REAL EFFECTS OF THE SOVEREIGN DEBT CRISIS IN EUROPE: EVIDENCE FROM SYNDICATED LOANS*

VIRAL V. ACHARYA TIM EISERT CHRISTIAN EUFINGER CHRISTIAN HIRSCH May 12, 2015

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 at 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 Codes: G01, G21, G28, E44.

*The authors appreciate helpful comments from Bo Becker, Matteo Crosignani, Giovanni Dell'Ariccia, Daniela Fabbri, Rainer Haselmann, Jhangkai Huang, Yi Huang, Vasso Ioannidou, Victoria Ivashina, Augustin Landier, Tatyana Marchuk, Steven Ongena, Marco Pagano, Sjoerd van Bekkum, and Annette Vissing-Jorgensen. Furthermore, we thank conference participants at the EFA Meeting 2014, the CSEF conference on "Bank Performance, Financial Stability and the Real Economy", the RELTIF CEPR Meeting Oxford 2015, the International Conference on "Financial Market Reform and Regulation", and the Tsinghua Finance Workshop 2014, as well as seminar participants at Berkeley, NYU, Columbia, Duke, Amherst, Temple, Zurich, IESE, the European Central Bank, CUNY, Mainz, and Konstanz. Eisert is grateful for financial support by the German National Scientific Foundation and the Erasmus Research Institute of Management. Hirsch gratefully acknowledges support from the Research Center SAFE, funded by the State of Hessen initiative for research Loewe. Eufinger gratefully acknowledges the financial support of the Public-Private Sector Research Center of the IESE Business School, University of Navara, Spain. Word Count: 16,274 (with notes). Corresponding author: Viral V. Acharya, Phone: +1-212-998-0354, Fax: +1-212-995-4256, Email: vacharya@stern.nyu.edu, Leonard N. Stern School of Business, 44 West 4th Street, Suite 9-84, New York, NY 10012.

I. INTRODUCTION

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, 2014), 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 liquidity management. As a result of the limited access to bank financing, we show that firms encountered strong negative real outcomes; their investments, employment growth, and sales growth became depressed. Using data on the geographical breakdown of firms' subsidiary revenues, we provide detailed evidence that the negative real effects are indeed significantly worsened by a bank lending shock, in addition to a pure macroeconomic shock. 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

^{1. &}quot;SMEs in peripheral Eurozone face far steeper borrowing rates" by Patrick Jenkins, Financial Times, October 10, 2013

^{2. &}quot;Italian Banks' Woes Hurt Small Firms" by Giovanni Legorano, Wall Street Journal, December 1, 2013

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 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 handmatching 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 United Kingdom (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. To this end, we focus on firms that are not exposed to a macroeconomic demand shock, yet are affected by a bank credit supply shock (e.g., a German firm without significant business in Spain but with a lending relationship with a Spanish bank affected by the crisis). 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., Bocola, 2013).

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 because of the high correlation with their other revenue sources (Diamond and Rajan, 2011; Crosignani, 2014). While banks are protected by limited liability in the case of a sovereign default, these bonds offer a relatively high return in the good state of the world when the sovereign is not in default. In addition, eurozone regulators consider these bonds to be risk-free (i.e., attach zero risk weights) and thus banks do not need to hold any capital against potential losses on eurozone government bonds. 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. 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 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, riskshifting, and moral suasion) by using a bank's country of incorporation as a proxy for how affected the bank was by the crisis. Using a difference-in-differences framework, our results document that during the sovereign debt crisis, firms with a high dependence on banks incorporated in a GHPS country (in the following called GHPS banks) 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 GHPS banks, nor for highly GHPS 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 results are robust to controlling for unobserved, time-constant firm heterogeneity, time trends, and time-varying firm characteristics. Results continue to hold if we include country-year fixed effects to capture unobserved heterogeneity in country-specific macroeconomic shocks. Furthermore, we can rule out that our results are driven by how firms and banks formed business relationships in the pre-crisis period. In particular, we find that there is no correlation between a firm's dependence on banks affected by the sovereign debt crisis and its quality. 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 control for shocks to a firm's domestic market, as well as to take into account its foreign business

activities, we collect information on the revenues of all foreign and domestic subsidiaries of the borrowing firms in our sample. This allows us to even more accurately disentangle the macroeconomic and the bank lending shocks. Our results continue to hold if we restrict the sample to non-GIIPS firms that only have subsidiaries in European Union countries that were not affected by the crisis.³ This finding confirms 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 amplifies the shock transmission across the eurozone.

Furthermore, we show that for our sample of GIIPS firms, all results continue to hold if we restrict the analysis to firms that have a substantial part of their revenues generated by non-GIIPS subsidiaries.⁴ Since these firms have a larger part of their business in non-GIIPS countries, it is plausible to assume that they faced a lower overall macroeconomic shock compared to firms that operate primarily in affected countries.

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 third of the aggregate reduction in the real outcome variables. Not surprisingly, we can explain less of the overall evolution for non-GIIPS firms since a substantial number of borrowers in non-GIIPS countries have no exposure to GIIPS banks.

After highlighting the importance of the bank lending channel for the real effects for borrowing firms, we specifically test the importance of the supply factors of bank lending and follow Sufi (2007) by splitting our sample into listed and non-listed firms. The underlying assumption is that non-listed firms have fewer alternative sources of funding and, in case bank-related loan supply factors played a role during the crisis, the non-listed firms should have been much more affected than listed firms, which may have other sources of funding available. Our results show that non-listed firms are indeed negatively affected by the sovereign debt crisis. We do not find any evidence that listed firms had significantly negative real effects during the crisis. Moreover, we show that banking relationships are in general sticky and that mostly non-listed firms are unable to switch their bank. This finding again confirms that bank lending supply played a major role in causing the real effects for borrowing firms.

^{3.} For example, a German company without significant business activity in GIIPS or non-EU countries.

^{4.} For example, a Spanish company with a German subsidiary that generates a significant fraction of the company's total returns.

Furthermore, to even more precisely isolate a potential loan demand shock from a loan supply shock and to test what actually causes the contraction in bank lending, we adapt the methodology first utilized by Khwaja and Mian (2008), which exploits multiple bank-firm relationships. 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. The results confirm that European borrowing firms that had lending relationships with banks that were significantly affected by the sovereign debt crisis suffered a severe loan supply shock.

To provide evidence on what actually caused the contraction in bank lending and ultimately the negative real effects for borrowing firms, we then determine for each bank in our sample to which degree it is "affected" by the sovereign debt crisis. Affected is defined, in line with the three potential channels through which the European Sovereign Debt Crisis might have affected bank lending, as having an above median exposure to sovereign risk (balance sheet hit), a below median capitalization or rating (risk-shifting), or 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.

Using the modified version of the Khwaja and Mian (2008) estimator, our results show that banks with larger sovereign risk in their portfolios reduce lending and increase 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 increase spreads more 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 facilitates the transmission of shocks across the eurozone when the banking sector experiences an aggregate shock such as the periphery sovereign crisis and remains undercapitalized.

II. 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 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 (2013) 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 (2013) 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

^{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).

a common central bank.

Regarding the empirical evidence, De Marco (2014) and Popov and Van Horen (2015) 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 (2015) 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 not analyze the consequences of the contraction in bank lending during the sovereign debt crisis 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 2007-2009 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 et al. (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 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 recent 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) exploit the shocks caused by the recent financial crisis and the European Sovereign Debt Crisis to Italian banks' funding costs.⁶ They find that firms that are connected to banks with a higher CDS spread invest less, hire fewer workers, and reduce the growth of bank borrowing. However, Balduzzi, Brancati and Schiantarelli (2014) focus solely on the impact of the sovereign debt crisis on market-based measures of banks health and, in turn, the effect of the impaired bank health on the corporate policies of borrowing firms. Therefore, our paper is the only one that sheds light on the question of how the sovereign debt crisis actually caused a contraction in bank lending and the resulting real effects for borrowing firms. 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.

III. DATA AND DESCRIPTIVE STATISTICS

In this section, we describe our dataset. We also provide descriptive statistics related to the corporate policies and firm characteristics of the firms in our sample.

III.A. 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 in our sample since only very few bonds are issued in Europe (Standard & Poor's, 2010). We collect information on syndicated loans to non-financial firms from all GHPS 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-GHPS 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

^{6.} 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 a bank credit supply shock, since this effect is supposedly even more pronounced for smaller firms given their inability to substitute bank financing with other funding sources.

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. 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.⁷ 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.

III.B. Descriptive Statistics of Firms' Corporate Policies and Characteristics

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 in year t is defined as:

$$(1) \qquad GIIPS \ Bank \ Dependence_{ijt} = \frac{\sum_{l \in L_{ijt}} \% GIIPS \ Lead \ Arranger \ in \ Syndicate_{lijt} \cdot Loan \ Amount_{lijt}}{Total \ Loan \ Amount_{ijt}}$$

where L_{ijt} 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).⁸ 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

^{7.} The data can be obtained from: http://ec.europa.eu/competition/elojade/isef/index.cfm?clear=1&policy_area_id= 3.

