

**FINANCIAL REPRESSION
IN THE EUROPEAN SOVEREIGN DEBT CRISIS**

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By the end of 2013, the share of government debt held by the domestic banking sectors of Eurozone countries was more than twice its 2007 level. We show that this type of increasing reliance on the domestic banking sector for absorbing government bonds generates a crowding out of corporate lending. For a given domestic firm, new debt is less likely to be a loan—i.e., the loan supply contracts—when local banks have purchased more domestic sovereign debt and when that debt is risky (as measured by CDS spreads). These effects are most pronounced in the period following the second Greek bailout in early 2010.

Key words: Credit cycles; Sovereign debt; Financial repression.
JEL Codes: G11, G22, G30

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When country risk and sovereign bond yields rise, governments may resort to formal and informal pressures on the local financial sector to absorb new issues of government bonds; in other words, they may use a form of “financial repression.”¹ If the financial sector cannot raise additional funds to purchase government debt, these acquisitions can only be made at the expense of other investments. Financial repression is not limited to the banking sector, but the crowding out of corporate loans can be particularly problematic since loans cannot easily be replaced with other forms of financing.² In this paper we show that financial repression of the banking sector was actively used by European countries during the sovereign debt crisis, and we measure the impact of this repression on domestic corporate bank credit.

As illustrated in Fig. 1, following the start of the global financial crisis in 2008, Eurozone countries experienced a run-up in public debt issuance. This expanding sovereign debt was increasingly absorbed by the *local* banking sector (Fig. 2.)³ On average, between 2010 and 2013, sovereign debt holdings of domestic banks (as opposed to foreign banks) increased by 5 percent of gross domestic product (GDP). Data for the early period of the crisis is scarce, but according to Eurostat, between 2007 and 2012, government debt held by the domestic financial sector increased from 26% to 39% of GDP. That said, the aggregate data masks significant variation in government debt holdings from country to country. The shift toward reliance on the domestic banking sector was largest for countries with the highest sovereign risk, i.e., those countries whose central governments would view financial repression—a form of domestic default—as

¹ The term “financial repression” dates back to work by Shaw (1973) and McKinnon (1973) and comprises a range of policies. Historically, the primary mechanism of financial repression was a discriminatory tax on the part of the financial system that channels savings to private uses, which results in an artificially low cost of domestic funding for government.

² This point is backed by a large strand of literature, including seminal theoretical work by Diamond (1984, 1991).

³ Where we use the term “local,” we mean belonging to the same country. E.g., for Greek sovereign debt, the local banking sector is the Greek banking sector.

most beneficial. For example, between 2010 and 2013, Greece, Ireland, Italy, Portugal, and Spain (the “GIIPS”) saw an average increase in domestic banks’ share of bank-held sovereign debt of 19 percentage points (or nearly 30%).

[FIGURES 1&2]

This period, which saw domestic banks increasing their holdings of local sovereign debt, was also characterized by contraction in the issuance of new bank credit in Europe.⁴ The expansion in government debt was at least partly a response to the global financial crisis, which created general economic stress and the consequent collapse in tax revenue. In this context, local investment opportunities—the demand for corporate loans—might have contracted, which, in turn, might have led banks to increase their holdings of sovereign debt.⁵ To demonstrate that sovereign debt on bank balance sheets crowds out corporate credit, we need to show a contraction in the bank credit supply to corporate borrowers. To do so, we build on Becker and Ivashina’s (2014) methodology for detecting time-variation in credit conditions. This methodology is discussed in more detail in the next section, but the basic idea is that, if a given firm issues debt, changes in its choice of debt are informative about the relative conditions of bank credit supply. If, in periods characterized by an expansion of the bank’s holdings of domestic sovereign debt, more firms issuing debt choose to *switch* to bond financing, we infer

⁴ For example, for 2013:Q3 and 2014:Q1, see “U.K. Bank Lending to Companies Falls,” *The Wall Street Journal*, November 25, 2013; “Italian Banks’ Woes Hurt Small Firms,” *The Wall Street Journal*, December 1, 2013; “The ‘Silent Austerity’ in Banking,” *The Wall Street Journal*, January 21, 2014; “Given Them Some Credit,” *The Financial Times*, February 19, 2014; “ECB: Private-Sector Lending Falls Again,” *The Wall Street Journal*, February 27, 2014; “Bank’s Lending to Private Sector Falls Again: ECB Data Suggests Recovery in the Euro Zone Will Remain Sluggish,” *The Wall Street Journal*, March 27, 2014; “Irish Lending Hits Eight-Year Low,” *The Wall Street Journal*, March 31, 2014; “U.K. mortgage approvals dip in February, business lending contracts again,” *Reuters*, March 31, 2014.

