median fraction of government ownership
High Fraction Gov. Board	Banks with an above median fraction of government affiliated directors on the board

Control Variables (all winsorized at the 5% level)

Variable	*Definition*
$ln(Assets)$	Natural logarithm of total assets
Leverage	$\frac{Total\ Assets\text{-}Total\ Equity}{Total\ Assets}$
Net Worth	$\frac{Total\ shareholder\ funds\&Liabilities\ -\ Current\&Non\text{-}Current\ Liabilities\ -\ Cash}{Total\ Assets}$
Tangibility	$\frac{Fixed\ Assets}{Total\ Assets}$
Interest Coverage Ratio	$\frac{EBIT}{Interest\ Expense}$
EBITDA/Assets	$\frac{EBITDA}{Total\ Assets}$
Cash Flow	$\frac{Cash\ flow}{Total\ Assets}$

Table II - Descriptive Statistics pre-Crisis

Panel A: Dependent Variables				Panel B: Explanatory Variables					
	Emp Growth	CAPX	Sales Growth	Total Assets (mn)	Tangibility	Int. Cov.	Net Worth	EBITDA/Assets	Leverage
High GIIPS Bank Dep. Mean	0.054	0.195	0.057	4330	0.610	2.98	0.220	0.108	0.620
Median	0.033	0.116	0.056	737	0.632	1.94	0.206	0.104	0.619
Std. Dev.	0.157	0.243	0.221	7710	0.211	3.32	0.174	0.075	0.198
Low GIIPS Bank Dep. Mean	0.045	0.192	0.049	2460	0.547	3.24	0.227	0.115	0.604
Median	0.021	0.112	0.052	416	0.557	2.06	0.233	0.104	0.592
Std. Dev.	0.162	0.249	0.205	5370	0.240	3.50	0.187	0.098	0.256
Diff.	0.009	0.003	0.007	3050	0.062	-0.267	-0.007	-0.0062	0.163
(t-Stat)	(1.14)	(0.25)	(0.69)	(7.08)	(5.55)	(-1.58)	(-0.84)	(-1.41)	(1.41)
Normalized Diff.				0.242	0.197	-0.053	-0.027	-0.056	0.049
Correlation with GIIPS Bank Dep.				-0.037	0.087	-0.116	-0.064	-0.127	0.117

Panel A presents descriptive statistics of dependent and Panel B of explanatory variables split into firms with a high and low *GIIPS Bank Dependence* for the pre-crisis periods. High (low) *GIIPS Bank Dependence* is an indicator variable equal to one if the fraction of total outstanding loans to a firm provided by GIIPS lead arrangers is above (below) the sample median. *Crisis* is an indicator variable equal to one starting in 2009 for Greece and in 2010 for all other countries (beginning of the sovereign debt crisis) and zero before. The sample consists of all firms in the intersection of DealScan and Amadeus that are located in the following countries: Greece, Italy, Ireland, Portugal, Spain (GIIPS countries) or Germany, France, U.K. (non-GIIPS countries).

Table II - Descriptive Statistics (contd.)

Panel C: Non-GIIPS firms without GIIPS or other non-EU subsidiaries

		Total Assets (mn)	Tangibility	Int. Cov.	Net Worth	EBITDA/Assets	Leverage
High GIIPS Bank Dep.	Mean	6330	0.580	1.968	0.200	0.087	0.664
	Median	1370	0.527	1.340	0.182	0.085	0.673
	Std. Dev.	10200	0.223	2.546	0.132	0.048	0.139
Low GIIPS Bank Dep.	Mean	8710	0.559	1.939	0.210	0.101	0.646
	Median	2560	0.558	1.300	0.180	0.099	0.678
	Std. Dev.	12000	0.167	2.540	0.143	0.062	0.128
Diff. (t-Stat)		-2380 (-1.37)	-0.208 (-0.68)	-0.028 (-0.07)	0.010 (0.50)	-0.145 (-1.35)	0.177 (0.84)
Normalized Diff.		-0.151	-0.075	-0.008	0.051	-0.178	0.095
Correlation with GIIPS Bank Dep.		-0.07	-0.03	0	0.01	-0.09	-0.02

Panel D: GIIPS firms with high fraction of revenue generated by non-GIIPS subsidiaries

		Total Assets (mn)	Tangibility	Int. Cov.	Net Worth	EBITDA/Assets	Leverage
High GIIPS Bank Dep.	Mean	1080	0.536	3.508	0.208	0.118	0.662
	Median	495	0.570	2.540	0.216	0.106	0.625
	Std. Dev.	2980	0.240	3.358	0.209	0.070	0.228
Low GIIPS Bank Dep.	Mean	1310	0.564	2.855	0.210	0.105	0.655
	Median	233	0.579	1.855	0.199	0.093	0.630
	Std. Dev.	3510	0.284	3.036	0.225	0.082	0.295
Diff. (t-Stat)		-224 (-0.47)	0.027 (0.70)	-0.653 (-1.52)	-0.001 (-0.04)	-0.012 (-1.11)	0.006 (0.16)
Normalized Diff.		0.049	0.075	-0.142	-0.006	-0.120	0.018
Correlation with GIIPS Bank Dep.		-0.037	0.087	-0.092	-0.064	-0.127	0.169

Panels C and D present descriptive statistics of explanatory variables for the pre-crisis period. Panel C reports summary statistics for non-GIIPS firms without GIIPS or other non-EU subsidiaries and Panel D reports results for GIIPS firms with a high fraction of revenue generated by non-GIIPS subsidiaries. Both panels are split into firms with high and low *GIIPS Bank Dependence* (subsample specific cutoff points are used to classify firms as high or low *GIIPS Bank Dependence*). Panel C includes firms located in Germany, France, or U.K. (non-GIIPS countries) that do not have any foreign subsidiary located in Greece, Italy, Ireland, Portugal, or Spain (GIIPS countries) or any other non-EU country. Panel D includes firms in GIIPS countries, which have a high fraction of their revenues generated by non-GIIPS subsidiaries.

Table II - Descriptive Statistics (contd.)

Panel E: GIIPS vs. non-GIIPS Banks

		Total Assets (mm)	Equity/Assets	Impaired Loans/Equity	Tier1 Ratio	avg 5-year CDS Spread
GIIPS Banks	Mean	192330	0.064	0.376	0.085	60.79
	Median	80378	0.062	0.325	0.080	60.95
	Std. Dev.	260356	0.018	0.271	0.025	18.34
Non-GIIPS Banks	Mean	658094	0.030	0.412	0.087	60.27
	Median	412977	0.027	0.351	0.086	44.49
	Std. Dev.	658926	0.013	0.276	0.018	45.07
	Diff. (t-Stat)	-465763 (-6.07)	0.034 (13.03)	-0.035 (0.76)	-0.001 (-0.51)	0.5 (0.04)
	Normalized Diff.	-0.657	1.531	-0.093	-0.064	0.017

Panel F: Non-GIIPS Banks

		Total Assets (mm)	Equity/Assets	Impaired Loans/Equity	Tier1 Ratio	avg 5-year CDS Spread
Non-GIIPS with high fraction GIIPS syndicates	Mean	710191	0.030	0.35	0.087	63.62
	Median	419654	0.025	0.27	0.087	45.24
	Std. Dev.	622090	0.013	0.25	0.018	54.18
Non-GIIPS with low fraction GIIPS syndicates	Mean	573659	0.034	0.48	0.088	55.00
	Median	223165	0.033	0.43	0.082	42.72
	Std. Dev.	717822	0.010	0.29	0.019	28.46
	Diff. (t-Stat)	136532 (0.87)	-0.004 (-1.55)	-0.012 (-1.81)	-0.001 (-0.12)	-8.61 (-0.38)
	Normalized Diff.	0.178	-0.243	-0.336	-0.038	-0.140

Panels E and F present descriptive statistics for the banks in our sample in the pre-crisis period. Panel E compares GIIPS and non-GIIPS banks while Panel F compares non-GIIPS banks with an above and below median fraction of deals issued with GIIPS Banks. Non-GIIPS banks are headquartered in Germany, France, or U.K. (non-GIIPS countries), whereas GIIPS banks are headquartered in Greece, Italy, Ireland, Portugal, or Spain (GIIPS countries).