^{8.} As a robustness check, we alternatively measure the *GIIPS Bank Dependence* of a firm as the fraction of total syndicated loans outstanding that is provided by banks in the syndicate that are incorporated in a GIIPS country. Our main results are qualitatively the same for this measure.

classify a bank as a lead arranger if its role is either "mandated lead arranger" or "bookrunner".

In Panel A of Table II, we show the differences in evolution of the corporate policies of firms across groups of high (above sample median) and low (below sample median) *GIIPS Bank Dependence*. The evolution of corporate policies of the sample of firms with high *GIIPS Bank Dependence* during the sovereign debt crisis is more negative than for firms with lower *GIIPS Bank Dependence*. Firms with a high *GIIPS Bank Dependence* have significantly less employment growth, invest less, and experience lower sales growth compared to the firms with a low *GIIPS Bank Dependence*. These results are consistent with the notion that the sovereign debt crisis impacted the real economy through the bank lending channel.

Panel B of Table II presents descriptive statistics for the firm-level control variables, split into firms with high and low *GIIPS Bank Dependence* and into crisis and 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. As can be seen in Panel B of Table II, none of the differences reaches this threshold, suggesting that firms in the two groups are comparable along observable dimensions.

IV. FINANCIAL AND REAL EFFECTS OF THE SOVEREIGN DEBT CRISIS

IV.A. Methodology

Our objective is to examine the association between a bank's exposure to the sovereign debt crisis and the resulting corporate policy of its borrowing firms. We expect that firms with stronger lending relationships to banks 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.

We start with broadly assessing whether the sovereign debt crisis affected the real economy through the bank lending channel. To capture all channels through which banks were affected, we use a bank's country of incorporation as a proxy for its exposure to the sovereign debt crisis. There are at least three reasons for this choice. 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).

For the analysis, we divide banks into two groups. The first group consists of banks headquartered in GIIPS countries given that these countries are most affected by the European Sovereign Debt Crisis. As a control group, we choose 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. In Section V, we provide more detailed evidence on which of the possible channels are causing the real effects.

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).⁹ 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.

In Panels A-C in Figure I, 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 equation (1). In line with the univariate results in Panel A of Table II, the evidence shows that 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* decrease 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 provide multivariate evidence for the results presented in Figure I, we estimate the following panel regressions for firm i in country j. The unit of observation is a firm-year and the dependent variables are a firm's employment growth rate, sales growth rate, investment level, and net debt, respectively:¹⁰

$$y_{ijt+1} = \alpha + \beta_1 \cdot GIIPS \ Bank \ Dependence_{ij,\min\{t,t_{lj}\}} \\ + \beta_2 \cdot GIIPS \ Bank \ Dependence_{ij,\min\{t,t_{lj}\}} \cdot Crisis_{jt} \\ + \gamma \cdot X_{ijt} + Firm_{ij} + Year_{t+1} + u_{it+1}.$$

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 to get funding from non-

^{9.} 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.

^{10.} 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

GIIPS banks and thus could only rely on GIIPS banks.¹¹ 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.

To 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) who 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 employ the following specification:

$$\Delta Cash_{ijt+1} = \alpha + \beta_1 \cdot GIIPS \ Bank \ Dependence_{ij,min\{t,t_{lj}\}} + \beta_2 \cdot Crisis_{jt} \cdot Cash \ Flow_{ijt} \\ + \beta_3 \cdot GIIPS \ Bank \ Dependence_{ij,min\{t,t_{lj}\}} \cdot Crisis_{jt} \\ + \beta_4 \cdot GIIPS \ Bank \ Dependence_{ij,min\{t,t_{lj}\}} \cdot Cash \ Flow_{ijt} \\ + \beta_5 \cdot GIIPS \ Bank \ Dependence_{ij,min\{t,t_{lj}\}} \cdot Crisis_{jt} \cdot Cash \ Flow_{ijt} \\ + \beta_6 \cdot Cash \ Flow_{ijt} + \gamma \cdot X_{ijt} + Firm_{ij} + Year_{t+1} + u_{it+1}.$$

Our key variables of interest are the firms' *GIIPS Bank Dependence* during the crisis period (β_2 in equation (2)) and the firms' cash flow sensitivity of cash during the crisis period (β_5 in equation (3)), respectively. If firms were adversely affected by the sovereign debt crisis through the bank lending channel, then we expect β_2 in equation (2) to be negative. Moreover, 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 equation (3) to be positive.

We employ several control variables to capture confounding factors. In the baseline specification, we include firm fixed effects to capture unobserved time-invariant firm heterogeneity and year fixed effects to control for systematic shocks that affect all firms in a given year. Moreover, we include firm-level control variables to capture other determinants of firms' corporate policies. These include firm size, leverage, net worth, the fraction of tangible assets, the interest coverage ratio, and the ratio of EBITDA to total assets.

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 address concerns that our results are driven by different aggregate demand fluctuations in our sample countries, we consider an alternative specification where we add interactions between year and country fixed effects to capture any unobserved

11. As indicated by the term $\min\{t, t_{lj}\}$

country-specific macroeconomic shocks. This allows us to also capture time-varying country-specific shocks to the credit demand of borrowing firms. We thus estimate the following regression model:

(4)

$$y_{ijt+1} = \alpha + \beta_1 \cdot GIIPS \ Bank \ Dependence_{ij,\min\{t,t_{lj}\}} + \beta_2 \cdot GIIPS \ Bank \ Dependence_{ij,\min\{t,t_{lj}\}} \cdot Crisis_{jt} + \gamma \cdot X_{ijt} + Firm_{ij} + Country_j \cdot Year_{t+1} + u_{it+1},$$

where y_{ijt+1} as before represents a firm's employment growth rate, sales growth rate, investment level, and net debt. For the cash flow sensitivity of cash we estimate:

$$\begin{split} \Delta Cash_{ijt+1} &= \alpha + \beta_1 \cdot GIIPS \; Bank \; Dependence_{ij,min\{t,t_{lj}\}} + \beta_2 \cdot Crisis_{jt} \cdot Cash \; Flow_{ijt} \\ &+ \beta_3 \cdot GIIPS \; Bank \; Dependence_{ij,min\{t,t_{lj}\}} \cdot Crisis_{jt} \\ &+ \beta_4 \cdot GIIPS \; Bank \; Dependence_{ij,min\{t,t_{lj}\}} \cdot Cash \; Flow_{ijt} \\ &+ \beta_5 \cdot GIIPS \; Bank \; Dependence_{ij,min\{t,t_{lj}\}} \cdot Crisis_{jt} \cdot Cash \; Flow_{ijt} \\ &+ \beta_6 \cdot Cash \; Flow_{ijt} + \gamma \cdot X_{ijt} + Firm_{ij} + Country_j \cdot Year_{t+1} + u_{it+1}. \end{split}$$

In the following, we report results for both specifications for the entire sample of firms.¹²

IV.B. Financial Outcomes

(5)

We start by analyzing how GIIPS Bank Dependence is affecting firms' financial decisions. Results 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 equation (2)) 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 between 2.0 and 2.3 percentage points.¹³

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 equation (3)) is statistically significant at the 1% 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

^{12.} Estimating regressions (2)-(5) with one year lagged *GIIPS Bank Dependence* for the entire sample periods leaves all results qualitatively unchanged.

^{13.} Results are qualitatively similar if we use the leverage ratio instead of net debt as the dependent variable.

save cash out of its cash flow in the pre-crisis 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. Taken together, these results indicate that firms with a high *GIIPS Bank Dependence* become financially constrained during the crisis. Based on the estimates in Column (2), a one standard deviation higher *GIIPS Bank Dependence* of borrowing firms during the crisis implies that these firms save 3.5 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. To absorb country-specific macroeconomic shocks, we include country-year fixed effects in our regression model. Results for this alternative specification are presented in columns (3) and (4) of Table III. All results continue to hold.

Acharya et al. (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 et al. (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. We show that there is a clear change in firm liquidity management during the sovereign debt crisis. Column (5) of Table III reports results for a firm's overall credit line, whereas column (6) 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.¹⁴

To summarize, our results on the firms' financial policy indicate that firms with a high GIIPS Bank

^{14.} Given the smaller number of observations in this analysis, we cannot use it in our various sample splits.

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.

IV.C. Real Outcomes

We next examine how the sovereign debt crisis impacted the corporate policies of firms. We estimate panel regressions (see equation (2)) where y_{ijt+1} measures employment growth ($\Delta \log Employment$), investment (*CAPX/Tangible Assets*), or sales growth ($\Delta \log Sales$), respectively.¹⁵ Table IV presents the results. Columns (1)-(3) 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. Columns (4)-(6) show that these results are robust to including interactions of country and year fixed effects. Based on the specifications in columns (4)-(6), a one standard deviation higher *GIIPS Bank Dependence* of borrowing firms during the sovereign debt crisis leads to a 2.0 percentage point reduction in employment growth, a 3.8 percentage point decrease in capital expenditures, and a 2.8 percentage point decrease in sales growth.¹⁶

IV.C.1 Controlling for Firms' Business Exposure to the Sovereign Debt Crisis

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. If this is the case, we would potentially overestimate the negative real effects that can be attributed to the bank lending channel since including country-year fixed effects does not rule out that our results are 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, 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. We use this information to determine each firm's geographical revenue distribution. 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

^{15.} A madeus 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.