⁵ To explain the increased “home bias” in holding of sovereign debt—in the absence of any pressure from the local government, i.e., financial repression—there would need to be some additional frictions.

that there was a relative shift in the cost of bank credit. To validate this inference as a measure of credit supply—similar to Becker and Ivashina’s (2014) findings for the U.S. market—we show that, for a European firm, choosing loans over bonds has a pro-cyclical pattern which strongly correlates with multiple proxies of the availability of bank credit, including: survey-based measures of tightening in lending standards; aggregate corporate lending growth; banks’ non-performing loans; loan allowances; stock price index; and GDP growth. Although this methodology can be only used for the larger firms (firms with access to the bond market), the supply of bank credit to small firms is likely to experience a similar, if not larger, contraction. In this sense, the estimates provided in this paper represent a lower bound on the contraction in bank lending for a typical firm.

While, by design, the firms in our sample have a non-zero demand for debt, we need to make sure that the shift from loans into bonds is not driven by simultaneous easing of the conditions in the bond market. Because we look at cross-country variations in the expansion of sovereign debt, eased conditions and an expansion in bond supply would need to be country-specific. These shifts would also have to positively correlate with the expansion of local banks’ holdings of government debt. We find just the opposite: in absolute terms, bond market conditions actually undergo tightening in such periods. In relative terms, we do not observe easing of bond market conditions for countries with rising sovereign debt risk. This allows us to interpret switching in the type of debt being issued as a measure of the difficulties firms experience in securing a new bank loan.

Our findings indicate that, between 2007 and 2013, ailing European countries expanded their public debt, which was increasingly absorbed on the balance sheets of the domestic banking sector. This absorption led to a drop in the local supply of loans to large corporate issuers, as

reflected in their increased propensity to switch from loan to bond financing. It is worth noting that the contraction in the loan supply in the latter part of the sovereign debt crisis—the period between the second Greek bailout and 2013:Q2 (the end of our sample)—is nearly three times larger than the contraction in loan supply that followed the period from Lehman Brothers’ collapse through the first Greek bailout (Fig.3). This is consistent with a prolonged and aggravated economic downturn triggered by “the vicious cycle of banks hurting sovereigns and sovereigns hurting banks.”⁶

[FIGURE 3]

Financial repression affects only the domestic sector: it is a forced home bias in banks’ holdings of sovereign debt. This fact is central to the interpretation of our result. Centralized, cross-country policy actions or regulatory measures cannot explain our finding. For example, Basel III rules assign zero risk-weight in calculating capital requirements for all OECD government bonds, regardless of whether they are denominated in the issuing country’s own currency. For the Eurozone, whose members are members of the OECD⁷, Basel III rules therefore do not favor home-country debt.⁸ Similarly, our finding is different from the work analyzing risk-shifting by Eurozone banks in the context of the sovereign debt crisis. Acharya and Steffen (2012), Popov and Van Horen, and Drechsler et al. (2013) find that European banks were more likely to purchase risky sovereign debt using funding provided by European Central Bank (ECB). However, the ECB’s lending facility set collateral haircuts based on the nature of

⁶ “Global Challenges in 2012,” statement by International Monetary Fund Managing Director Christine Lagarde January 23, 2012. The spill-over spiral between government debt and banking markets is analyzed in Bolton and Jeanne (2011), and Cooper and Nikolov (2014).

⁷ Except Cyprus and Malta, which are not important to our analysis. Latvia joined the Euro zone on January 1, 2014, after the end of our data sample.

⁸ See also “Squaring the Eurozone’s Vicious Circle,” by Lucrezia Reichlin and Luis Garicano, *Project Syndicate*, January 27, 2014.

the collateral (the issuing country's credit rating), and not based on the counterparty. As such, it cannot explain the relative increase in domestic share of the bank-held sovereign debt; i.e., it cannot explain why Italian banks increasingly bought Italian debt while Spanish banks increasingly bought Spanish debt. Furthermore, risk-shifting has a distinct cross-sectional prediction (which is confirmed in the data): weaker, less capitalized banks are more likely to pursue risk-shifting behavior. This is not necessarily the case for financial repression. Indeed, we find that, across large banks, there is little correlation between a bank's health and its relative preference for domestic sovereign debt.