Table III - Real and Financial Outcomes

	(1) Net Debt	(2) Δ Cash	(3) $\frac{TotalCreditLine}{Cash+TotalCreditLine}$	(4) $\frac{UndrawnCreditLine}{Cash+UndrawnCreditLine}$	(5) Emp Growth	(6) CAPX	(7) Sales Growth
GIIPS Bank Dep.*Crisis	-0.039***	0.003	-0.091**	-0.164***	-0.041***	-0.060***	-0.049***
	(-2.98)	(0.73)	(-2.31)	(-3.33)	(-2.97)	(-2.70)	(-2.96)
Cash Flow*Crisis		0.001					
		(0.24)					
Cash Flow*GIIPS Bank Dep.		-0.003					
		(-0.50)					
Cash Flow*GIIPS Bank Dep.*Crisis		0.007**					
		(2.44)					
Cash Flow		0.000					
		(0.10)					
R^2	0.543	0.442	0.831	0.841	0.423	0.587	0.494
N	4448	4003	507	507	3781	4351	4214
Firm Controls	YES	YES	YES	YES	YES	YES	YES
Firm Fixed Effects	YES	YES	YES	YES	YES	YES	YES
Industry*Country*Year Fixed Effects	YES	YES	YES	YES	YES	YES	YES
Foreign Bank Country*Year Fixed Effects	YES	YES	NO	NO	YES	YES	YES

Table III presents firm-level regressions. The dependent variables are net debt, the change in cash holdings, credit lines as a fraction of the sum of credit lines and cash, undrawn credit lines as a fraction of the sum of undrawn credit lines and cash, employment growth, investments, and sales growth, respectively. The sample consists of all firms in the intersection of DealScan and Amadeus that are located in the following countries: Greece, Italy, Ireland, Portugal, Spain (GIIPS countries) or Germany, France, U.K. (non-GIIPS countries) for the employment growth, investments, sales growth, net debt and cash flow regressions. For the credit line regressions, the sample consists of all firms in the intersection of DealScan, Amadeus, and Capital IQ that are located in a GIIPS or non-GIIPS country. *GIIPS Bank Dependence* is defined as fraction of total outstanding loans provided by GIIPS lead arrangers. *Crisis* is an indicator variable equal to one starting in 2009 for Greece and in 2010 for all other countries (beginning of the sovereign debt crisis) and zero before. Firm control variables include the logarithm of total assets, tangibility, interest coverage ratio, EBITDA as a fraction of total assets, leverage, net worth and for the cash regression a firm's cash flow and capital expenditures. All firm-level control variables are lagged by one period. All variables are defined in Table I. All regressions include firm and industry-country-year fixed effects as well as all firm-level controls. Columns (1)-(2) and (5)-(7) additionally include foreign bank country-year fixed effects. Standard errors are adjusted for heteroskedasticity and clustered at the firm-level. Significance levels: * ($p < 0.10$), ** ($p < 0.05$), *** ($p < 0.01$).

Table IV - Subsidiaries

Panel A: Non-GIIPS Firms without GIIPS or other non-EU Subsidiaries

	(1)	(2)	(3)	(4)	(5)
	Net Debt	Δ Cash	Emp Growth	CAPX	Sales Growth
GIIPS Bank Dep.*Crisis	-0.123**	-0.037	-0.097***	-0.186**	-0.149**
	(-2.59)	(-1.14)	(-2.95)	(-2.07)	(-2.16)
Cash Flow*GIIPS Bank Dep.*Crisis		0.177***			
		(3.12)			
R^2	0.496	0.475	0.419	0.583	0.443
N	1175	997	892	1107	1079

Panel B: Non-GIIPS Firms with GIIPS Subsidiaries

GIIPS Bank Dep.*Crisis	-0.002	-0.005	-0.027*	-0.010	-0.014
	(-0.10)	(-0.91)	(-1.93)	(-0.48)	(-0.74)
Cash Flow*GIIPS Bank Dep.*Crisis		0.041**			
		(2.49)			
R^2	0.561	0.379	0.344	0.600	0.446
N	1315	1282	1192	1304	1302

Panel C: GIIPS Firms with high Fraction of Revenue generated by non-GIIPS Subsidiaries

GIIPS Bank Dep.*Crisis	-0.086**	-0.021	-0.168***	-0.156**	-0.140**
	(-2.07)	(-1.21)	(-2.64)	(-2.05)	(-2.55)
Cash Flow*GIIPS Bank Dep.*Crisis		0.039**			
		(2.30)			
R^2	0.671	0.664	0.621	0.670	0.730
N	485	462	424	471	450

Panel D: GIIPS Firms with low Fraction of Revenue generated by non-GIIPS Subsidiaries

GIIPS Bank Dep.*Crisis	-0.054**	0.010	-0.047	-0.098*	-0.046
	(-2.33)	(0.93)	(-1.38)	(-1.88)	(-0.91)
Cash Flow*GIIPS Bank Dep.*Crisis		0.020			
		(1.02)			
R^2	0.594	0.483	0.435	0.630	0.536
N	923	747	779	913	858
Firm Controls	YES	YES	YES	YES	YES
Firm Fixed Effects	YES	YES	YES	YES	YES
Industry*Year Fixed Effects	YES	YES	YES	YES	YES
Foreign Bank Country*Year Fixed Effects	YES	YES	YES	YES	YES

Table IV presents firm-level regressions. The dependent variables are net debt, the change in cash holdings, employment growth, investments, and sales growth, respectively. The sample consists of firms in the intersection of DealScan and Amadeus. Panel A includes firms located in Germany, France, or U.K. (non-GIIPS countries) that do not have any foreign subsidiary located in Greece, Italy, Ireland, Portugal, or Spain (GIIPS countries) or any other non-EU country. Panel B includes firms located in a non-GIIPS country that have at least one foreign GIIPS subsidiary. Panel C includes firms in GIIPS countries that have a high fraction (in the highest tercile of the distribution) of their revenues generated by non-GIIPS subsidiaries. Panel D includes firms located in a GIIPS country that have a low fraction of their revenue generated by non-GIIPS subsidiaries. *GIIPS Bank Dependence* is defined as fraction of total outstanding loans provided by GIIPS lead arrangers. *Crisis* is an indicator variable equal to one starting in 2009 for Greece and in 2010 for all other countries (beginning of the sovereign debt crisis) and zero before. Firm control variables include the logarithm of total assets, leverage, net worth, tangibility, interest coverage ratio, and EBITDA as a fraction of total assets and for the cash regression a firm's cash flow and capital expenditures. All firm-level control variables are lagged by one period. All variables are defined in Table I. All regressions include firm, industry-year and foreign bank country-year fixed effects, as well as all firm-level controls. Standard errors are adjusted for heteroskedasticity and clustered at the firm-level. Significance levels: * ($p < 0.10$), ** ($p < 0.05$), *** ($p < 0.01$).

Table V - Listed vs. non-listed Firms and rated vs. unrated Firms

	(1) Net Debt	(2) Δ Cash	(3) Emp Growth	(4) CAPX	(5) Sales Growth
Panel A: Listed Firms					
GIIPS Bank Dep.*Crisis	0.013	0.013*	-0.038	-0.018	-0.037
	(0.68)	(1.95)	(-1.41)	(-0.62)	(-1.36)
Cash Flow*GIIPS Bank Dep.*Crisis		-0.005			
		(-1.41)			
R^2	0.669	0.569	0.552	0.673	0.648
N	1805	1772	1737	1786	1748
Panel B: Non-listed Firms					
GIIPS Bank Dep.*Crisis	-0.045**	0.003	-0.047**	-0.073**	-0.056**
	(-2.31)	(0.50)	(-2.20)	(-2.12)	(-2.06)
Cash Flow*GIIPS Bank Dep.*Crisis		0.010**			
		(2.46)			
R^2	0.637	0.558	0.548	0.678	0.592
N	2643	2231	2044	2565	2466
Panel C: Rated Firms					
GIIPS Bank Dep.*Crisis	-0.037	0.033	-0.033	-0.056	-0.043
	(-1.15)	(1.59)	(-1.10)	(-1.50)	(-1.22)
Cash Flow*GIIPS Bank Dep.*Crisis		-0.034			
		(-1.26)			
R^2	0.763	0.787	0.739	0.764	0.826
N	572	562	539	565	546
Panel D: Unrated Firms					
GIIPS Bank Dep.*Crisis	-0.043***	0.005	-0.043***	-0.070***	-0.050***
	(-2.87)	(0.98)	(-2.71)	(-2.96)	(-2.63)
Cash Flow*GIIPS Bank Dep.*Crisis		0.008***			
		(2.75)			
R^2	0.568	0.468	0.461	0.614	0.502
N	3876	3441	3242	3786	3675

Table V presents firm-level regressions. The dependent variables are net debt, the change in cash holdings, employment growth, investments, and sales growth, respectively. The sample consists of all firms in the intersection of DealScan and Amadeus and located in the following countries: Greece, Italy, Ireland, Portugal, Spain (GIIPS countries) or Germany, France, U.K. (non-GIIPS countries). Panel A includes firms that are publicly listed, while Panel B firms that are not publicly listed. Panel C includes firms that are rated while Panel D firms that are not rated. *GIIPS Bank Dependence* is defined as fraction of total outstanding loans provided by GIIPS lead arrangers. *Crisis* is an indicator variable equal to one starting in 2009 for Greece and in 2010 for all other countries (beginning of the sovereign debt crisis) and zero before. Firm control variables include the logarithm of total assets, leverage, net worth, tangibility, interest coverage ratio, and EBITDA as a fraction of total assets and for the cash regression a firm's cash flow and capital expenditures. All firm-level control variables are lagged by one period. All variables are defined in Table I. All regressions include firm, industry-country-year and foreign bank country-year fixed effects, as well as all firm-level controls. Standard errors are adjusted for heteroskedasticity and clustered at the firm-level. Significance levels: * ($p < 0.10$), ** ($p < 0.05$), *** ($p < 0.01$).