^{16.} In unreported results we find that there is no significant change in the return on assets, suggesting that the observed reduction in investment is not driven by firms cutting back on inefficient investment.

to also control for export/import dependence.

In a first step, we restrict the sample to non-GIIPS firms without subsidiaries in a GIIPS or any other non-EU country (e.g., a German firm without subsidiaries), thereby narrowing the 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. This subsample of firms allows us to better disentangle the shock that comes from the lending behavior of banks and the resulting funding uncertainty of firms from the overall macroeconomic shock.

In Panels A-C in Figure III, 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. Similar to Panels A-C in Figure I, Panels A-C in Figure III show that for non-GIIPS firms without GIIPS subsidiaries, a higher *GIIPS Bank Dependence* leads to larger negative real effects during the crisis period.

Panel A of Table V provides multivariate results for the evidence presented in Figure III. 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, have negative real effects for borrowing firms. Looking at Panel B of Table V, we find weaker effects for non-GIIPS firms with GIIPS subsidiaries (e.g., a German firm with subsidiaries in Italy and Spain), indicating that these firms are hit by the macroeconomic shock and that the bank lending supply shock is thus only of second-order importance.

In a second step, we restrict our sample to GIIPS firms with an above median fraction 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). For these firms, it is plausible to assume that they have a relatively smaller macroeconomic shock compared to firms with more business in the eurozone periphery countries.

Panels A-C of Figure IV show that firms with higher dependence on GIIPS banks have to incur larger negative real effects. In line with this evidence, Panel C of Table V shows that all results continue to hold for the subsample of GIIPS firms with a high fraction of their revenue generated by foreign non-GIIPS subsidiaries. Looking at Panel D of Table V, we again find weaker effects for GIIPS firms with a majority of their business in GIIPS countries (e.g., a Spanish firm without subsidiaries), although the difference is in most cases not statistically significant. For these firms, it seems plausible that the country-year fixed effects absorb the dominating macro shock and that the bank lending channel is again only a second-order effect if firms are hit very hard by the crisis.

As a robustness check, we rerun our main regressions from Tables III and IV, using all firms for which information on subsidiaries is available and include year fixed effects interacted with fixed effects that account for the region where the firm is primarily conducting its business activities. More precisely, we construct two pairs of interaction fixed effects: GIIPS business-year fixed effects and non-GIIPS business year fixed effects. GIIPS business-year fixed effects are included in the regression for all GIIPS firms, along with all non-GIIPS firms with subsidiaries in GIIPS countries. Similarly, non-GIIPS business-year fixed effects are included in the regression for all non-GIIPS firms, along with all GIIPS firms that have an above median fraction of their revenues generated by non-GIIPS subsidiaries. This allows us to capture the macroeconomic shocks in the country of incorporation, as well as the shocks for business regions outside the firm's country. All results continue to hold using this alternative specification (see Table VI).

Taken together, the findings show that even firms without significant business exposure to countries that were severely hit by the sovereign debt crisis incurred negative real effects if they had strong ties to GIIPS banks before the crisis. Therefore, the contraction in bank lending indeed aggravated the negative impact of the sovereign debt crisis on the real economy.

IV.C.2 Aggregate Effects

With some additional assumptions, we can use the firm-level results for the different subsamples from Table V to inform the debate regarding the aggregate effects of the loan supply shock of the European Sovereign Debt Crisis. 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. This strategy to estimate aggregate effects is similar in spirit to the procedure used in Chodorow-Reich (2014). 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 $Firm_{ij}$ if it had a one standard deviation lower *GIIPS Bank Dependence* as

(6)
$$\widetilde{y_{ijt}} = \widehat{y_{ijt}} - \beta_1 \cdot GIIPS \ Bank \ Dependence_{ij,\min\{t,t_{lj}\}} \cdot \sigma_{GIIPSBankDependence} - \beta_2 \cdot GIIPS \ Bank \ Dependence_{ij,\min\{t,t_{lj}\}} \cdot Crisis_{jt} \cdot \sigma_{GIIPSBankDependence},$$

where $\widehat{y_{ijt}}$ denotes the fitted value from the respective regression. We set the counterfactual *GIIPS Bank* Dependence equal to zero if it becomes negative. 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

(7)
$$Total \ Losses = \sum_{ijt} \left[\widetilde{Emp_{ijt}} - \widetilde{Emp_{ijt}} \right]$$

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

(8)
$$\frac{\sum_{ijt} \left[\widetilde{Emp_{ijt}} - \widetilde{Emp_{ijt}}\right]}{\sum_{ijt} \left[Emp_{ijt-1} - Emp_{ijt}\right]}$$

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% during the European Sovereign Debt Crisis period. Our effect accounts for 50% of this decline, that is, firms would have cut employment by 50% less, had they borrowed from syndicates with a one standard deviation lower fraction of GIIPS lead arrangers. Similarly, investment fell by 13% of which 52% 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 33%.

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 20% of this decline to the bank lending supply shock. Similarly, investment fell by 2% of which we can explain 33% with a contraction in bank lending. Finally, sales decreased by 2% and we are able to explain 19% 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, overall, that we can explain less of the overall macroeconomic evolution.

IV.C.3 Matching of Firms and Banks

To ensure that the negative real effects for borrowing firms are actually caused by the shock of the European Sovereign Debt Crisis on GIIPS banks, we have to rule out three alternative explanations for our results that are related to how firms and banks formed business relationships in the pre-crisis period.

First, there could be 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. If this would be the case, a firm's *GIIPS Bank Dependence* would be negatively correlated with a firm's quality and we would wrongly attribute the negative real effects to the bank lending channel although they are, at least partly, driven by an endogenous matching of low quality firms and GIIPS banks in the pre-crisis period. In Panel B of Table II, we presents descriptive statistics for all control variables, split into high and low *GIIPS Bank Dependence* firms for the pre-crisis period. The results in Panel B of Table II show that firms do not differ across *GIIPS Bank Dependence*. This also holds for the subsidiary subsamples (see Panels C and D of Table II). The correlation between GIIPS Bank Dependence and the firm control variables is in general very low as well. Therefore, we can rule out that the results are driven by an endogenous matching of low quality firms and GIIPS banks.

Second, our results could also be driven by the possibility that GIIPS banks were 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, our results would not solely be driven 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 can draw two general conclusions from the descriptive statistics in Panel E of Table II. First, GIIPS and non-GIIPS banks differ ex-ante along observable dimensions. GIIPS banks are smaller, have a considerably higher equity ratio, and less impaired loans to equity compared to non-GIIPS banks, while the Tier 1 ratio seems to be comparable across the two subgroups of banks. To more formally test the difference between the two subsamples, we report the normalized difference below the table. This test reveals significant differences in the two subsamples with respect to size and the equity to assets ratio, while impaired loans to assets and the Tier 1 ratio are not significantly different. Therefore, we can reject the possibility that the results are driven by a lower pre-crisis quality and, in turn, lower crisis resilience of GIIPS banks as, if anything, GIIPS banks seem to be of better quality before the crisis.

Third, we have to rule out the possibility that the results are driven 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, there could be exante 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 address 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). Hence, our results do not seem to be driven by an ex-ante lower quality of syndicates that include GIIPS banks.

IV.C.4 Supply Factors of Bank Lending

To specifically test the importance of supply factors for bank lending, we follow Sufi (2007) in that we use our entire sample and split it into listed and non-listed firms. The underlying assumption is that non-listed firms have fewer alternative sources of funding, since they are not able to raise additional public equity or issue bonds, implying that these firms are more bank-dependent. Moreover, there is less publicly available information for non-listed 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 firms should thus be much more affected than listed firms, which have potentially other sources of funding available. Indeed Becker and Ivashina (2014b) show that very large firms with access to alternative funding sources (e.g., bonds) are able to substitute the lack of funding from banks.

Panel A of Table VII presents the results for the subsample of listed firms, whereas results for non-listed firms are presented in Panel B of Table VII. 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. In line with the argument of Becker and Ivashina (2014b), listed firms thus seem to be able to substitute the lack of bank financing with other funding sources, whereas non-listed firms cannot easily alter their funding sources.

Furthermore, 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 greater detail the evolution of bank relationships during the crisis period. 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 80% 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, 70% of firms with constant bank relationships are non-listed firms. Panel C of Table VII 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.¹⁷ Firms that switch banks only differ in size and whether they are public or not from firms that do not switch banks. Along all other observable dimensions they are similar. This finding again confirms that the bank lending supply shock that occurred during the European Sovereign Debt Crisis played a major role in causing the real effects for borrowing firms.

Therefore, two important contributions of this study are: (i) we document the existence of strong spillovers from high-spread euro area sovereigns to the local real economy through the bank lending channel and (ii) we show that there are 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 facilitated the transmission of shocks across the eurozone.

V. ACTIVE AND PASSIVE TRANSMISSION CHANNELS

In this section, we shed more light on how sovereign credit risk translated into the contraction of lending by banks incorporated in GIIPS countries and the resulting financial and real effects of borrowing firms during the sovereign debt crisis.