The small correlation between banks' risk and their holdings of the domestic sovereign debt is also helpful in addressing a negative shock to the banks' balance sheet as the core explanation for an increase in demand for local sovereign debt. In addition, we show that the effect that we identify is distinct from an increased demand for safe assets. We also show that trend in accumulation of risky domestic sovereign debt in the banking sector seems to generalize to insurance and pension sectors. This suggests that a liquidity shock which is more characteristic of the banking is unlikely to be the underlying cause of the documented effect.

There are multiple channels through which governments can exercise pressure on their domestic banking sectors. Increased investment in home-country sovereign bonds could be explained by the expectation that bailout mechanisms will be national, and will favor those banks that hold home country sovereign debt. This is consistent with findings that home bias in sovereign debt holdings intensifies in times of economic distress. However, there does not appear to be a relationship between a bank's health and its propensity to buy local sovereign debt, which suggests that the most important mechanisms for financial repression are likely to be something other than an implicit bailout guarantee. Instead, we find that government control

through a direct equity holding is positively correlated with the spread of financial repression. But there are additional complementary channels through which central governments can influence the local banking sector. In particular, direct government ownership of banks has been shown to influence banks' investment decisions (e.g., Barth, Caprio and Levine, 2001; La Porta, Lopez-de-Silanes and Shleifer, 2002 and Sapienza, 2004). We look at several measures of state ownership of large banks and find that, for the countries with a high cost of debt, there is a strong positive correlation between state ownership of large banks and an increase in the share of local sovereign debt on the banks' balance sheet.

Although financial repression policies are traditionally associated with developing countries, Reinhart and Sbrancia (2011) show that such practices were the norm for many advanced economies for over thirty years following the end of World War II. In this paper we provide evidence of the use of financial repression by ailing European countries during the worst post-war economic recession and show the negative consequences of such behavior.

The remainder of this paper is organized in six sections. In Section I, we provide a detailed discussion of the methodology and data used to construct the dependent variables. In Section II, we validate our methodology by replicating the central result in Becker and Ivashina (2014) for European countries. Section III discusses our core results. Section IV generalizes our results in a longer sample of sovereign debt holdings. Section V examines specific mechanisms of financial repression, and Section VI concludes.

I. Methodology and Data

A. Methodology: Mechanics

During the European sovereign debt crisis, much of the public debt issued by governments had been purchased by local banking sectors. We want to examine whether, over this period,

banks that took on more domestic government debt did so at the expense of their traditional lending activities. In other words, we want to show that the reduction in loan volumes was driven by contraction in credit supply caused by the pressure to buy local government debt, and not by contraction in credit demand. To measure movements in bank credit supply over time, we build on the methodology proposed by Becker and Ivashina (2014). This methodology suggests that substitution from bank credit to public debt is indicative of a relative contraction in bank credit supply.⁹ By only sampling firms that issue new debt (either bonds or loans), we infer that all of the firms in our sample have non-zero demand for debt. As in Becker and Ivashina (2014), we examine the choice of debt at the firm level with firm-fixed effects, thus addressing potential concerns about compositional changes in the set of firms raising debt (as long as firm characteristics stay constant). This addresses the concern raised by Kashyap and Stein (2000) that using aggregate relative issuance of different types of debt may miss systematic time variation in the composition of firms raising finance (e.g., large, stable firms with access to the bond market issue more newly-available credit in bad times than their smaller, less stable competitors do).

In our main regressions, the dependent variable is the quarterly indicator of the debt choice (L_{it}) which is equal to 1 if a firm i receives a bank loan, and 0 if a firm issues a bond in a given quarter t . The sample excludes any firm-quarter where no debt was raised. The basic estimated equation takes the following form:

⁹ Note that this research design does not require perfect substitutability between public debt and bank loans. If substitutability is low, the tests will lack power.

$$L_{it} = c_i + \beta S_{It} + e_{it} \quad (1)$$

where c_i are firm fixed effects (within the firm time-invariant effect); S_{It} is a time-series measure capturing government debt held by the banks in country I (the home country of company i) in quarter t . Inclusion of firm fixed effects, c_i , is core to the identification of movements in bank credit supply. The coefficient of interest, β , can be identified only if individual firms switch between loans and bonds. Due to firm fixed effects (c_i), including non-switchers in the sample—i.e., firms that only issue one type of debt—brings the coefficient of interest (β) toward zero, *regardless* of the type of debt that they issue. To reduce this bias, the sample is limited to firms that issued bonds and loans over the period of our sample.