Table VI - Switcher vs. non-Switcher

Panel A: Firms with constant *GIIPS Bank Dependence*

	(1)	(2)	(3)	(4)	(5)
	Net Debt	Δ Cash	Emp Growth	CAPX	Sales Growth
GIIPS Bank Dep.*Crisis	-0.044***	0.002	-0.043**	-0.074***	-0.047**
	(-2.74)	(0.28)	(-2.29)	(-2.81)	(-2.12)
Cash Flow*GIIPS Bank Dep.*Crisis		0.011***			
		(3.35)			
R^2	0.598	0.482	0.476	0.647	0.525
N	3405	3016	2795	3326	3237

Panel B: Firms that switch their Bank Relationships

GIIPS Bank Dep.*Crisis	-0.011	0.002	-0.014	-0.018	0.008
	(-0.44)	(0.29)	(-0.58)	(-0.54)	(0.19)
Cash Flow*GIIPS Bank Dep.*Crisis		0.002			
		(0.22)			
R^2	0.781	0.720	0.753	0.761	0.772
N	1043	987	986	1025	977

Panel C: Switcher vs. non-Switcher

	Listed	Non-Listed	Cum.
Switcher	62.38%	37.62%	100%
Non-Switcher	27.27%	72.73%	100%

Table VI presents firm-level regressions. The dependent variables are net debt, the change in cash holdings, employment growth, investments, and sales growth, respectively. The sample consists of all firms in the intersection of DealScan and Amadeus and located in the following countries: Greece, Italy, Ireland, Portugal, Spain (GIIPS countries) or Germany, France, U.K. (non-GIIPS countries). Panel A includes firms that have a constant *GIIPS Bank Dependence* throughout the sample period, whereas Panel B firms that switch their bank relationships. Finally, Panel C reports the fraction of firms with constant *GIIPS Bank Dependence* (non-switcher) in the listed and non-listed subsamples. *GIIPS Bank Dependence* is defined as fraction of total outstanding loans provided by GIIPS lead arrangers. *Crisis* is an indicator variable equal to one starting in 2009 for Greece and in 2010 for all other countries (beginning of the sovereign debt crisis) and zero before. Firm control variables include the logarithm of total assets, leverage, net worth, tangibility, interest coverage ratio, and EBITDA as a fraction of total assets and for the cash regression a firm's cash flow and capital expenditures. All firm-level control variables are lagged by one period. All variables are defined in Table I. All regressions include firm, industry-country-year and foreign bank country-year fixed effects, as well as all firm-level controls. Standard errors are adjusted for heteroskedasticity and clustered at the firm-level. Significance levels: * ($p < 0.10$), ** ($p < 0.05$), *** ($p < 0.01$).

Table VII - Lending Volume and Spread

Panel A: Loan Volume

	(1) ΔVolume	(2) ΔVolume	(3) ΔVolume	(4) ΔVolume	(5) ΔVolume	(6) ΔVolume	(7) ΔVolume
GIIPS*Crisis	-0.046** (-2.04)		-0.018 (-0.71)	-0.045* (-1.74)	-0.068** (-2.12)	-0.046* (-1.78)	-0.039* (-1.66)
CDS Weighted Dom. Bondholdings*Crisis		-0.048** (-2.00)					
High Leverage*GIIPS*Crisis			-0.076** (-2.04)				
Low Rating*GIIPS*Crisis				-0.096** (-1.97)			
Gov. Intervention*GIIPS*Crisis					0.044 (1.08)		
High Gov. Board*GIIPS*Crisis						-0.012 (-0.37)	
High Gov. Own.*GIIPS*Crisis							-0.045 (-1.12)
R^2	0.707	0.744	0.731	0.730	0.727	0.730	0.730
N	5448	4947	5372	5372	5372	5372	5372

Panel B: Loan Spread

	ΔSpread	ΔSpread	ΔSpread	ΔSpread	ΔSpread	ΔSpread	ΔSpread
GIIPS*Crisis	0.041* (1.92)		0.018 (1.06)	0.045* (1.84)	0.043 (0.98)	0.044* (1.69)	0.052** (2.21)
CDS Weighted Dom. Bondholdings*Crisis		0.047* (1.92)					
High Leverage*GIIPS*Crisis			0.082** (2.03)				
Low Rating*GIIPS*Crisis				0.157* (1.93)			
Gov. Intervention*GIIPS*Crisis					-0.022 (-0.45)		
High Gov. Board*GIIPS*Crisis						-0.075 (-1.14)	
High Gov. Own.*GIIPS*Crisis							-0.072 (-1.07)
R^2	0.685	0.737	0.747	0.747	0.745	0.748	0.748
N	3230	3004	3171	3171	3171	3171	3171
Bank-Level Controls	YES	YES	YES	YES	YES	YES	YES
Firm Cluster-Year Fixed Effects	YES	YES	YES	YES	YES	YES	YES
Firm Cluster-Bank Fixed Effects	YES	YES	YES	YES	YES	YES	YES

Table VII presents the results of a modified version of the Khwaja and Mian (2008) bank lending channel regression. The unit of observation is a firm cluster-bank-year. The dependent variable is the change in log loan volume (Panel A) or change in log spread (Panel B) of a bank-firm cluster relation in a given year where firm clusters are formed based on a firm's country of incorporation, industry, and rating. The rating of each firm is estimated from EBIT interest coverage ratio medians for firms by rating category provided by Standard & Poor's. We assign ratings on the basis of the pre-crisis median interest coverage ratio of each firm. Data is restricted to: (i) the set of firm cluster-bank relations that existed before the start of the sovereign debt crisis, and (ii) firm cluster-bank years where firms in a cluster borrow at least from one GIIPS bank and one non-GIIPS bank. *Crisis* is an indicator variable equal to one starting in 2009 for Greece and in 2010 for all other countries (beginning of the sovereign debt crisis) and zero before. All variables are defined in Table I. All regressions include firm cluster-year fixed effects, firm cluster-bank fixed effects and bank controls (logarithm of total assets, equity to total assets, impaired loans to total equity). Standard errors are clustered at the bank level. Significance levels: * ($p < 0.10$), ** ($p < 0.05$), *** ($p < 0.01$).

Table VIII - Passive Channel: Hit on Balance Sheet

Panel A: Risk of GIIPS Sovereign Bondholdings

	(1) Net Debt	(2) Δ Cash	(3) Emp Growth	(4) CAPX	(5) Sales Growth
CDS Weighted GIIPS Sov. Bondholdings*Crisis	-0.018**	-0.000	-0.025**	-0.029**	-0.031*
	(-2.02)	(-0.01)	(-2.03)	(-2.07)	(-1.80)
CDS Weighted GIIPS Sov. Bondholdings*Crisis*Cash Flow		0.011***			
		(2.73)			
R^2	0.553	0.472	0.441	0.609	0.516
N	4191	3781	3573	4099	3972

Panel B: Risk of Domestic Sovereign Bondholdings

	(1) Net Debt	(2) Δ Cash	(3) Emp Growth	(4) CAPX	(5) Sales Growth
CDS Weighted Domestic Sov. Bondholdings*Crisis	-0.019**	0.000	-0.027**	-0.031**	-0.027**
	(-2.24)	(0.14)	(-2.23)	(-2.23)	(-2.22)
CDS Weighted Domestic Sov. Bondholdings*Cash Flow*Crisis		0.011***			
		(2.81)			
R^2	0.553	0.474	0.442	0.609	0.502
N	4191	3781	3573	4099	3972

Table VIII presents firm-level regressions. The dependent variables are net debt, the change in cash holdings, employment growth, investments, and sales growth, respectively. The sample consists of all firms in the intersection of DealScan and Amadeus that are located in the following countries: Greece, Italy, Ireland, Portugal, Spain (GIIPS countries) or Germany, France, U.K. (non-GIIPS countries), which have a lending relationship to a bank that was part of the EBA stress tests. *CDS Weighted GIIPS Sov. Bondholdings* (Panel A) and *CDS Weighted Domestic Sov. Bondholdings* (Panel B) measure the fraction of affected lead arrangers based on the risk-adjusted GIIPS and domestic sovereign bondholdings of banks in a firm's syndicate, respectively. *Crisis* is an indicator variable equal to one starting in 2009 for Greece and in 2010 for all other countries (beginning of the sovereign debt crisis) and zero before. Firm control variables include the logarithm of total assets, leverage, net worth, tangibility, interest coverage ratio, and EBITDA as a fraction of total assets and for the cash regression a firm's cash flow and capital expenditures. All firm-level control variables are lagged by one period. All variables are defined in Table I. All regressions include firm, industry-country-year and foreign bank country-year fixed effects, as well as all firm-level controls. Standard errors are adjusted for heteroskedasticity and clustered at the firm-level. Significance levels: * ($p < 0.10$), ** ($p < 0.05$), *** ($p < 0.01$).