There are at least three potential channels through which banks might have been affected by the 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, 2014). 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. To cope with these losses, GIIPS banks might have deleveraged and reduced lending to the private sector (e.g., Chodorow-Reich, 2014; Bocola, 2013). 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).

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). This is due

^{17.} Results available upon request.

to the fact that these bonds are correlated with the banks' other sources of revenue and offer a comparatively high return in the good state of the world when the sovereign is not in default, while the banks are protected by limited liability in the case of a sovereign default. In addition, regulators consider that these 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. This risk-shifting mechanism might have led to a crowding-out of lending to the private sector during the sovereign debt crisis.

Furthermore, a crowding-out of corporate lending might have been also caused by moral suasion (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. Note that both active channels are consistent with an increase in domestic sovereign bondholdings over the crisis period, which makes their disentanglement particularly challenging.

V.A. Loan Level Outcomes

To investigate the importance of these three channels for the contraction of lending supply by banks in our sample period, we compare, in a cross-sectional setting, lending before to lending during the sovereign debt crisis. To control for loan demand and other observed and unobserved changes in borrowing firm characteristics, we apply the Khwaja and Mian (2008) estimator, which exploits multiple bank-firm relationships to isolate demand from supply effects. 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.

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. This approach thus 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.

Panel A of Table VIII presents results for lending volume. The unit of observation in this regression is a bank-year-firm cluster. The dependent variable accordingly represents the annual change in loan volume provided by a given bank to a given cluster of firms. In column (1), we use a bank's country of incorporation as proxy for how affected a bank is by the crisis. Note, that this proxy summarizes all possible channels that may affect the lending behavior of banks to the real sector. 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 supports the results presented in the previous section that the financial and real effects of the firms during the sovereign debt crisis are indeed associated with a reduction in bank lending.

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 (2015), and measure the dependency on domestic sovereign risk of bank b in year t as follows:

$$(9) \quad Domestic \ Sovereign \ Debt \ Risk_{bt} = \frac{Domestic \ Sov. \ Bondholdings_{bt} \cdot Domestic \ Sov. \ CDS_t}{Total \ Assets_{bt}}$$

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 coefficient of the sovereign risk dummy variables interacted with the crisis dummy variable in column (2) of Panel A of Table VIII is negative and significant, indicating 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 This result demonstrates that the risk associated with the sovereign bondholdings and thus the

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

^{19.} Note that 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.

losses incurred due to the sovereign debt crisis indeed play an important role for the lending behavior of banks.

The risk-shifting and moral suasion hypotheses posit that GIIPS banks increased their domestic bondholding during the sovereign debt crisis, which led to a crowding-out of corporate lending. Therefore, to determine whether this is indeed the case, we plot in Figure V 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 V 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, consistent with the results in column (2) of Panel A of Table VIII, Figure V 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. Furthermore, Panel A of Figure V 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 V documents that both GIIPS and non-GIIPS banks hold their domestic sovereign exposure constant. Hence, this preliminary evidence contradicts 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 V, 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. 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. As can be seen from Panel A of Figure VI, 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. To determine the rating cutoff, we follow Drechsler et al. (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. In Panel B of Figure VI, 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.

Given this evidence, we more formally 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 in Table VIII. 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 VI 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. We use three proxies for the degree to which banks are prone to moral suasion of their sovereigns. First, following Acharya and Steffen (2014), 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.²⁰ 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

^{20.} The data can be obtained from: http://ec.europa.eu/competition/elojade/isef/index.cfm?clear=1&policy_area_id= 3.

banks. We construct an indicator variable "High Fraction of Government Ownership", which is equal to 1 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 1 if the fraction of affiliated directors exceeds the median fraction of government affiliated directors.

Columns (5) to (7) of Table VIII present the results for our three proxies for moral suasion. 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 VIII 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 VIII. 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 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 not have faced the need to pressure banks into buying more domestic sovereign debt since the weakly-capitalized banks did so anyway due to their risk-shifting incentives.

V.B. Financial and Real Outcomes

We now examine which of the three channels contributed to the financial and real effects of borrowing firms. We rerun our main panel regressions from equations (4) and (5). 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 VIII. This leads to the following measure for firm i in country j in year t:

(10) Affected Bank Dependence_{ijt} =
$$\frac{\sum_{l \in L_{ijt}} \% Affected \ Banks \ in \ Syndicate_{lijt} \cdot Loan \ Amount_{lijt}}{Total \ Loan \ Amount_{ijt}}$$

where as before L_{ijt} are all of the firm's loans outstanding at time t. 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 IX. 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 X reports results for the real effects if we construct our affected bank dependence variable using 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 could better manage the losses incurred during the sovereign debt crisis.

Finally, the results for the moral suasion proxy are presented in Table XI. 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.

VI. 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.

New York University, CEPR, and NBER Erasmus University Rotterdam IESE Business School Goethe University Frankfurt and SAFE

References

- Acharya, Viral V., Heitor Almeida, Filippo Ippolito, and Ander Perez, "Credit Lines as Monitored Liquidity Insurance: Theory and Evidence," *Journal of Financial Economics*, 112 (2014), 287-319.
- Acharya, Viral V., Itamar Drechsler, and Philipp Schnabl, "A Pyrrhic Victory? Bank Bailouts and Sovereign Credit Risk," Journal of Finance, 69 (2014), 2689-2739.
- Acharya, Viral V., and Sascha Steffen, "The Greatest Carry Trade Ever? Understanding Eurozone Bank Risks," Journal of Financial Economics, 115 (2014), 215-236.
- Adrian, Tobias, Paolo Colla, and Hyun Song Shin, "Which Financial Frictions? Parsing the Evidence from the Financial Crisis of 2007-09," in NBER Macroeconomics Annual 2012, Daron Acemoglu, Jonathan Parker, and Michael Woodford, ed. (Chicago: University of Chicago Press, 2013).
- Almeida, Heitor, Murillo Campello, and Michael S. Weisbach, "The Cash Flow Sensitivity of Cash," Journal of Finance, 59 (2004), 1777-1804.
- Balduzzi, Pierluigi, Emanuele Brancati, and Fabio Schiantarelli, "Financial Markets, Banks' Cost of Funding, and Firms' Decisions: Lessons from Two Crises," Working Paper, 2014.
- Becker, Bo, and Victoria Ivashina, "Cyclicality of Credit Supply: Firm Level Evidence," Journal of Monetary Economics, 62 (2014a), 76-93.
- Becker, Bo, and Victoria Ivashina, "Financial Repression in the European Sovereign Debt Crisis," Working Paper, 2014b.
- Bentolila, Samuel, Marcel Jansen, Gabriel Jiménez, and Sonia Ruano, "When Credit Dries Up: Job Losses in the Great Recession," CESifo Working Paper, 2013.
- Bernanke, Ben, "Nonmonetary Effects of the Financial Crisis in the Propagation of the Great Depression," American Economic Review, 73 (1983), 257-276.
- Bocola, Luigi, "The Pass-Through of Sovereign Risk," Working Paper, 2013.
- Bofondi, Marcello, Luisa Carpinelli, and Enrico Sette, "Credit Supply during a Sovereign Debt Crisis," Bank of Italy Temi di Discussione Working Paper, 2013.
- Chodorow-Reich, Gabriel, "The Employment Effects of Credit Market Disruptions: Firm-Level Evidence from the 2008-09 Financial Crisis," *Quarterly Journal of Economics*, 129 (2014), 1-59.
- Cingano, Federico, Francesco Manaresi, and Enrico Sette, "Does Credit Crunch Investments Down? New Evidence on the Real Effects of the Bank-Lending Channel," Working Paper, 2013.
- Crosignani, Matteo, "Why are Banks not Recapitalized during Crises?," Working Paper, 2014.
- De Marco, Filippo, "Bank Lending and the Sovereign Debt Crisis," Working Paper, 2014.

- De Marco, Filippo, and Marco Macchiavelli, "The Political Origin of Home Bias: The Case of Europe," Working Paper, 2014.
- Diamond, Douglas W., "Monitoring and Reputation: The Choice between Bank Loans and Directly Placed Debt," Journal of Political Economy, 99 (1991), 689-721.
- Diamond, Douglas W., and Raghuram G. Rajan, "Fear of Fire Sales, Illiquidity Seeking, and Credit Freezes," Quarterly Journal of Economics, 126 (2011), 557-591.
- Drechsler, Itamar, Thomas Drechsel, David Marques-Ibanez, and Philipp Schnabl, "Who Borrows from the Lender of Last Resort?," *Journal of Finance*, forthcoming, 2015.
- Farhi, Emmanuel, and Jean Tirole, "Deadly Embrace: Sovereign and Financial Balance Sheets Doom Loops," Working Paper, 2014.
- Iannotta, Giuliano, Giacomo Nocera, and Andrea Sironi, "The Impact of Government Ownership on Bank Risk," Journal of Financial Intermediation, 22 (2013), 152-176.
- Imbens, Guido M., and Jeffrey M. Wooldridge, "Recent Developments in the Econometrics of Program Evaluation," Journal of Economic Literature, 47 (2009), 5-86.
- Ivashina, Victoria, "Asymmetric Information Effects on Loan Spreads," Journal of Financial Economics 92 (2009), 300-319.
- Ivashina, Victoria, David Scharfstein, and Jeremy Stein "Dollar Funding and the Lending Behavior of Global Banks," *Quarterly Journal of Economics*, forthcoming, 2015.
- Khwaja, Asim Ijaz, and Atif Mian "Tracing the Impact of Bank Liquidity Shocks: Evidence from an Emerging Market," American Economic Review, 98 (2008), 1413-1442.
- Popov, Alexander and Neeltje Van Horen, "Exporting Sovereign Stress: Evidence from Syndicated Bank Lending during the Euro Area Sovereign Debt Crisis," *Review of Finance*, forthcoming, 2015.
- Standard&Poor's, "Corporate Ratings Criteria," (New York, NY: The McGraw-Hill Companies, Inc., 2006).
- Standard&Poor's, "A Guide To The European Loan Market," (New York, NY: The McGraw-Hill Companies, Inc.,2010).
- Sufi, Amir, "Information Asymmetry and Financing Arrangements: Evidence from Syndicated Loans," Journal of Finance 62 (2007), 629-668.
- Uhlig, Harald, "Sovereign Default Risk and Banks in a Monetary Union," German Economic Review, 15 (2013), 23-41.