Our goal is to measure relative rise in the cost of bank debt. Because the loan price (r^l) is not observable when no loan was raised, we imply movement in the relative cost of bank debt ($r^l - r^b$) from firms' observable decisions about the source of new debt. The quarterly indicator of the debt choice (L_{it}) can be written as:

$$L = \begin{cases} 1 & \text{if } F(r^l - r^b) \geq \alpha \\ 0 & \text{if } F(r^l - r^b) < \alpha . \end{cases} \quad (2)$$

As in Kashyap, Stein and Wilcox (1993), $F(\cdot)$ is a decreasing function of the price difference of bonds and loans, but it may also reflect that loans have “relationship” benefits. Equation (2) highlights that while the change in relative cost of loans and bonds, ($r^l - r^b$), is continuous, the observable outcome—debt choice—is discrete. Some firms in our sample will continue to obtain bank credit despite the fact that loans become more expensive for them, meaning we will miss changes in bank credit conditions. This makes it harder for us to find the evidence that we are looking for.

Similarly, the “true” demand for credit is not observable; implicitly, we are using our sample restriction to ensure that all observations in our sample represent firm-quarters with non-zero demand for debt. We know for certain that a firm that issues a loan or a bond has a non-zero demand for credit, but the methodology misses firms with non-zero demand for debt that cannot get a loan or a bond—i.e., firms facing the most severe supply constraint—when private credit is crowded out by government debt.¹⁰ Such observations would make our case stronger; thus, missing these cases in our sample biases the estimate of β toward zero (against our findings).

B. Methodology: Validity of assumptions

The methodology is designed to measure fluctuations in relative cost of bank debt ($r_i^l - r_i^b$), but we are interested in bank credit contraction (i.e., an increase in r_i^l). Because we rely on country-specific variation in debt-substitution behavior, we implicitly assume that country-level bond-market conditions—as measured by yield spread—are not negatively correlated with signs of financial repression, that is, $dr_i^b/dS_{IT} \geq 0$. Through the period of the sovereign debt crisis, overall conditions of bond supply in the Eurozone may have been easing as a result of ECB cutting its benchmark rate to record low levels, but this cannot explain the cross-country variation in propensity to switch from loans into bonds. To give a concrete example, for an expansion in bond supply to explain our finding that Greek firms turn to the bond market for new credit at the time of the sovereign debt crisis, it would need to be the case that Greek firms face a reduction in the cost of issuing public debt among the European companies just as Greek sovereign debt—and its country risk—increases. In absolute terms, if the cost of bonds reflects a

¹⁰ Note that, because of the firm fixed effect, this is only a concern for firms that a) use both types of debt over the span of our sample and b) only drop out of the sample in periods of financial repression.

country risk premium, the cost of bonds should be rising as both sovereign debt and its riskiness are increasing. Fig. 5 shows that bond yield spreads for European corporate issuers were highest in the countries most affected by the sovereign debt crisis. Moreover, given that financial repression affects the banking sector as well as traditional bond investors like pension funds and insurance companies, the expansion of sovereign debt is likely to depress both the domestic supply of bank debt and of bonds.

[FIGURE 5]

The second assumption underlying our interpretation of the empirical results is that firms' preference, or demand for different type of debt, does not shift from loans toward bonds in times of crisis. In other words, we assume that it is not the case that Greek firms favor bonds over loans—for reasons *other* than credit conditions—as the country sovereign debt crisis escalates. This is consistent with the standard prediction that in economic downturns, firms are likely to prefer bank debt because of its advantages in monitoring and renegotiation. Becker and Ivashina (2014) provide a discussion of the plausibility of a range of alternative explanations that relate to the countercyclical shift in demand for bonds.

C. Sample

The benchmark sample consists of non-financial European firms (excluding SIC codes 6000 to 6999) that issued loans and bonds between 1996 and 2013:Q2. We look at substitution between term loans (installment loans as opposed to revolving line) and bonds.¹¹

¹¹ A revolving line would be comparable to commercial paper, but we do not observe commercial paper issues for European firms. Becker and Ivashina (2014) find that in US data, revolving loans and commercial paper produce similar results to those obtained using term loans and bonds with this methodology.

Our firm-level data on bonds comes from Thomson Reuter's SDC Platinum database. We exclude convertible bonds, mortgage- and asset-backed bonds, and preferred stock (which appear under bonds in SDC). The median bond issue in our sample is equivalent to \$225 million, and the mean is equivalent to \$1,865 million. The median maturity of bonds is 5.1 years and the average is 5.8 years; the average is slightly shorter at end of our sample. Less than 10% of bonds in our sample have maturities of two years or less.