Table IX - Active Channel: Risk Shifting

Panel A: Leverage

	(1) Net Debt	(2) Δ Cash	(3) Emp Growth	(4) CAPX	(5) Sales Growth
High Leverage GIIPS*Crisis	-0.032*	-0.003	-0.036**	-0.049**	-0.040**
	(-1.94)	(-0.73)	(-2.13)	(-2.13)	(-2.01)
High Leverage*Crisis	-0.006	0.003	0.007	0.001	0.013
	(-0.69)	(0.82)	(0.66)	(0.05)	(1.35)
GIIPS*Crisis	-0.015	0.006	-0.025**	-0.031*	-0.019
	(-1.17)	(1.41)	(-2.00)	(-1.70)	(-1.29)
High Leverage GIIPS*Crisis*Cash Flow		0.011**			
		(2.06)			
High Leverage*Crisis*Cash Flow		0.001			
		(0.51)			
GIIPS*Crisis*Cash Flow		0.003			
		(0.68)			
R^2	0.554	0.461	0.430	0.594	0.500
N	4339	3918	3695	4246	4115

Panel B: Rating

	(1) Net Debt	(2) Δ Cash	(3) Emp Growth	(4) CAPX	(5) Sales Growth
Low Rating GIIPS*Crisis	-0.026*	-0.004	-0.032**	-0.044**	-0.063***
	(-1.68)	(-0.70)	(-2.01)	(-1.99)	(-2.72)
Low Rating*Crisis	0.023**	-0.002	0.012	0.045***	0.055***
	(2.10)	(-0.53)	(1.07)	(2.68)	(2.63)
GIIPS*Crisis	-0.033***	0.008*	-0.025*	-0.037**	-0.032**
	(-2.72)	(1.89)	(-1.94)	(-2.10)	(-2.10)
Low Rating GIIPS*Crisis*Cash Flow		0.017*			
		(1.83)			
Low Rating*Crisis*Cash Flow		-0.010			
		(-1.28)			
GIIPS*Crisis*Cash Flow		0.008**			
		(2.54)			
R^2	0.553	0.464	0.430	0.596	0.502
N	4339	3918	3695	4246	4115

Table IX presents firm-level regressions. The dependent variables are net debt, the change in cash holdings, employment growth, investments, and sales growth, respectively. The sample consists of all firms in the intersection of DealScan and Amadeus and located in the following countries: Greece, Italy, Ireland, Portugal, Spain (GIIPS countries) or Germany, France, U.K. (non-GIIPS countries), with a lending relationship to a bank that was part of the EBA stress tests. *GIIPS* measures the fraction of syndicated loans provided by banks incorporated in a GIIPS country and *High Leverage GIIPS* (*Low Rating GIIPS*) the fraction provided by high leverage (low rating) banks incorporated in a GIIPS country. A bank is considered highly leveraged if its ratio of total equity to total assets is below the sample median in 2009 (separate median split for GIIPS and non-GIIPS banks) (Panel A) and it is considered to have a low rating if its median rating is A+ or lower in 2009 (Panel B). *Crisis* is an indicator variable equal to one starting in 2009 for Greece and in 2010 for all other countries (beginning of the sovereign debt crisis) and zero before. Firm control variables include the logarithm of total assets, leverage, net worth, tangibility, interest coverage ratio, and EBITDA as a fraction of total assets and for the cash regression a firm's cash flow and capital expenditures. All firm-level control variables are lagged by one period. All variables are defined in Table I. All regressions include firm, industry-country-year and foreign bank country-year fixed effects, as well as all firm-level controls. Standard errors are adjusted for heteroskedasticity and clustered at the firm-level. Significance levels: * ($p < 0.10$), ** ($p < 0.05$), *** ($p < 0.01$).

Table X - Active Channel: Moral Suasion

Panel A: Intervened Banks

	(1) Net Debt	(2) Δ Cash	(3) Emp Growth	(4) CAPX	(5) Sales Growth
GIIPS Gov. Intervention*Crisis	-0.004 (-0.44)	-0.006* (-1.95)	0.002 (0.21)	0.001 (0.04)	-0.011 (-0.62)
Gov. Intervention*Crisis	0.001 (0.10)	0.002 (0.54)	0.004 (0.39)	0.014 (1.02)	-0.011 (-0.80)
GIIPS*Crisis	-0.032** (-2.55)	0.009* (1.95)	-0.032** (-2.44)	-0.040** (-2.26)	-0.038** (-2.37)
GIIPS Gov. Intervention*Crisis*Cash Flow		0.009 (1.54)			
Gov. Intervention*Crisis*Cash Flow		0.001 (0.22)			
GIIPS*Crisis*Cash Flow		0.007* (1.83)			
R^2	0.552	0.463	0.429	0.593	0.500
N	4339	3918	3695	4246	4115

Panel B: Government Ownership

	(1) Net Debt	(2) Δ Cash	(3) Emp Growth	(4) CAPX	(5) Sales Growth
High Fraction Gov. Own. GIIPS*Crisis	0.003 (0.31)	0.000 (0.03)	0.011 (1.22)	0.012 (0.81)	0.015 (1.33)
High Fraction Gov. Own.*Crisis	0.020 (1.57)	0.003 (0.70)	0.004 (0.38)	0.003 (0.16)	-0.014 (-1.05)
GIIPS*Crisis	-0.024* (-1.74)	0.006 (1.33)	-0.031** (-2.14)	-0.044** (-2.36)	-0.046*** (-2.80)
High Fraction Gov. Own. GIIPS*Crisis*Cash Flow		-0.000 (-0.04)			
High Fraction Gov. Own.*Crisis*Cash Flow		-0.011*** (-2.84)			
GIIPS*Crisis*Cash Flow		0.010*** (2.69)			
R^2	0.554	0.463	0.430	0.593	0.500
N	4339	3918	3695	4246	4115

Panel C: Government Board Seats

	(1) Net Debt	(2) Δ Cash	(3) Emp Growth	(4) CAPX	(5) Sales Growth
High Fraction Gov. Board GIIPS*Crisis	0.012 (1.10)	-0.004 (-1.23)	0.011 (1.04)	0.012 (0.83)	0.015 (1.21)
High Fraction Gov. Board*Crisis	-0.002 (-0.16)	0.003 (0.84)	0.006 (0.46)	0.007 (0.41)	-0.029** (-2.00)
GIIPS*Crisis	-0.032** (-2.47)	0.006 (1.40)	-0.026* (-1.80)	-0.037** (-2.16)	-0.048*** (-3.02)
High Fraction Gov. Board GIIPS*Crisis*Cash Flow		-0.002 (-0.41)			
High Fraction Gov. Board*Crisis*Cash Flow		0.002 (0.37)			
GIIPS*Crisis*Cash Flow		0.012*** (3.31)			
R^2	0.553	0.462	0.431	0.593	0.500
N	4339	3918	3695	4246	4115

Table X presents firm-level regressions. The dependent variables are net debt, the change in cash holdings, employment growth, investments, and sales growth, respectively. The sample consists of all firms in the intersection of DealScan and Amadeus and located in the following countries: Greece, Italy, Ireland, Portugal, Spain (GIIPS countries) or Germany, France, U.K. (non-GIIPS countries), with a lending relationship to a bank that was part of the EBA stress tests. *GIIPS* measures the fraction of syndicated loans provided by banks incorporated in a GIIPS country. *Gov. Intervention* measures the fraction of loans provided by banks that received government support during the crisis (Panel A). *High Fraction Gov. Own.* measures the fraction of loans provided by banks with an above median government ownership (Panel B). *High Fraction Gov. Board* measures the fraction of loans provided by banks with an above median fraction of government affiliated directors (Panel C). *Crisis* is an indicator variable equal to one starting in 2009 for Greece and in 2010 for all other countries (beginning of the sovereign debt crisis) and zero before. Firm control variables include the logarithm of total assets, leverage, net worth, tangibility, interest coverage ratio, and EBITDA as a fraction of total assets and for the cash regression a firm's cash flow, and capital expenditures. All firm-level control variables are lagged by one period. All variables are defined in Table I. All regressions include firm, industry-country-year and foreign bank country-year fixed effects, as well as all firm-level controls. Standard errors are adjusted for heteroskedasticity and clustered at the firm-level. Significance levels: * ($p < 0.10$), ** ($p < 0.05$), *** ($p < 0.01$).

Figure 1. - Real Effects - Entire Sample

Panel A: Employment Growth

Panel B: Investment

Panel C: Sales Growth

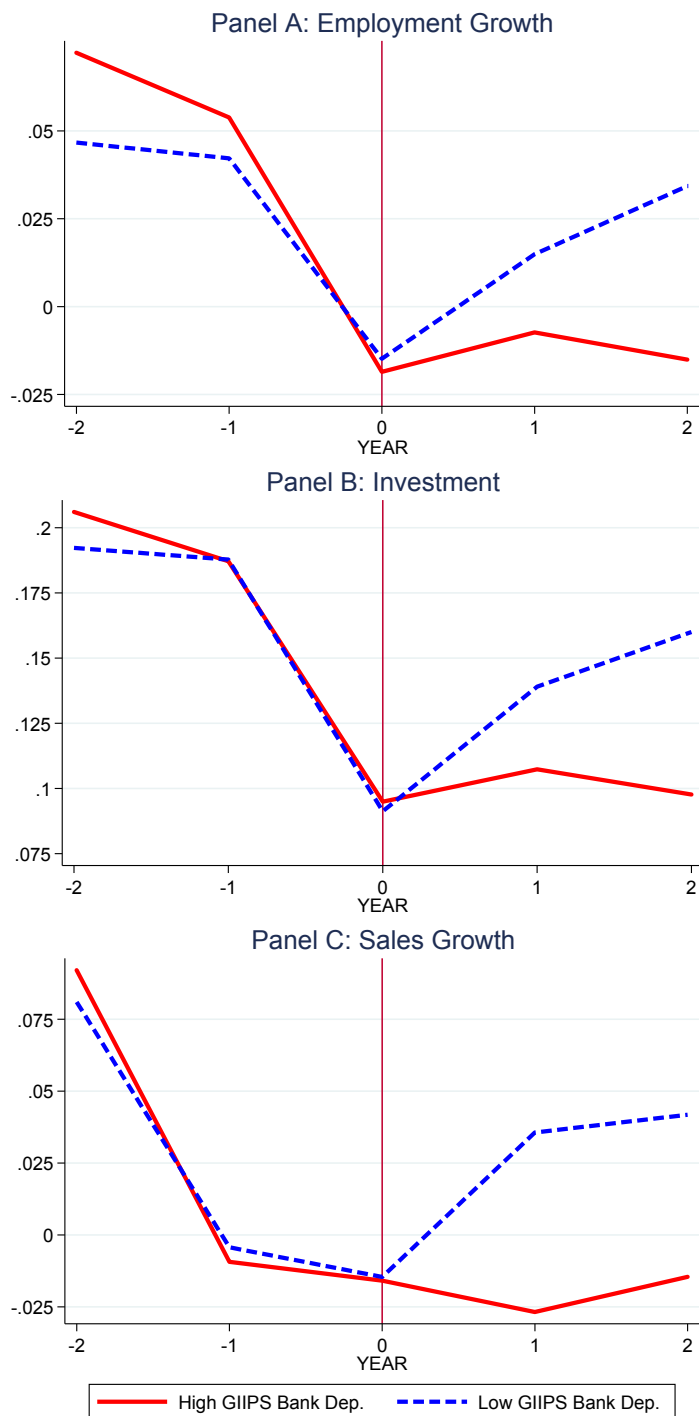High GIIPS Bank Dep. — — — Low GIIPS Bank Dep.