TABLE I: VARIABLE DEFINITIONS

Dependent Variables (all winsorized at	the 5% level)
Variable	Definition
Net Debt	<u>Current + Non-Current Liabilities - Cash</u> Total Assets
$\Delta Cash$	$\frac{Cash_{t+1}-Cash_t}{Total\ Assets_t}$
Employment Growth	$ln(Employment_{t+1}) - ln(Employment_t)$
CAPX	$\frac{Fixed \ Assets_{t+1} - Fixed \ Assets_t + Depreciation}{Fixed \ Assets_t}, \text{ set to } 0 \text{ if negative}$
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)
$GIIPS \ Bank \ Dependence_{ijt}$	$\frac{\sum_{l \in L_{ijt}} \% GIIPS \ Lead \ Arranger \ in \ Syndicate_{lijt} \cdot Loan \ Amount_{lijt}}{Total \ Loan \ Amount_{iit}}$
Affected Bank Dependence $_{ijt}$	$\frac{\sum_{l \in L_{ijt}} \% A \textit{ffected Banks in Syndicate}_{iijt}. \textit{Loan Amount}_{lijt}}{\textit{Total Loan Amount}_{ijt}}$
Affected Bank Measures	
Variable	Definition
CDS Weighted GIIPS Sov. Bondholdings	Banks with an above median ratio of $\frac{\sum_{k} \text{Sov. Bondholdings}_{kt} \cdot \text{CDS}_{kt}}{\text{Total Assets}_{t}}$, for all $k \in \text{GHPS}$
CDS Weighted Domestic Sov. Bondholdings	Banks with an above median ratio of $\frac{Domestic Sov. Bondholdings_t Domestic Sov. CDS_t}{Total Assets_t}$
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	e 5% level)
Variable	Definition
$\ln(Assets)$	Natural logarithm of total assets
Leverage	$\frac{Total \ Assets-Total \ Equity}{Total \ Assets}$
Net Worth	$\frac{Total\ shareholder\ funds @Liabilities\ -\ Current @Non-Current\ Liabilities\ -\ Cash}{Total\ Assets}$
Tangibility	Fixed Assets Total Assets
Interest Coverage Ratio	EBIT Interest Expense
EBITDA/Assets	EBITDA Total Assets
Cash Flow	Cash flow Total Assets

Panel A: Dependent V	Variables												
					pre-Crisis			I		Crisis			
				Emp Growth	CAPX	Sales Growth	1	I	Emp Growth	CAPX	Sales Growth	1	
	Mean			0.061	0.248	0.060			0.008	0.118	0.037		
High GIIPS Bank Dep.	Median			0.022	0.112	0.046			0	0.060	0.032		
	Std. Dev.			0.177	0.362	0.259			0.134	0.215	0.198		
	Mean			0.045	0.239	0.050			0.022	0.159	0.053		
Low GIIPS Bank Dep.	Median			0.020	0.108	0.048			0.010	0.086	0.050		
	Std. Dev.			0.165	0.366	0.224			0.138	0.250	0.205		
Diff-in-Diff.									-0.03 (-3.06)	-0.05 (-2.56)	-0.027 (-1.77)		
Panel B: Explanatory	Variables												
				pre-Crisi	s					Ū	isis		
		Total Assets (mn)	Tangibility	Int. Cov.	Net Worth	EBITDA/Assets	Leverage	Total Assets	Tangibility	Int. Cov.	Net Worth	EBITDA/Assets	Leverage
	Mean	4390	0.614	2.48	0.198	0.092	0.653	4700	0.594	2.28	0.200	0.076	0.646
High GIIPS Bank Dep.	Median	629	0.658	1.2	0.189	0.093	0.655	633	0.637	1.13	0.189	0.077	0.639
	Std. Dev.	7840	0.249	5.28	0.180	0.067	0.192	8280	0.272	6.08	0.187	0.067	0.201
	Mean	2980	0.531	3.55	0.225	0.105	0.594	2850	0.540	3.70	0.236	0.096	0.587
Low GIIPS Bank Dep.	Median	531	0.543	1.55	0.202	0.098	0.597	511	0.561	1.53	0.231	0.092	0.579
	Std. Dev.	6130	0.262	7.39	0.202	0.079	0.210	5910	0.265	7.90	0.224	0.077	0.218
Normalized Diff	Ĩ.	0.144	0.229	-0.149	-0.098	-0.131	0.202						
Correlation with GIIPS 1	Bank Dep.	-0.0207	0.0961	-0.0722	-0.0511	-0.1006	0.1315						
Panel A presents desc	criptive s	tatistics of deper	ndent and F	Panel B of ex	planatory	variables split	into firms	with high and	l low GIIPS	Bank Dep	endence and	into crisis and	pre-crisis
periods. High (low) (GIIPS B	ank Dependence	is an indic	ator variable	equal to c	one if the fract	cion of tota	l outstanding	loans to a f	irm provid	ed by GIIPS	distribution of the second sec	is above
(below) the sample n	median.	Crisis is an indic	ator variał	ole equal to c	one startin	ig in 2009 for	Greece and	d in 2010 for	all other co	untries (be	ginning of t	he sovereign de	bt crisis)
and zero before. The	sample	consists of all firm	ms in the in	ntersection of	î DealScan	ı and Amadeu	s that are l	ocated in the	following co	ountries: G	reece, Italy,	Ireland, Portug	al, Spain

TABLE II: DESCRIPTIVE STATISTICS

(GIIPS countries) or Germany, France, U.K. (non-GIIPS countries).

Panel C: Non-GIIPS	firms witho	ut GIIPS or othe	r non-EU su	bsidiaries			
		Total Assets (mn)	Tangibility	Int. Cov.	Net Worth	EBITDA/Assets	Leverage
	Mean	1650	0.541	3.514	0.236	0.109	0.610
High GIIPS Bank Dep.	Median	179	0.580	1.175	0.235	0.096	0.621
	Std. Dev.	4510	0.335	9.340	0.266	0.093	0.262
	Mean	831	0.521	2.970	0.223	0.104	0.614
Low GIIPS Bank Dep.	Median	198	0.538	1.145	0.199	0.093	0.619
	Std. Dev.	2060	0.305	7.560	0.233	0.092	0.237
Normalized Di	iff.	0.01	0.04	0.03	0.04	0.03	0.01
Correlation with GIIPS	Bank Dep.	-0.05	-0.03	0.02	-0.10	-0.03	0.10
Panel D: GIIPS firm	s with high	fraction of revenu	le generated	by non-G1	IPS subsidi	aries	
	Mean	6050	0.559	2.835	0.244	0.093	0.600
High GIIPS Bank Dep.	Median	1390	0.563	1.56	0.237	0.091	0.591
	Std. Dev.	8750	0.201	6.262	0.146	0.056	0.148
	Mean	6120	0.606	2.863	0.221	0.100	0.623
Low GIIPS Bank Dep.	Median	2290	0.598	1.345	0.189	0.087	0.645
	Std. Dev.	7500	0.231	5.021	0.181	0.063	0.170
Normalized Di	iff.	0.13	0.15	0.00	0.10	0.09	0.10
Correlation with GIIPS	Bank Dep.	-0.08	-0.08	-0.01	0.05	-0.10	-0.10
Panels C and D present descriptive subsidiaries and Panel D reports re-	e statistics of expla sults for GIIPS firm	natory variables for the pr is with a high fraction of re	e-crisis period. Pa evenue generated by	nel C reports re / non-GIIPS sub	sults for non-GIIF sidiaries. Both par	S firms without GIIPS or tels are split into firms wit	r other non-EU ch high and low
GIIPS Bank Dependence. Panel C	includes firms loca	ted in Germany, France, or	r U.K. (non-GIIPS	countries) that	do not have any fc	reign subsidiary located i	n 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.