Firm-level data on term loans issuance is compiled from two different sources: (i) Thomson Reuters' DealScan database of syndicated loans, and (ii) CapitalIQ. To make sure that we analyze similar forms of debt, we look at bonds and term loans rather than revolving credit lines, as a revolving line is unlikely to be a close substitute for a bond. Approximately 8,000 loans (74%) in the sample are from Dealscan and 2,800 loans (26%) are from CapitalIQ. DealScan tracks new issuance of large loans; the median loan size in our sample is equivalent to \$294 million, and the mean is equivalent \$1,052 million.¹² CapitalIQ reports bank loan balance by type of loan (term loans and revolving lines) on an annual basis. We infer that a new term loan has been issued when the balance of term loans increases from one report to the next. This procedure will miss new term loans which are not associated with an increase in loans outstanding. Additionally, we are unsure in which quarter a loan was issued. We have tried a number of approaches in our regressions to evaluate the sensitivity of our findings to this issue, including randomizing quarter assignment, assigning all CapitalIQ loans to a particular quarter,

¹² 91% of loans in the Eurozone and 30% of loans in the rest of Europe are denominated in Euro. Here all amounts are converted to dollars using issue date spot exchange rate. The variable of interest for us is the choice of debt (a dummy), as opposed to the issue amount.

or simply analyzing the data at an annual frequency. All these approaches give similar results to the ones reported here, which spread loans evenly across quarters.

The data used in the analysis is organized as a panel of firm-quarter observations. Multiple loan issues in the same quarter are counted as one, and we count bond issues the same way. We define the dependent variable for our regressions (bank credit) as one if a firm issues a new term loan but no bonds, and as zero if it issues a bond but no term loans. We exclude any quarters with issuance of both types of debt (2,507 firm-quarters).¹³

Table 1 summarizes the composition of the sample by country and by year. Our starting sample has 13,609 firm-quarters. (Since firm quarters where no new debt was issued are excluded, the panel is unbalanced.) Italy and Germany have the lowest incidence of bank debt issuance; 26.5%, and 32.0%, respectively, of their debt issues were bank loans. As reported in Becker and Ivashina (2014), 32.3% of U.S. firms issued bank debt over the same period. Some of the variation at the high end of the bank debt issuance spectrum might be driven by a small number of observations; excluding these outliers, approximately 55-60% of firms issuing new debt choose bank debt.

[TABLE 1]

II. The cyclicalities of European bank lending

¹³ An alternate way of dealing with such observations is to set the dependent variable equal to the share of new debt that comes from bank loans, or when no amounts are available, the number share. This increases our sample size by around a fifth, but doesn't change our results in any important way.

We start by validating a connection between loan and bond substitution and common proxies of bank lending conditions. The results are reported in Table 2.¹⁴ We use six different proxies:

Tightening in lending standards is a survey-based variable collected by central banks, which is available for eleven Eurozone countries in our sample. A higher value indicates that more banks report tighter credit standards (contraction in bank credit). For seven countries, the data is available from 2003 onward; for the other four countries, that data is available after 2007:Q2.¹⁵ This explains the relatively small size of the sample in specification (1). Although the surveys' data is not always methodologically comparable across countries, this is not an issue for our analysis given that we focus on debt issuance choices within firms (i.e., within country).

The next three variables are constructed using Bankscope and use bank balance-sheet information. The first, *Aggregate lending growth*, is measured as a four-quarter rolling-window growth in outstanding loans for all banks in a country. The *Non-performing loans* variable is based on realized losses and is defined as the ratio of non-performing loans to total loans, also for the entire banking sector. *Loan allowances*, a forward-looking measure of bank-portfolio quality, is defined as the ratio of loan allowances to total loans. We use asset-weighted averages to consolidate the data across different banks within a country by quarter. Both measures of bank portfolio quality should be negatively associated with bank-credit conditions: a higher value is likely to be associated with a contraction in bank-credit supply.

The last two variables, *GDP growth* and *Bank stock-index*, are based on the credit supply and are important for the evolution of the business cycle as postulated in the theoretical literature

¹⁴ All results estimated using ordinary least squares (OLS). Using logit or probit regressions does not affect our conclusions.

¹⁵ More information about country level reporting can be found at <http://www.ecb.europa.eu/stats/money/surveys/lend/html/index.en.html>.

including Bernanke and Gertler (1989), Holmström and Tirole (1997), Kiyotaki and Moore (1997), and Diamond and Rajan (2005). Stronger economic growth—as measured by either of the proposed proxies—is likely to be associated with an expansion of bank credit. *GDP growth* is real change in per capita gross domestic product, at quarterly frequency (but relative to the year prior to avoid seasonality), collected from the Eurostat website. We form a stock price index of domestic banks in each country (equally weighted), and we use the log of the stock index as an independent variable.