Figure 1 shows employment growth rates (Panel A), capital expenditures as a fraction of tangible assets (Panel B), and sales growth rates (Panel C) for firms with high (red solid line) and low (blue dashed line) *GIIPS Bank Dependence* in the pre-crisis period (years -2 and -1) and the crisis period (starting in year 0). We consider all loans in DealScan to firms located in the following countries: Greece, Italy, Ireland, Portugal, Spain, Germany, France, or U.K. We restrict the sample to firms with financial information available in Amadeus.

Figure 2. - Liquidity Management - Entire Sample

Panel A: Total Credit Line/(Total Credit Line+Cash)

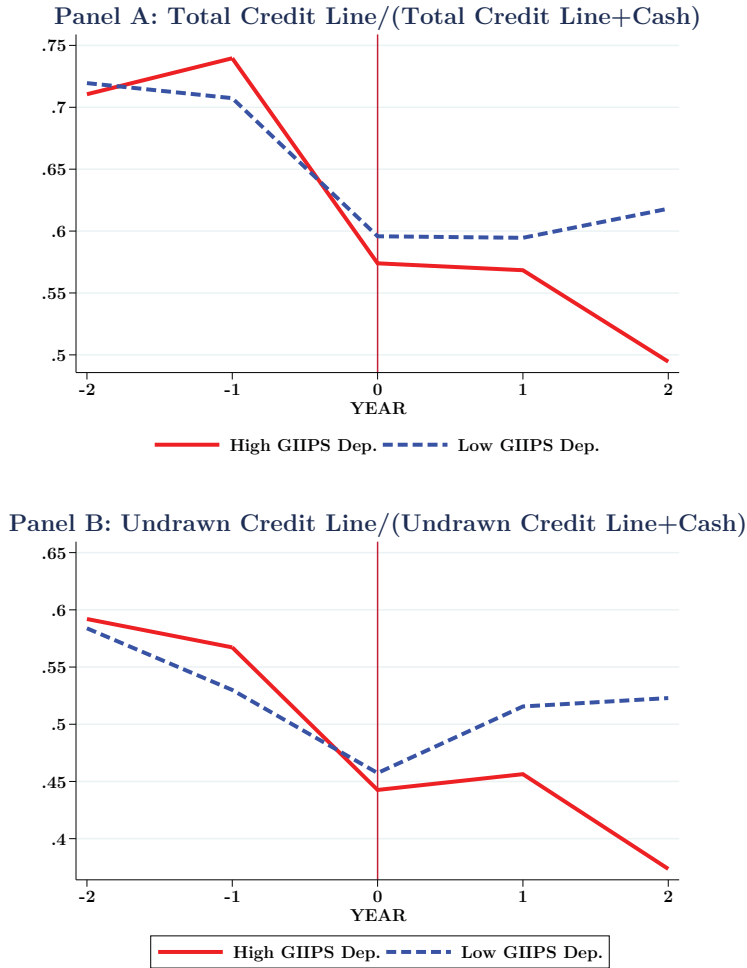**Panel B: Undrawn Credit Line/(Undrawn Credit Line+Cash)**

Figure 2 shows firms' total outstanding credit lines as a fraction of their credit lines plus cash holdings (Panel A) and firms' undrawn credit lines as a fraction of their undrawn credit lines plus cash holdings (Panel B) for firms with high (red solid line) and low (blue dashed line) *GIIPS Bank Dependence* in the pre-crisis period (years -2 and -1) and the crisis period (starting in year 0). We consider all loans to firms located in the following countries: Greece, Italy, Ireland, Portugal, Spain, Germany, France, or U.K. We restrict the sample to firms in the intersection of DealScan, Amadeus, and Capital IQ.

Figure 3. - Example for Matching of Firms and Banks

Figure 3 shows the geographical overview of business activities conducted by the German catering firm "Die Menu Manufaktur Hofmann", a firm located in Southern Germany that delivers food to canteens of hospitals, corporations, etc.

Figure 4. - Real Effects - Non-GIIPS Firms without GIIPS or other non-EU Subsidiaries
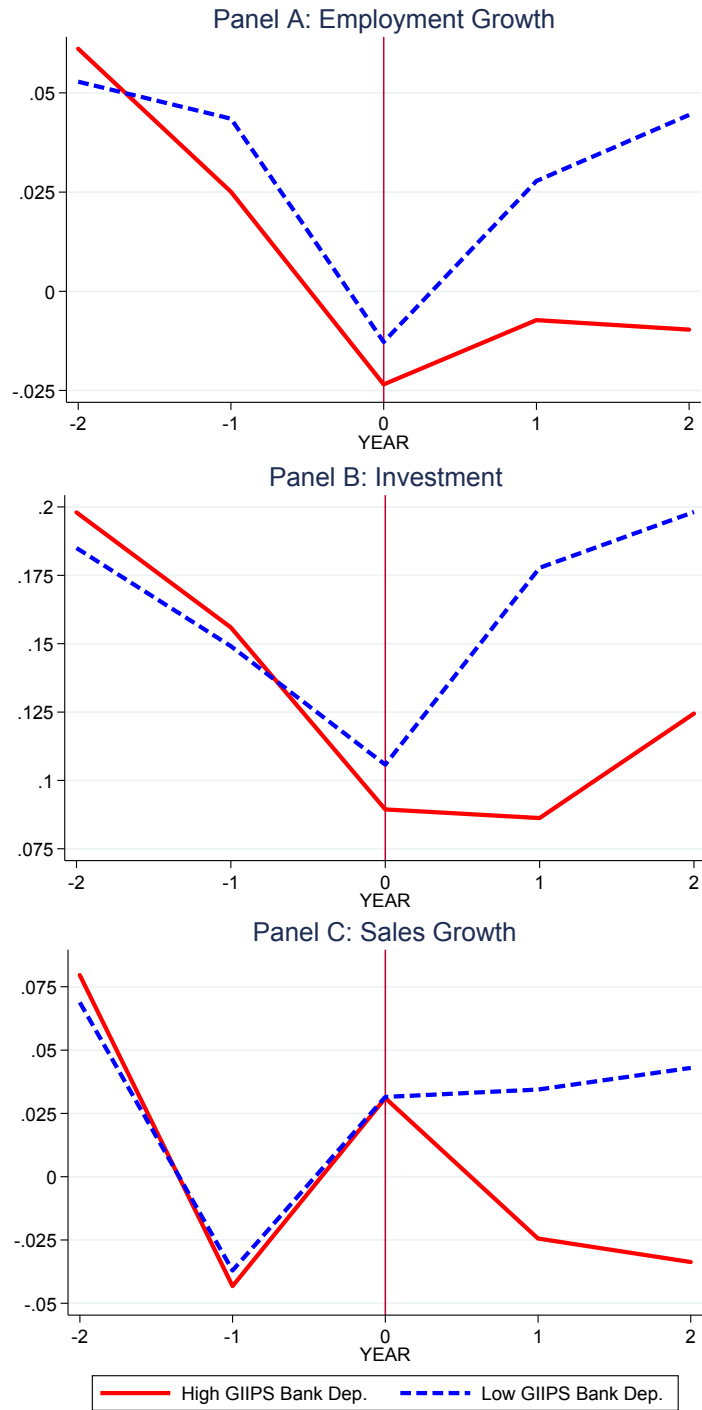

Figure 4 shows employment growth rates (Panel A), capital expenditures as a fraction of tangible assets (Panel B), and sales growth rates (Panel C) for firms located in France, U.K., or Germany with high (red solid line) and low (blue dashed line) *GIIPS Bank Dependence* in the pre-crisis period (years -2 and -1) and the crisis period (starting in year 0) that do not have subsidiaries in Greece, Italy, Ireland, Portugal, Spain, or other non-EU countries. We restrict the sample to firms with financial information available in Amadeus.