(CONTD.)
STATISTICS
DESCRIPTIVE
Π:
TABLE

Panel E: GIIPS vs. Non-GIIPS Banks					
		Total Assets (mn)	Equity/Assects	Impaired Loans/Equity	Tier1 Ratio
	Mean	299574	0.066	0.323	0.085
GIIPS Banks	Median	121723	0.061	0.26	0.080
	Std. Dev.	331841	0.024	0.22	0.017
	Mean	839277	0.03	0.39	0.087
Non-GIIPS Banks	Median	466045	0.027	0.30	0.082
	Std. Dev.	724286	0.014	0.26	0.018
	Normalized Diff.	-0.68	1.32	-0.21	-0.063
Panel F: Non-GIIPS Banks					
	Mean	691641	0.028	0.33	0.085
Non-GIIPS with high fraction GIIPS syndicates	Median	414260	0.025	0.24	0.082
	Std. Dev.	641653	0.017	0.26	0.019
	Mean	958339	0.032	0.43	0.088
Non-GIIPS with low fraction GIIPS syndicates	Median	712432	0.031	0.36	0.084
	Std. Dev.	774313	0.010	0.24	0.018
	Normalized Diff.	-0.26	-0.22	-0.28	-0.13
Panels E and F present descriptive statistics for the banks	i in our sample in the I	pre-crisis period. Panel	E compares GIIPS	and Non-GIIPS banks while P	anel 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 II: DESCRIPTIVE STATISTICS (CONTD.)

		TABLE	III: FINANCI	al Outco	MES	
	(1)	(2)	(3)	(4)	(5)	(9)
	Net Debt	$\Delta \mathrm{Cash}$	Net Debt	$\Delta \mathrm{Cash}$	Total Credit Line Cash+Total Credit Line	Undrawn Credit Line Cash+Undrawn Credit Line
GIIPS Bank Dep.*Crisis	-0.061**	-0.003	-0.079**	-0.002	-0.298***	-0.463**
	(-2.30)	(-0.47)	(-2.38)	(-0.29)	(-2.84)	(-2.32)
Cash Flow*Crisis		-0.002		-0.002		
		(-0.30)		(-0.31)		
Cash Flow*GIIPS Bank Dep.		0.075		0.081		
		(0.99)		(1.10)		
Cash Flow*GIIPS Bank Dep.*Crisis		0.106^{***}		0.108^{***}		
		(2.94)		(2.94)		
Firm Controls	YES	YES	YES	YES	YES	YES
Firm Fixed Effects	YES	YES	YES	\mathbf{YES}	YES	YES
Year Fixed Effects	YES	YES	NO	NO	NO	NO
Country*Year Fixed Effects	NO	NO	YES	\mathbf{YES}	YES	YES
R^2	0.254	0.099	0.269	0.111	0.329	0.299
Ν	4022	3389	4022	3389	411	411
Table III presents firm-level regressions. The d	lependent variab	les are net d	ebt, the change	in cash hold	ings, credit lines as a fraction of	the sum of credit lines and cash, and
undrawn credit lines as a fraction of the sum o	f undrawn credi	t lines and ca	sh, respectively	. The sample	consists of all firms in the inters	ection of DealScan and Amadeus that
are located in the following countries: Greece, J	Italy, Ireland, Po	ortugal, Spair	(GIIPS countr	ies) or Germ	any, France, U.K. (non-GIIPS cou	intries) for the net debt and cash flow
regressions. For the credit line regressions, the	sample consists	of all firms i	1 the intersectic	on of DealSca	n, 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 lea	d arrangers. Crisis is an indicator	variable equal to one starting in 2009
for Greece and in 2010 for all other countries ((beginning of the	e sovereign d	bt crisis) and a	zero before.	Firm control variables include the	e logarithm of total assets, tangibility,
interest coverage ratio, EBITDA as a fraction of	f total assets, and	d for the cash	regressions, a f	irm's cash flo	w, leverage, and capital expenditu	rres. All firm-level control variables are
lagged by one period. All variables are defined i	in Table I. All re	gressions inc	ude firm and ye	ear fixed effec	ts as well as all firm-level controls	. Columns (3)-(6) additionally include
country-year fixed effects. Standard errors are z	adjusted for hete	roskedasticity	r and clustered	at the firm-le	vel. Significance levels: * $(p < 0.1)$	10), ** (p < 0.05), *** (p < 0.01).

OUTCO
FINANCIAL
Ξ
TABLE

	(1)	(2)	(3)	(4)	(5)	(9)
	Emp Growth	CAPX	Sales Growth	Emp Growth	CAPX	Sales Growth
GIIPS Bank Dep.	0.041	-0.047	-0.014	0.030	-0.063	0.005
	(0.73)	(-0.32)	(-0.13)	(0.49)	(-0.40)	(0.05)
GIIPS Bank Dep.*Crisis	-0.062***	-0.101***	-0.059**	-0.059***	-0.117***	-0.086**
	(-3.99)	(-3.74)	(-2.52)	(-2.83)	(-3.03)	(-2.48)
Firm Controls	YES	YES	YES	YES	YES	YES
Firm Fixed Effects	YES	YES	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	NO	NO	NO
Country-Year Fixed Effects	NO	NO	NO	YES	\mathbf{YES}	YES
R^2	0.081	0.302	0.173	0.100	0.310	0.196
N	3401	3912	3816	3401	3912	3816
Table IV presents firm-level regressions. The intersection of DealScan and Amadeus that al countries). <i>GIIPS Bank Dependence</i> is define- for Greece and in 2010 for all other countries worth, tangibility, interest coverage ratio, and All regressions include firm and year fixed eff- for hereoclassicity and clustered at the firm	e dependent variables are re located in the following d as fraction of total outs (beginning of the sovere I EBITDA as a fraction c ects, as well as all firm-le	e employment grov g countries: Greeco standing loans prov sign debt crisis) an of total assets. All of total assets. Colu- evel controls. Colu- ale. $* (n < 0.10) *$	wth, investments, and s e, Italy, Ireland, Portug, vided by GIIPS lead arr nd zero before. Firm co firm-level control varia mns (4)-(6) additionall *(n, < 0.5) ***(n, < 0	ales growth, respectivel al, Spain (GIIPS countr angers. Crisis is an indi ntrol variables include i bles are lagged by one F y include country*year (1)	y. The sample co ies) or Germany, F cator variable equa the logarithm of to beriod. All variable fixed effects. Stan,	usists of all firms in the rance, U.K. (non-GIIPS I to one starting in 2009 tal assets, leverage, net s are defined in Table I. lard errors are adjusted
TOT THE AND A TAXABLE AND A TAXABAN AND AND AND AND AND AND AND AND AND A				.(+0)		

TABLE IV: REAL OUTCOMES

Panel A: Non-GIIPS firms witho	out GIIPS or o	other non-l	EU subsidiarie	s	
	(1)	(2)	(3)	(4)	(5)
	Emp Growth	CAPX	Sales Growth	Net Debt	Δ Cash
GIIPS Bank Dep.*Crisis	-0.557***	-0.611***	-0.862***	-0.564*	0.029**
Cash Flow*GIIPS Bank Dep.*Crisis	(-7.77)	(-4.43)	(-4.70)	(-1.71)	$\begin{array}{c} (2.12) \\ 0.330^{***} \\ (8.85) \end{array}$
$\frac{R^2}{N}$	$\begin{array}{c} 0.118\\ 809 \end{array}$	$\begin{array}{c} 0.330\\ 1024 \end{array}$	$\begin{array}{c} 0.192 \\ 999 \end{array}$	$0.251 \\ 1090$	$\begin{array}{c} 0.133\\ 868 \end{array}$
Panel B: Non-GIIPS firms with	GIIPS subsidi	iaries			
GIIPS Bank Dep.*Crisis	-0.126**	-0.002	-0.094	-0.018	-0.094**
Cash Flow*GIIPS Bank Dep.*Crisis	(-2.10)	(-0.02)	(-0.88)	(-0.29)	(-2.06) 0.880^{**} (2.21)
$\frac{R^2}{N}$	$0.084 \\ 1118$	$0.369 \\ 1238$	$0.191 \\ 1238$	$0.297 \\ 1252$	$0.124 \\ 1115$
T-Test for Diff. Interaction	2.75	3.02	2.07	1.84	1.50
Panel C: GIIPS firms with high	fraction of rev	venue gene	rated by non-0	GIIPS subs	sidiaries
GIIPS Bank Dep.*Crisis	-0.135**	-0.319***	-0.154**	-0.170**	-0.008
Cash Flow*GIIPS Bank Dep.*Crisis	(-2.30)	(-3.12)	(-2.59)	(-2.44)	(-0.54) 0.152^{**} (2.51)
$\frac{R^2}{N}$	$\begin{array}{c} 0.204\\ 304 \end{array}$	$\begin{array}{c} 0.291 \\ 343 \end{array}$	$0.357 \\ 342$	$\begin{array}{c} 0.328\\ 350 \end{array}$	$\begin{array}{c} 0.273\\ 310 \end{array}$
Panel D: GIIPS firms with low f	raction of reve	enue gener	ated by non-G	IIPS subsi	idiaries
GIIPS Bank Dep.*Crisis	-0.042	-0.075	-0.047	-0.061^{*}	-0.007
Cash Flow*GIIPS Bank Dep.*Crisis	(-1.40)	(-1.48)	(-0.94)	(-1.66)	(-0.61) 0.155^{**} (2.48)
R^2 N	$0.172 \\ 727$	$\begin{array}{c} 0.374\\ 820 \end{array}$	$\begin{array}{c} 0.263 \\ 766 \end{array}$	$\begin{array}{c} 0.394\\ 836 \end{array}$	$\begin{array}{c} 0.154 \\ 677 \end{array}$
T-Test for Diff. Interaction	1.52	2.07	0.66	1.26	0.24

TABLE V: SUBSIDIARIES

Table V presents firm-level regressions. The dependent variables are employment growth, investments, sales growth, net debt, and change in cash holdings, 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 fraction 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. All firm-level control variables are lagged by one period. All variables are defined in Table I. All regressions include firm, and 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).