In complement to the results for the U.S. reported in Becker and Ivashina (2014), we find strong cyclical substitution from loans into bonds in periods that should be characterized by low credit supply. More firms switch from loans to bonds in periods when a large percentage of banks are tightening credit standards, bank credit growth is low, balances of non-performing loans and loan allowances are large, economic growth is low, and stock prices are depressed. The signs are as predicted, and all coefficients are statistically significant at the conventional levels. The coefficient estimate of .858 for GDP growth implies that a one standard deviation decrease in GDP growth is associated with a 2.06 percentage point decrease in probability that a firm gets a loan, conditional on receiving debt financing (a 5.3% decrease over the sample mean). Bank stock prices are also positively linked with new corporate debt being issued as bank loans rather than bonds. A 50% increase in the stock price of domestic banks is associated with a 2.25 percentage point increase in the fraction of new debt issued as loans.

The result we obtain by using survey-based tightening in lending standards (specification (1)) is particularly interesting because this is the most direct measure of credit conditions. Furthermore, this only includes Eurozone countries. Given that member countries do not have national currencies, the result cannot be explained by cross-country variation in monetary policy.

[TABLE 2]

III. Main results

A. *The effect of domestic sovereign debt holding on bank lending*

Our main result establishes that a contraction in the corporate loan supply is a byproduct of higher bank investment in domestic sovereign bonds during periods that are likely to be characterized by financial repression. The most direct test is to look at the sovereign debt holdings of domestic banks and firms' debt issuance; these results are reported in Table 3, specifications (1) through (3).

The data for bank holdings of local government debt comes from the European Banking Authority's (EBA) 2011 Stress Tests, 2011/2012 Capital Exercise, and 2013 Transparency Exercise. The information is available at the bank level and covers the period between December 31, 2010 and June 30, 2013 with semiannual frequency (four snapshots). The specific variable in the stress tests that we look at is "Gross Direct Long Exposures (accounting value gross of specific provisions);" it is reported by country, which allows us to measure domestic sovereign debt holdings. Country-level variables correspond to a value-weighted average across all banks covered by the EBA test (the largest banks) in a given country. We consider two alternative ways to scale bank holdings of domestic sovereign debt: (i) by risk-weighted assets, and (ii) by common equity.

The result in column (1) indicates that countries where banks hold more domestic sovereign debt on their balance sheets are the countries where bank lending, as a fraction of overall debt issuance, drops the most. The economic magnitude of the effect is large: a one standard deviation increase in domestic sovereign exposure (14.5%) implies a reduction in the likelihood of new

corporate debt being a loan by 13.5 percentage points, which is very large compared to the coefficients for macro variables reported in Table 2.

Increasing sovereign risk and (subsequently) the cost of government debt are important parts of the financial repression mechanism. Local banks' holdings of domestic government debt (holdings of the captive audience) increase as a result of drop in traditional demand as the sovereign risk rises. Also, relatively safe sovereign debt can be used as collateral to raise additional funding, and therefore may not necessary be associated with a contraction in corporate lending. To capture the role of sovereign risk, we look at how local government debt interacts with country credit default swaps (CDS) spreads. CDS are a market-based measure of country risk, and capture the cost at which banks could insure themselves against sovereign default. The CDS data comes from Markit. We use logarithmic transformation of the 5-year CDS spread, measured as of the calendar year-end preceding the timing of the EBA data. As reported in columns (2) and (3), regardless of scaling, the association between domestic sovereign debt risk and lending is significantly negative. As before, the economic magnitude of the estimated coefficients is large.

[TABLE 3]

To extend our sample to a longer period, in specifications (4) to (6), we look at total—domestic and foreign—sovereign assets held by the banking sector expressed as a percentage of total assets. The data is obtained from Bankscope, and corresponds to the annual aggregate holdings of all domestic banks. The advantage of this data is that it covers a longer period. However, one drawback is that it does not distinguish between domestic and foreign sovereign debt. Since accounting conventions may not agree precisely across countries, we normalize sovereign debt holdings with bank assets rather than equity or risk-weighted assets, variables for

which variation in accounting treatment may matter more. Specification (4) uses the full Bankscope sample, which extends back to 1997. The coefficient is negative and significant, implying that high debt holdings of sovereign debt are associated with low loan availability for firms. In column (5), the focus is on the most recent period, when sovereign debt may be more important. The coefficient is now much larger and highly significant. (The coefficient estimate for the period from 1997-2006, not reported, is insignificant). The result is robust to year fixed effects, so the identification is only driven by within-country changes in sovereign debt holdings on bank balance sheets. The findings in columns (4) to (6) are consistent with the results in earlier specifications, but it simultaneously picks up general preference for sovereign debt during the European crisis documented in Drechsler et al. (2013). (These effects are not mutually exclusive.)¹⁶ We return to this point below.