Figure 5. - Evolution of Sovereign Debt Holdings - All Banks

Panel A: GIIPS Sovereign Debt Exposure (% Bank Assets)
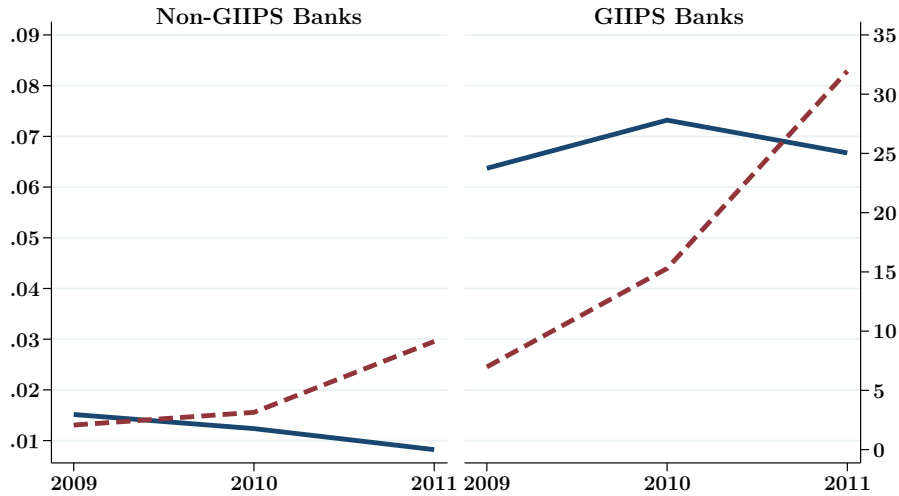
Panel B: Domestic Sovereign Debt Exposure (% Bank Assets)

Figure 5 shows the banks' aggregated GIIPS (Panel A) and domestic (Panel B) sovereign bondholdings (solid blue line, left axis, as a fraction of total assets) and the banks' aggregated GIIPS (Panel A) and domestic (Panel B) sovereign bondholdings multiplied by the CDS spread of the respective GIIPS country (dashed red line, right axis, as a fraction of total assets). GIIPS banks comprise all banks headquartered in Greece, Italy, Ireland, Portugal, or Spain. Non-GIIPS banks consist of banks headquartered in France, Germany, or U.K. Sovereign bondholdings are from the EBA. We compile total assets from SNL Financial and CDS spreads from Datastream. CDS spreads are measured at the end of the preceding year.

Figure 6. - Evolution of Domestic Sovereign Debt Holdings - GIIPS Banks

Panel A: Domestic Sovereign Debt Exposure (% Bank Assets)

Panel B: Domestic Sovereign Debt Exposure (% Bank Assets)
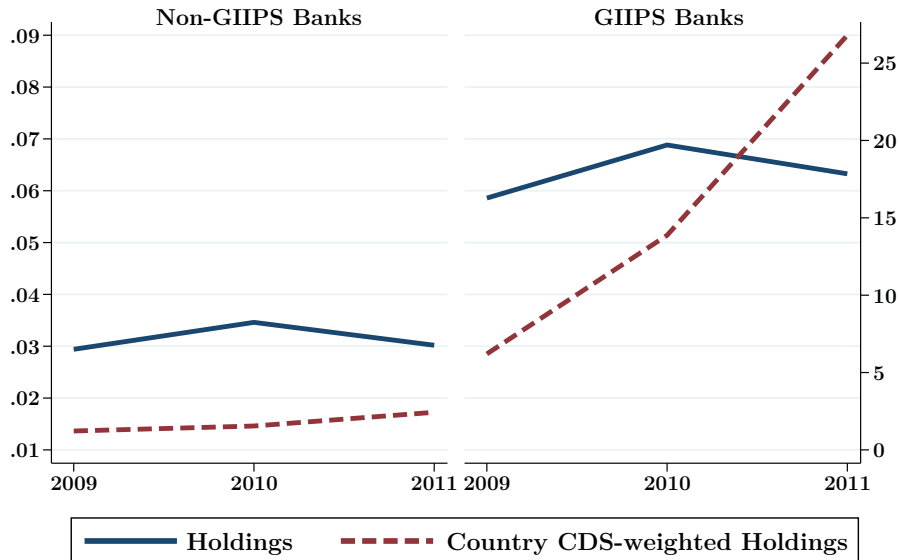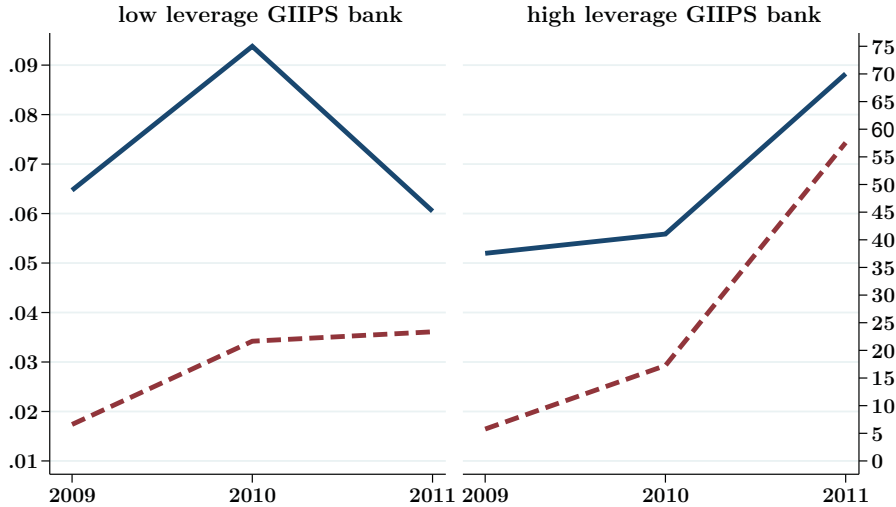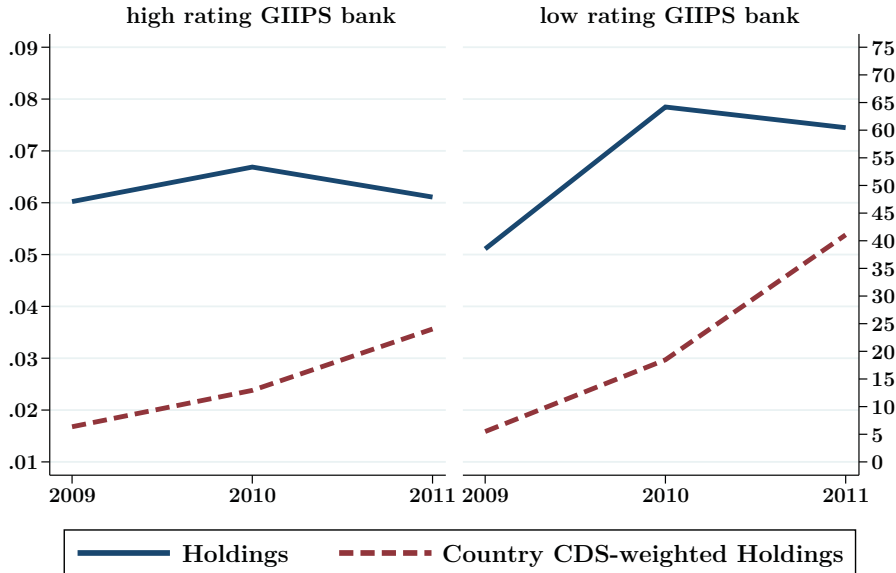

Figure 6 shows the banks' aggregated domestic sovereign bondholdings (solid blue line, left axis, as a fraction of total assets) and these holdings multiplied by the CDS spread of the banks' home countries (dashed red line, right axis, as a fraction of total assets). High (low) leverage GIIPS banks comprise all banks headquartered in Greece, Italy, Ireland, Portugal, or Spain that have a below (above) median ratio of total equity to total assets (Panel A). Low (high) rating GIIPS banks comprise all banks headquartered in a GIIPS country that have a rating of A+ or lower (AA- or better) (Panel B). We compile total assets from SNL Financial and CDS spreads from Datastream. CDS spreads are measured at the end of the preceding year.

VI. Online Appendix

Table XI - Descriptive Statistics – DealScan Sample vs. very large Amadeus

Panel A: Dependent Variables

		Emp Growth	CAPX	Sales Growth
DealScan Sample	Mean	0.052	0.193	0.055
	Median	0.024	0.12	0.052
	Std. Dev.	0.145	0.181	0.161
Very Large Amadeus	Mean	0.056	0.199	0.049
	Median	0.017	0.14	0.044
	Std. Dev.	0.186	0.165	0.175
	Diff.	-0.004	-0.006	-0.006
	(t-Stat)	(0.58)	(-1.45)	(-1.52)
	Normalized Diff.			

Panel B: Explanatory Variables

		Total Assets (mn)	Tangibility	Int. Cov.	Net Worth	EBITDA/Assets	Leverage
DealScan Sample	Mean	3780	0.576	3.06	0.224	0.112	0.610
	Median	592	0.587	2.55	0.220	0.106	0.610
	Std. Dev.	9610	0.238	3.09	0.170	0.070	0.174
Very Large Amadeus	Mean	471	0.390	2.96	0.217	0.113	0.603
	Median	114	0.343	3.01	0.198	0.099	0.621
	Std. Dev.	2100	0.269	4.23	0.228	0.08	0.246
	Diff.	3310	0.186	0.1	-0.007	-0.001	0.007
	(t-Stat)	(19.49)	(29.98)	(1.14)	(1.43)	(-0.16)	(0.91)
	Normalized Diff.	0.336	0.53	0.02	-0.025	-0.003	0.016

Panel A of XI presents descriptive statistics of dependent and Panel B of explanatory variables for the pre-crisis period split into firms that are in the intersection of Amadeus and DealScan and the remaining firms in the category of "Very Large" companies in Amadeus in the following countries: Greece, Italy, Ireland, Portugal, Spain (GIIPS countries) or Germany, France, U.K. (non-GIIPS countries).