	(1)	(2)	(3)	(4)	(5)
	Emp Growth	CAPX	Sales Growth	Net Debt	Δ Cash
GIIPS Bank Dep.*Crisis	-0.066***	-0.132***	-0.101***	-0.109***	-0.004
	(-2.84)	(-3.14)	(-2.65)	(-2.94)	(-0.49)
Cash Flow*Crisis					-0.006
					(-0.89)
Cash Flow*GIIPS Bank Dep.*Crisis					0.117***
					(3.06)
R^2	0.104	0.319	0.205	0.278	0.112
Ν	2958	3425	3345	3528	2970
Firm Fixed Effects	YES	YES	YES	YES	YES
Business Region-Year Fixed Effects	YES	YES	YES	YES	YES
Firm-Level Controls	YES	YES	YES	YES	YES

TABLE VI: BUSINESS REGION EXPOSURE

Table VI presents firm-level regressions. The dependent variables are employment growth, investments, sales growth, net debt, and change in cash holdings, respectively. The sample consists of all firms in the intersection of DealScan and Amadeus that are incorporated 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. 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. All firm-level control variables are lagged by one period. All variables are defined in Table I. All regressions include firm and business region-year fixed effects, as well as all firm-level controls. Business region fixed effects are defined via data on subsidiary revenues. GIIPS firms and non-GIIPS firms with GIIPS subsidiaries are classified as having exposure to the GIIPS countries. Non-GIIPS firms and GIIPS firms with a high fraction of revenues generated by non-GIIPS subsidiaries are classified as being exposed to non-GIIPS countries. Standard errors are adjusted for heteroskedasticity and clustered at the firm-level. Significance levels: * (p < 0.10), ** (p < 0.05), *** (p < 0.01).

Panel A: Listed Firms					
	(1)	(2)	(3)	(4)	(5)
	Emp Growth	CAPX	Sales Growth	Net Debt	Δ Cash
GIIPS Bank Dep.*Crisis	-0.037	-0.071	-0.091	-0.034	-0.001
	(-0.88)	(-1.01)	(-1.38)	(-0.89)	(-0.03)
Cash Flow*GIIPS Bank Dep.*Crisis					0.012
					(0.27)
R^2	0.338	0.492	0.401	0.480	0.288
N	1530	1576	1560	1597	1442
Panel B: Non-Listed Firms					
GIIPS Bank Dep.*Crisis	-0.059**	-0.135***	-0.082*	-0.068*	0.001
	(-2.27)	(-2.66)	(-1.72)	(-1.86)	(0.12)
Cash Flow*GIIPS Bank Dep.*Crisis					0.122**
					(2.39)
R^2	0.241	0.433	0.316	0.392	0.233
N	1871	2336	2256	2425	1947
Panel C: Firms with constant G .	IIPS Bank De	ependence			
GIIPS Bank Dep.*Crisis	-0.056**	-0.120***	-0.098**	-0.086***	0.000
	(-2.35)	(-2.62)	(-2.52)	(-2.72)	(0.05)
Cash Flow*GIIPS Bank Dep.*Crisis					0.098^{**}
					(2.46)
R^2	0.111	0.320	0.196	0.281	0.114
N	2310	2740	2672	2827	2414
Panel D: Switcher vs. Non-Switch	cher				
	Liste	ed	Non-Li	sted	Cum.
Switcher	61.17	'%	38.83	%	100%
Non-Switcher	29.29	%	70.71	%	100%

TABLE VII: LISTED VS. NON-LISTED FIRMS

Table VII presents firm-level regressions. The dependent variables are employment growth, investments, sales growth, net debt, and change in cash holdings, 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 have a constant *GIIPS Bank Dependence* throughout the sample period. Finally, Panel D 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. All firm-level control variables are lagged by one period. All variables are defined in Table I. All regressions include firm and 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).

Panel A: Loan Volume							
	(1) Δ Volume	$\stackrel{(2)}{\Delta \text{Volume}}$	(3) Δ Volume	(4) Δ Volume	(5) Δ Volume	(6) Δ Volume	(7) Δ Volume
GIIPS*Crisis	-0.035^{*}		-0.001	-0.041^{*}	-0.066**	-0.046^{*}	-0.042**
CDS Weighted Dom. Bondholdings*Crisis	(-1.70)	-0.051^{**}	(-0.03)	(-1.00)	(-2.19)	(-1.73)	(-2.27)
High Leverage*GIIPS*Crisis		(2.41)	-0.096^{***} (-2.78)				
Low Rating*GIIPS*Crisis			()	-0.086^{*} (-1.95)			
Gov. Intervention*GIIPS*Crisis					0.010 (0.27)		
High Gov. Board*GIIPS*Crisis						$0.097 \\ (1.67)$	
High Gov. Own.*GIIPS*Crisis							$\begin{array}{c} 0.097 \\ (1.60) \end{array}$
R^2 N	$\begin{array}{c} 0.444\\ 3563 \end{array}$	$\begin{array}{c} 0.460\\ 3364 \end{array}$	$0.448 \\ 3531$	$0.451 \\ 3531$	$0.453 \\ 3531$	$\begin{array}{c} 0.448\\ 3531 \end{array}$	$0.449 \\ 3531$
Panel B: Loan Spread							
	Δ Spread	Δ Spread	Δ Spread	Δ Spread	Δ Spread	Δ Spread	Δ Spread
GIIPS*Crisis	0.039^{*}		-0.002	0.038	-0.001	0.030	0.039
CDS Weighted Dom. Bondholdings*Crisis	(1.82)	0.036	(-0.12)	(1.57)	(-0.05)	(0.86)	(1.56)
High Leverage*GIIPS*Crisis		(1.47)	0.086**				

Low Rating*GIIPS*Crisis

Gov. Intervention*GIIPS*Crisis

High Gov. Board*GIIPS*Crisis

High Gov. Own.*GIIPS*Crisis

Firm Cluster-Year Fixed Effects

Bank-Level Controls

 \mathbb{R}^2

N

(2.11)

0.552

2207

YES

YES

0.454***

(2.77)

0.553

2207

YES

YES

0.000

(0.00)

0.553

2207

YES

YES

 $\begin{array}{c} 0.020\\ (0.32) \end{array}$

0.552

2207

YES

YES

0.006(0.13)

0.551

2207

YES

YES

TABLE VIII: LENDING VOLUME AND SPREAD

Table VIII presents the results of an adapted version of the Khwaja and Mian (2008) bank lending channel regression. The unit of observation is a bank-firm cluster-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 the 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 regressions include firm cluster-year 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).

0.553

2109

YES

YES

0.548

2220

YES

YES

Panel A: Risk of GIIPS sovereign bondholdings					
	$\mathop{\rm Emp}\limits\limits_{} \mathop{\rm Growth}\limits_{}$	${ m CAPX}^{(2)}$	(3) Sales Growth	(4) Net Debt	$\Delta \mathop{\mathrm{Cash}}\limits^{(5)}$
CDS Weighted GIIPS Sov. Bondholdings*Crisis CDS Weighted GIIPS Sov. Bondholdings*Crisis*Cash Flow	-0.063 *** (-2.70)	-0.097** (-2.40)	-0.095*** (-2.81)	-0.071^{**} (-2.35)	$\begin{array}{c} -0.008 \\ (-0.83) \\ 0.137^{**} \\ (2.50) \end{array}$
${R^2 \over N}$	$\begin{array}{c} 0.100\\ 3206 \end{array}$	$0.311 \\ 3683$	0.210 3593	$\begin{array}{c} 0.263\\ 3790 \end{array}$	$0.124 \\ 3187$
Panel B: Risk of domestic sovereign bondholdings					
	Emp Growth	CAPX	Sales Growth	Net Debt	$\Delta \ {\rm Cash}$
CDS Weighted Domestic Sov. Bondholdings*Crisis	-0.060 *** (-2.60)	-0.085^{**} (-2.10)	-0.099^{***} (-2.84)	-0.067^{**} (-2.23)	-0.008 (-0.80)
CDS Weighted Domestic Sov. Bondholdings*Cash Flow*Crisis					0.133^{**} (2.49)
${R^2 \over N}$	$\begin{array}{c} 0.100\\ 3206 \end{array}$	$0.311 \\ 3683$	0.210 3593	$\begin{array}{c} 0.262\\ 3790 \end{array}$	$\begin{array}{c} 0.124\\ 3187\end{array}$
Table IX presents firm-level regressions. The dependent variables are employment growth, in	vestments, sales grow	th, net debt,	and the change in	cash holdings,	respectively. The
sample consists of all firms in the intersection of DealScan and Amadeus that are located	n the following count of the maximum of t	tries: Greece	, Italy, Ireland, Po	rtugal, Spain (attad CIIDS S	GIIPS countries)
(Panel A) and CDS Weighted Domestic Sov. Bondholdings (Panel B) measure the fraction	of affected lead arra	ngers based o	on the risk-adjusted	d GIIPS and d	omestic sovereign
bondholdings of banks in a firm's syndicate, respectively. Crisis is an indicator variable equ	al to one starting in 2	009 for Gree	ce and in 2010 for	all other count	ries (beginning of
the sovereign debt crisis) and zero before. Firm control variables include the logarithm of t	tal assets, leverage, n	et worth, tai	ngibility, interest co	overage ratio, a	nd EBITDA as a
fraction of total assets. All firm-level control variables are lagged by one period. All variable	s are defined in Table	I. All regres	sions include firm a	und country-ye	ar fixed effects, as
well as all firm-level controls. Standard errors are adjusted for heteroskedasticity and cluste	ed at the firm-level. S	Significance l	evels: $* (p < 0.10)$,	, ** $(p < 0.05)$,	*** $(p < 0.01)$.