The results in Table 3 rely on time-variation in domestic sovereign bond holdings by the banking sector in a given country. But different banks in the same country might have different exposure to financial repression, and therefore may experience different pressures on their corporate lending capacity during the crisis. In Table 4 we use such bank-level variation in the holdings of domestic sovereign debt to examine the key prediction about the sovereign debt – corporate lending link using within-country variation. To do so we must link firms to individual banks, that is, in a given quarter we have to associate a firm with its most likely lender regardless of whether a firm is receiving a loan. We use past syndicated loan participation as an indication that a bank has a relationship with a firm. This assumption builds on the vast theoretical and

¹⁶ From the point of view of understanding financial flows to firms and private capital formation, it may be less important whether banks restrict lending in order to invest in risky sovereign bonds (risk shifting) or are forced/incentivized by their government to buy local sovereign bonds (repression). But the distinction is important for understanding which frictions affect the credit supply.

empirical literature that discusses the benefits of long-standing banking relationships. In particular, Bharath et al. (2011) and Ivashina and Kovner (2011) examine the importance of repeated borrowing from the same lender for firms using the syndicated loan market. Thus, for any new credit—loan or bond—we assume that the firm and the bank have a relationship if in the past five years the bank was the lead or co-lead lender to the borrower.

In matching borrowers and banks, we lose several observations if firms do not have bank relationships, or if the banks in question are not included in the ECB data. To overcome this issue, we use the 1996-2013 sample to estimate the basic firm fixed effect regression, and use the predicted residuals from this regression as the dependent variable in the analysis reported in Table 4 (2010-2013 sample).

[TABLE 4]

The first three specifications reported in Table 4 are equivalent to the first three specifications in Table 3; however, in Table 4 the explanatory variable of interest is measured at the bank level. When two banks were involved in a previous syndicated—around a third of firm-quarters—the firm-year appears twice in the sample, once for each bank. (In a handful of cases there are more than two relationship banks.) The new results also include bank fixed effects. We discuss the specific mechanisms through which financial repression might operate in the last part of the paper; meanwhile, bank-fixed effects help us to rule out any (fixed) bank characteristics as a potential explanation for larger exposure to domestic sovereigns and larger contractions in credit.

As before, we find an economically strong, negative relationship between individual banks' holdings of domestic sovereign debt and their relationship borrowers' propensity to receive a loan when they seek debt financing. The effect is similar in magnitude to the estimate in Table 3.

In specifications (2) and (3), we look at the interaction with the CDS spread; this allows for riskier government bond holdings to have a bigger impact on lending. Again, we find a negative effect, although only significant in one case. In column (4), we include only firms with a single identified bank relationship. These firms are perhaps likely to be more exposed to the loan supply of their (unique) relationship bank. Indeed, the point estimate for the effect of sovereign debt is higher for this sample. Taken together, the results in Table 4 suggest that, during the financial crisis period, firms are less likely to get a loan when their relationship bank(s) are absorbing large amounts of home country sovereign debt.

B. Alternative explanations

We interpret a contraction in a firm's propensity to get a loan during periods of rising exposure of local banks—and, in particular, rising exposure of relationship banks—to risky domestic sovereign debt as financial repression. However, we need to make sure that the effect that we identify is distinct from the effect of risk shifting and negative shock to banks, in other words an increase in banks' *demand* for local sovereign debt. (A negative shock can be either a need for recapitalization and/or a liquidity shock; we explain both below.)

The risk-shifting explanation suggests that—due to the convex payoff structure of equity—bank management might be seeking to increase its holdings of risky assets. Given the capital treatment of sovereign debt, investing in risky government securities might be particularly attractive. Thus, the concern might be that an increase in holdings of domestic sovereign debt is the result of such behavior, and not the result of outside pressure to absorb domestic government debt.