Table XII - Loan Amount/Total Debt by Subsamples

		Full Sample	listed Firms	non-listed Firms	non-GIIPS Firms w/o Subs	non-GIIPS Firms with Subs
High GIIPS Bank Dep.	Mean	0.485	0.413	0.524	0.525	0.537
	Median	0.392	0.316	0.460	0.429	0.557
	Std. Dev.	0.356	0.353	0.352	0.314	0.348
Low GIIPS Bank Dep.	Mean	0.518	0.432	0.560	0.579	0.444
	Median	0.419	0.314	0.487	0.579	0.327
	Std. Dev.	0.366	0.342	0.370	0.368	0.341
Diff. (t-Stat)		-0.033 (1.435)	-0.019 (- 0.511)	-0.036 (-1.248)	0.0542 (0.900)	0.093 (-1.825)
Normalized Diff.		-0.065	-0.039	-0.070	-0.112	0.191

Table XII compares the bank dependence (measured as syndicated loan amount/total debt) for firms with low and high *GIIPS Bank Dependence* incorporated in the following countries: Greece, Italy, Ireland, Portugal, Spain (GIIPS countries) or Germany, France, U.K. (non-GIIPS countries). Column I focuses on the entire sample. Column II summarizes the bank dependence for listed firms whereas non-listed firms are summarized in Column III. Column IV restricts the analysis to non-GIIPS firms without GIIPS subsidiaries and Column V restricts the sample to non-GIIPS firms with GIIPS subsidiaries.

Table XIII - Alternative Measures

Panel A: Indirect Sovereign Debt Holdings

	(1)	(2)	(3)	(4)	(5)
	Net Debt	Δ Cash	Emp Growth	CAPX	Sales Growth
Risk Weighted Indirect Sov. Bondholdings	-0.030**	0.001	-0.024**	-0.039**	-0.029*
	(-2.17)	(0.49)	(-2.18)	(-2.20)	(-1.91)
Risk Weighted Indirect Sov. Bondholdings*Cash Flow		0.009**			
		(2.24)			
R^2	0.569	0.481	0.455	0.631	0.540
N	4101	3696	3495	4014	3890

Panel B: GIIPS Bank Dependence as a Fraction of total Debt

GIIPS Bank Dep./Total Debt*Crisis	-0.027***	0.000	-0.020**	-0.039***	-0.054***
	(-2.90)	(0.09)	(-1.97)	(-2.60)	(-4.06)
Cash Flow*Crisis*GIIPS Bank Dep./Total Debt		0.003*			
		(1.90)			
R^2	0.541	0.442	0.421	0.586	0.495
N	4448	4003	3781	4351	4221

Panel C: Average GIIPS Bank Dependence

Avg. GIIPS Bank Dep.*Crisis	-0.031***	0.002	-0.030***	-0.054***	-0.041***
	(-2.78)	(0.57)	(-2.63)	(-3.21)	(-3.04)
Cash Flow*Avg.GIIPS Bank Dep.*Crisis		0.004**			
		(2.11)			
R^2	0.541	0.441	0.422	0.586	0.492
N	4448	4003	3781	4351	4221

Table XIII presents firm-level regressions. The dependent variables are net debt, the change in cash holdings, employment growth, investments, and sales growth, respectively. The sample consists of all firms in the intersection of DealScan and Amadeus and located in the following countries: Greece, Italy, Ireland, Portugal, Spain (GIIPS countries) or Germany, France, U.K. (non-GIIPS countries). Panel A considers the *Risk Weighted Indirect Sov. Bondholdings* of firms, defined as the amount of domestic sovereign bondholdings multiplied with the sovereign CDS spread (taken from EBA stress test data) that a firm holds (indirectly) through the lead banks in a firm's syndicate. Panel B considers the fraction of a firms total debt that is issued by GIIPS lead arrangers in the form of syndicated loans. Panel C considers the average GIIPS Bank Dependence (measured over the period 2005-2009) for each firm. *Crisis* is an indicator variable equal to one starting in 2009 for Greece and in 2010 for all other countries (beginning of the sovereign debt crisis) and zero before. Firm control variables include the logarithm of total assets, leverage, net worth, tangibility, interest coverage ratio, and EBITDA as a fraction of total assets and for the cash regression a firm's cash flow and capital expenditures. All firm-level control variables are lagged by one period. All variables are defined in Table I. All regressions include firm, industry-country-year and foreign bank country-year fixed effects, as well as all firm-level controls. Standard errors are adjusted for heteroskedasticity and clustered at the firm-level. Significance levels: * ($p < 0.10$), ** ($p < 0.05$), *** ($p < 0.01$).

<p align="center">**Table XIV** - Placebo Test</p>

	(1)	(2)	(3)	(4)	(5)
	Net Debt	Δ Cash	Emp Growth	CAPX	Sales Growth
GIIPS Bank Dep.*Placebo Crisis	0.008	0.001	0.012	0.010	-0.010
	(0.73)	(0.23)	(1.04)	(0.58)	(-0.79)
Cash Flow*Placebo Crisis		-0.001			
		(-0.35)			
Cash Flow*GIIPS Bank Dep.		-0.004			
		(-1.46)			
Cash Flow		0.005			
		(1.15)			
Cash Flow*Placebo Crisis*GIIPS Bank Dep.		-0.001			
		(-0.34)			
R^2	0.544	0.441	0.421	0.585	0.493
N	4448	4003	3781	4351	4221

Table XIV presents firm-level regressions. The dependent variables are net debt, the change in cash holdings, employment growth, investments, and sales growth, respectively. The sample consists of all firms in the intersection of DealScan and Amadeus and located in the following countries: Greece, Italy, Ireland, Portugal, Spain (GIIPS countries) or Germany, France, U.K. (non-GIIPS countries). *GIIPS Bank Dependence* is defined as fraction of total outstanding loans provided by GIIPS lead arrangers. *Placebo Crisis* is an indicator variable equal to one for the pre crisis years 2006-2008. Firm control variables include the logarithm of total assets, leverage, net worth, tangibility, interest coverage ratio, and EBITDA as a fraction of total assets and for the cash regression a firm's cash flow and capital expenditures. All firm-level control variables are lagged by one period. All variables are defined in Table I. All regressions include firm, industry-country-year and foreign bank country-year fixed effects, as well as all firm-level controls. Standard errors are adjusted for heteroskedasticity and clustered at the firm-level. Significance levels: * ($p < 0.10$), ** ($p < 0.05$), *** ($p < 0.01$).

Table XV - Change in Bank CDS

	Δ CDS	Δ log CDS
GIIPS sov. Bondholdings	0.002***	0.112***
	(3.35)	(4.40)
log Total Assets	-0.003	0.014
	(-1.54)	(0.13)
R^2	0.457	0.408
N	25	25

Table XV presents bank-level regressions. The dependent variable is the change in bank CDS or the log change in bank CDS over the crisis period. The sample consists of all banks in the following countries: Greece, Italy, Ireland, Portugal, Spain (GIIPS countries) or Germany, France, U.K. (non-GIIPS countries), that were included in the 2010 EBA stress tests and with available CDS data. GIIPS sov. Bondholdings is measured as the amount of GIIPS sovereign bondholdings divided by a bank's total assets. Standard errors are clustered at the bank-level. Significance levels: * ($p < 0.10$), ** ($p < 0.05$), *** ($p < 0.01$).

Table XVI - Change in Sovereign Holdings

Panel A: Leverage

	Delta Holdings	Delta Holdings
High Leverage	-0.008 (-1.62)	-0.010 (-1.57)
High Leverage*GIIPS	0.020** (2.33)	0.027** (2.44)
GIIPS	0.005 (1.13)	
R^2	0.352	0.458

Panel B: Rating

Low Rating	0.002 (0.25)	0.002 (0.27)
Low Rating*GIIPS	0.021** (2.18)	0.026** (2.29)
GIIPS	0.005 (1.28)	
R^2	0.512	0.559

Panel C: Government Intervention

Gov. Intervention	-0.001 (-0.26)	-0.004 (-0.75)
Gov. Intervention*GIIPS	0.008 (1.11)	0.006 (0.75)
GIIPS	0.006 (1.31)	
R^2	0.238	0.422

Panel D: Government Ownership

High Fraction Gov. Own.	0.000 (0.03)	0.001 (0.22)
High Fraction Gov. Own.*GIIPS	-0.004 (-0.40)	-0.003 (-0.22)
GIIPS	0.014*** (2.94)	
R^2	0.303	0.318

Panel E: Government Board Seats

High Fraction Gov. Board	0.001 (0.16)	0.001 (0.23)
High Fraction Gov. Board*GIIPS	0.001 (0.15)	0.010 (1.18)
GIIPS	0.009** (2.10)	
R^2	0.197	0.458
N	32	32
Country Fixed Effects	NO	YES

Table XVI presents bank-level regressions. The dependent variable is the change in a bank's domestic sovereign debt holdings from 2009-2011. The sample consists of all banks in the following countries: Greece, Italy, Ireland, Portugal, Spain (GIIPS countries) or Germany, France, U.K. (non-GIIPS countries), that were included in all EBA stress tests/capital exercises between 2009 and 2011. *High Leverage* is an indicator variable equal to one if a bank had an above median leverage in 2009, and zero otherwise. *Low Rating* is an indicator variable equal to one if a bank had a median rating of A+ or lower in 2009, and zero otherwise. *Government intervention* is an indicator variable equal to one if a bank received government support during the 2008-09 financial crisis, and zero otherwise. *High Fraction Gov. Ownership* is an indicator variable equal to one if a bank had an above median fraction of shares by the respective government in 2009, and zero otherwise. *High Fraction Gov. Board Seats* is an indicator variable equal to one if a bank has an above median fraction of government affiliated directors, and zero otherwise. GIIPS is an indicator variable equal to one if a bank is incorporated in one of the GIIPS countries. Significance levels: * ($p < 0.10$), ** ($p < 0.05$), *** ($p < 0.01$).