TABLE IX: PASSIVE CHANNEL: HIT ON BALANCE SHEET

Panel A: Leverage					
	(1)Emp Growth	${\rm (2)} \atop {\rm CAPX}$	(3) Sales Growth	$ \overset{(4)}{\text{Net Debt}} $	$\Delta (5) \\ \Delta Cash$
High Leverage GIIPS*Crisis	-0.107**	-0.151*	-0.176**	-0.141*	0.003
High Leverage*Crisis	(-2.08) 0.032	(-1.87) 0.034	(-2.27) 0.042^*	(-1.88) -0.015	(0.22) 0.004
GIIPS*Crisis	(1.24) - 0.039^{**}	(1.00) -0.058	(1.74) -0.063**	(-0.60) -0.035	(0.51) -0.003
High Leverage GIIPS*Crisis*Cash Flow	(-2.01)	(-1.60)	(-2.22)	(-1.56)	(-0.45) 0.126^{**}
High Leverage*Crisis*Cash Flow					(2.28) -0.003
GIIPS*Crisis*Cash Flow					(-0.18) 0.026 (0.94)
${R^2 \over N}$	$0.103 \\ 3314$	$0.309 \\ 3811$	$0.210 \\ 3720$	$0.271 \\ 3922$	$0.120 \\ 3303$
Panel B: Rating					
Low Rating GIIPS*Crisis	-0.444***	-0.479***	-0.656**	-0.636***	-0.075*
Low Rating*Crisis	(-2.82) 0.138^{**}	(-2.79) 0.238^{***}	(-2.36) 0.133	(-3.10) 0.264^{**}	(-1.82) 0.058^{**}
GIIPS*Crisis	(2.06) - 0.051^{***}	(2.61) - 0.075^{**}	(1.51) - 0.068^{***}	(2.38) - 0.043^*	(2.03) -0.002
Low Rating GIIPS*Crisis*Cash Flow	(-2.79)	(-2.19)	(-2.61)	(-1.98)	$(-0.30) \\ 0.393^*$
Low Rating*Crisis*Cash Flow					(1.72) -0.183
GIIPS*Crisis*Cash Flow					$\begin{array}{c} (-1.54) \\ 0.035 \\ (1.33) \end{array}$
R^2 N	$0.103 \\ 3314$	$0.308 \\ 3811$	0.211 3720	$0.272 \\ 3922$	$0.118 \\ 3303$

TABLE X: ACTIVE CHANNEL: RISK SHIFTING

Table X presents firm-level regressions. The dependent variables are employment growth, investments, sales growth, net debt, and the change in cash holdings, respectively. The sample consists of all firms in the intersection of DealScan and Amadeus and located in the following countries: Greece, Italy, Ireland, Portugal, and Spain (GIIPS countries) and Germany, France, and 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. All firm-level control variables are lagged by one period. All variables are defined in Table I. All regressions include firm and 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).

42

Panel A: Intervened Banks					
	(1) Emp Growth	${\rm CAPX}^{(2)}$	(3) Sales Growth	(4) Net Debt	$\Delta (5) (5)$
GIIPS Gov. Intervention*Crisis	0.032	0.006	0.028	-0.048	-0.005
Gov. Intervention*Crisis	-0.020	(0.03) -0.021	-0.021	(-1.00) -0.005	(-0.39) -0.007
GIIPS*Crisis	(-1.01) -0.073^{***}	(-0.79) -0.093^{**}	(-0.94) -0.091^{***}	(-0.20) -0.043	(-1.12) -0.006
GIIPS Gov. Intervention*Crisis*Cash Flow	(-2.81)	(-2.30)	(-2.73)	(-1.44)	(-0.69) -0.015
Gov. Intervention*Crisis*Cash Flow					(-0.26) 0.018
GIIPS*Crisis*Cash Flow					$(1.16) \\ 0.052^* \\ (1.67)$
$\frac{R^2}{N}$	$\begin{array}{c} 0.104 \\ 3314 \end{array}$	$\begin{array}{c} 0.308 \\ 3811 \end{array}$	$0.209 \\ 3720$	$0.271 \\ 3922$	$0.119 \\ 3303$
Panel B: Government Ownership					
High Fraction Gov. Own. GIIPS*Crisis	-0.002	-0.049	-0.045	-0.049	-0.001
High Fraction Gov. Own.*Crisis	0.035**	0.031	0.018	0.050^{***}	0.008
GIIPS*Crisis	(2.17) -0.043**	(1.12) -0.067*	(0.90) -0.065^{**}	(2.71) -0.033	(1.45) -0.001
High Fraction Gov. Own. GIIPS*Crisis*Cash Flow	(-2.26)	(-1.91)	(-2.46)	(-1.51)	(-0.21) 0.004
High Fraction Gov. Own.*Crisis*Cash Flow					(0.15) - 0.022^*
GIIPS*Crisis*Cash Flow					$(-1.95) \\ 0.042 \\ (1.63)$
$\frac{R^2}{N}$	$\begin{array}{c} 0.102\\ 3314 \end{array}$	$0.312 \\ 3811$	$0.211 \\ 3720$	$0.272 \\ 3922$	$\begin{array}{c} 0.118\\ 3303 \end{array}$
Panel C: Government Board Seats					
High Fraction Gov. Board GIIPS*Crisis	-0.015	-0.021	-0.040	-0.002	-0.005
High Fraction Gov. Board*Crisis	(-0.52) 0.043^{*} (1.70)	(-0.42) 0.035 (0.00)	0.018	0.012	0.000
GIIPS*Crisis	(1.70) -0.022 (0.86)	(0.90) -0.050 (1.16)	(0.03) -0.060* (1.80)	(0.40) -0.038	(0.00) -0.004
High Fraction Gov. Board GIIPS*Crisis*Cash Flow	(-0.00)	(-1.10)	(-1.69)	(-1.38)	(-0.48) 0.018
High Fraction Gov. Board*Crisis*Cash Flow					(1.04) 0.009
GIIPS*Crisis*Cash Flow					$(0.50) \\ 0.053^{*} \\ (1.86)$
$\frac{R^2}{N}$	$0.101 \\ 3314$	$0.308 \\ 3811$	$0.209 \\ 3720$	$0.268 \\ 3922$	$0.122 \\ 3303$

TABLE XI: ACTIVE CHANNEL: MORAL SUASION

Table XI presents firm-level regressions. The dependent variables are employment growth, investments, sales growth, net debt, and the change in cash holdings, respectively. The sample consists of all firms in the intersection of Dealscan and Amadeus and located in the following countries: Greece, Italy, Ireland, Portugal, and Spain (GIIPS countries) and Germany, France, and 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. All firm-level control variables are lagged by one period. All variables are defined in Table I. All regressions include firm and 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 I: REAL EFFECTS - ENTIRE SAMPLE

Figure I 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, and U.K. We restrict the sample to firms with financial information available in Amadeus.





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



Figure II 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, and U.K. We restrict the sample to firms in the intersection of DealScan, Amadeus, and Capital IQ.



FIGURE III: REAL EFFECTS - NON-GIIPS FIRMS WITHOUT GIIPS OR OTHER NON-EU SUBSIDIARIES

Figure III 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 IV: REAL EFFECTS - GIIPS FIRMS WITH A HIGH FRACTION OF REVENUE FROM NON-GIIPS SUBSIDARIES.



Figure IV 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 Greece, Italy, Ireland, Portugal, or Spain 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 generate an above median fraction of their revenue in subsidiaries not located in GIIPS countries. We restrict the sample to firms with financial information available in Amadeus.

FIGURE V: EVOLUTION OF SOVEREIGN DEBT HOLDINGS - ALL BANKS



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

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



Figure V 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, and Spain. Non-GIIPS banks consist of banks headquartered in France, Germany, and 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.



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

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



Figure VI 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, and 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.