Table XVII - Comparison DealScan other Banks

		Total Assets (mn)	Impaired Loans Equity	Tier1 Capital Ratio	Equity/Total Assets
DealScan Banks	Mean	157242	0.236	0.080	0.061
	Median	46427	0.182	0.075	0.056
	Std. Dev.	219245	0.203	0.020	0.031
Other Banks	Mean	56110	0.249	0.097	0.068
	Median	12959	0.162	0.087	0.059
	Std. Dev.	133031	0.203	0.036	0.036
Diff. (t-Stat)		101131 (5.21)	- 0.012 (- 0.39)	-0.016 (-4.01)	-0.006 (-1.59)
Normalized Diff.		0.394	-0.036	-0.402	-0.136

Table XVII presents descriptive statistics from the pre-crisis period for banks that are active in the syndicated loan market and all other banks incorporated in the following countries: Greece, Italy, Ireland, Portugal, Spain (GIIPS countries) or Germany, France, U.K. (non-GIIPS countries). All data are from SNL Financial.

Table XVIII - Number of Borrowers and Banks per Country

	Borrowers	Lead Banks
Germany	150	13
Spain	165	26
France	180	7
United Kingdom	342	8
Greece	12	1
Ireland	14	2
Italy	171	8
Portugal	22	4

Table XVIII presents a breakdown of the number of firms and lead arranger banks by country.

Table XIX - Loan Characteristics

	Loan Amount	Loan Amount/ Total Debt	Maturity	Interest Rate Spread
	(mn)		(days)	(basis points above LIBOR)
Mean	4810	0.507	2582	209
Median	1250	0.407	2556	200
Std. Dev.	13900	0.363	1592	134

Table XIX presents descriptive statistics of loan characteristics for the syndicated loans in the intersection of Amadeus and DealScan issued to firms in the following countries: Greece, Italy, Ireland, Portugal, Spain (GIIPS countries) or Germany, France, U.K. (non-GIIPS countries). Loan Amount measures the loan amount in million Euro. Loan Amount/Total Debt measures the fraction of a syndicated loan relative to the overall debt outstanding for a firm. Maturity describes the maturity of a loan (in days) and the interest rate spread is taken from allinspreaddrawn reported in DealScan.

Figure 7. - Fraction of syndicated Loans to total Loans in Europe
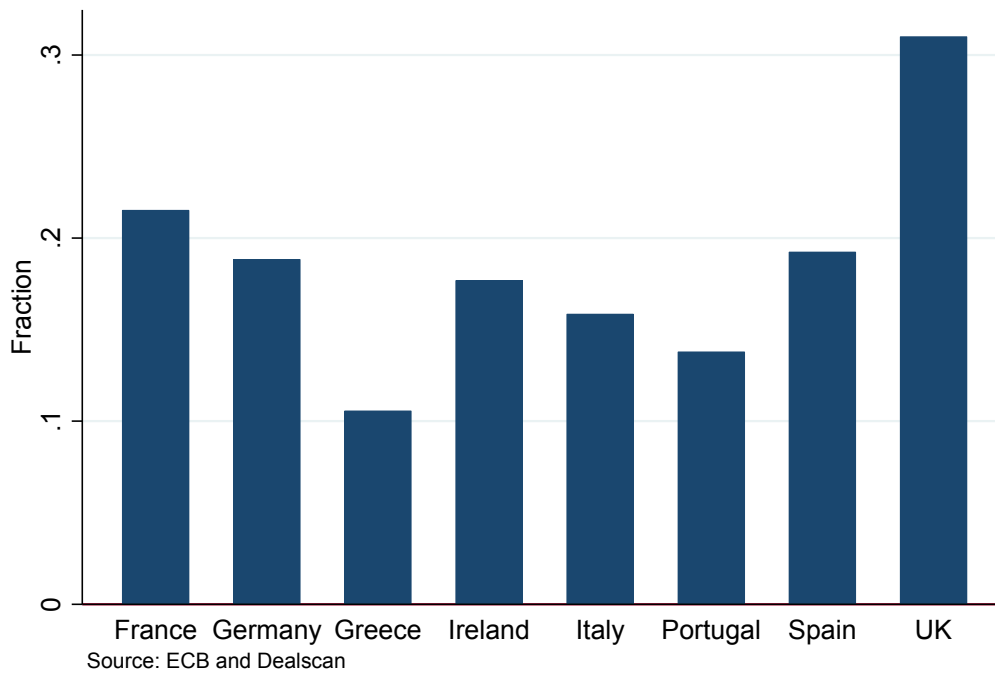

Source: ECB and Dealscan

Figure 7 shows the fraction of syndicated loans relative to the total amount of loans issued to non-financial corporations in a given country, measured as the average fraction from 2005-2009.
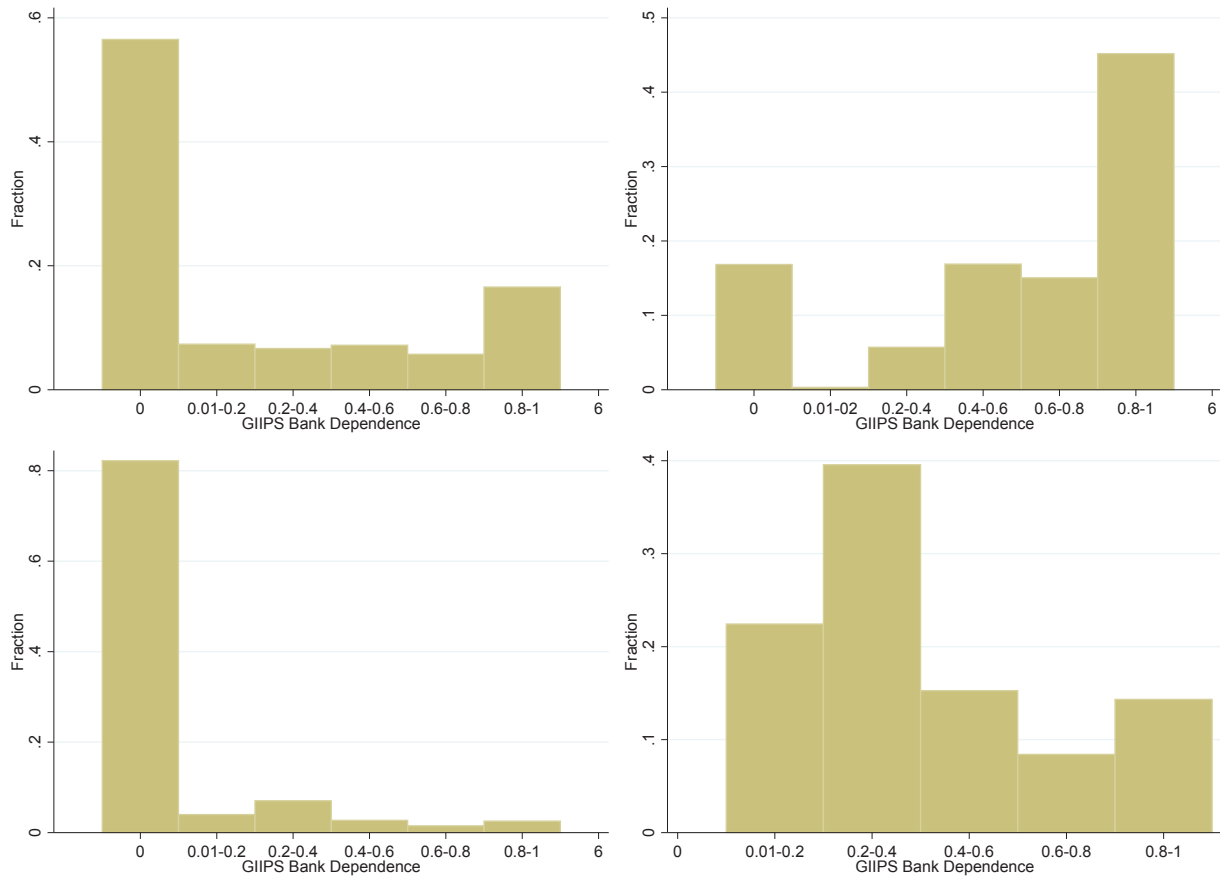
Figure 8. - Distribution of GIIPS Bank Dependence

Figure 8 shows the distribution of *GIIPS Bank Dependence* for various subsamples. Panel A shows the distribution of *GIIPS Bank Dependence* for our entire sample of firms. Panel B plots the distribution for firms incorporated in GIIPS countries. Panel C shows the distribution for non-GIIPS firms while Panel D shows the distribution for non-GIIPS firms conditional on having a positive *GIIPS Bank Dependence*.