To compare the financial repression hypothesis to the risk shifting documented by Dreschsler et al. (2013), we perform a placebo test. If European banks like to buy risky sovereign debt in

order to risk-shift, and if this is associated with lower corporate lending, a stronger predictor of lending than *domestic* sovereign debt ought to be the sovereign debt that carries the most risk. In the period in question, the country with the riskiest sovereign debt is Greece. In fact, Dreschsler et al. (2013), specifically focus on the banks' risk-shifting behavior in periods when Greek sovereign risk measured by CDS and its credit rating— used as a base for a haircut applied by the ECB to the sovereign debt used as collateral—would diverge. Under the financial repression hypothesis, holdings of foreign sovereign debt are not expected to have the same effect on lending as holdings of domestic sovereign debt. Whereas home debt has been forced upon unwilling banks, holding foreign sovereign debt is voluntary. This is important, because it implies that home debt may be associated with missed lending opportunities, whereas other sovereign debt will not.

To distinguish the domestic and general risky sovereign debt effect we reexamine the results in Table 3 with an extra control: the holdings of Greek debt by domestic banks. (Greek firms are excluded from this sample.) The results are reported in Table 5, columns (1) and (2). Both with and without the CDS adjustment, holdings of domestic debt are negatively associated with the propensity to issue bank debt, whereas holdings of Greek debt have no effect, or even a positive effect, on the choice of debt.¹⁷

Greece is typically the country with the highest CDS spread in the period of the analysis. However, several other countries also have very high CDS spreads in some periods. Bonds from such countries would be a natural target for any bank that wished to risk-shift or take advantage

¹⁷ We have also run “horse race” regressions between holdings of Greek and home country sovereign debt in the bank-specific sample (Table 4). In this setting banks' holdings of home debt also have a negative effect on the propensity of borrowers to issue loans, but holdings of Greek debt do not (outside Greece).

of the subsidy embedded in the ECB funding facility. To generalize our result, in columns (3) and (4) we look at holdings of top-3 riskiest EURO-area sovereign bonds. That is, for any country, we add up holdings of sovereign bonds of the three countries with the highest spreads at the previous year-end. For example, for 2012, we use holdings of Greek, Cypriot, and Portuguese sovereign debt (the highest three CDS spreads at year end 2011). For banks from one of these countries, we use Irish debt instead (Ireland had the fourth highest CDS spread). So for Greek banks in 2012, Greek sovereign debt is the domestic debt, and the sum of holding of Cypriot, Portuguese and Irish sovereign debt is the exposure to the top-3 riskiest EURO-area countries. These results show that the effect that we measure is specific to the local debt, and so our earlier findings do not reflect risk shifting.

An alternative explanation of the link between holdings of sovereign debt and low corporate lending, posits that banks may have felt a need to increase holdings of liquid assets during the crisis period—negative liquidity shock. For example, this could happen as a buffer against liquidity needs of the bank’s customers (Kashyap, Rajan and Stein 2002). In turn, higher demand for liquidity could have led to an increase in holdings for sovereign debt (Krishnamurthy and Vissing-Jorgensen, 2012) at the expense of the willingness to hold other assets, including corporate loans. This theory would predict that banks would hold the safest sovereign debt, and not necessary a bank’s home country debt. (The prediction is thus opposite to risk-shifting.)

To distinguish our result from this alternative effect, we repeat the test above, using the lowest risk sovereign issuer in the Euro area: Germany.¹⁸ The results are reported in Table 5,

¹⁸ We also tried using the lowest three CDS Euro area issuers (Finland, Germany and either the Netherlands or Austria, depending on the exact time), or the three lowest overall: Norway, the United States and Sweden or Finland depending on the exact time). The results are similar.

specifications (5) and (6). The strong negative association with domestic debt remains, while holdings of German debt have a positive association with lending in one regression and a negative one (but only borderline statistically significant) in the other. Overall, these results suggest that the sovereign debt of a bank's home country has a special role in its balance sheet, where it tends to displace corporate lending. Other types of sovereign debt do not appear to have this effect during the European sovereign debt crisis.

An additional reason why risk shifting is unlikely to explain our findings can be seen from an examination of bank characteristics. Risk-shifting should be associated with riskier banks. In Table 6 we look at how different measures of a bank's health are related to the bank's propensity to hold and grow its holdings of local sovereign debt. Capital adequacy measures come from ECB tests. CDS and ratings data is from Markit and is available for a more restricted sample of banks. The first set of results correspond to the unconstrained sample of countries, however the emphasis is on European countries with CDS spread above 100 basis point as of December 2010. The results indicate that correlations between bank health and relative preference for domestic sovereign debt overall are economically small, and rarely statistically significant.¹⁹

[TABLES 5&6]

The small correlation between a bank's financial health and its propensity to hold domestic sovereign debt is also important in distinguishing financial repression from a capitalization shock or liquidity shock. In a traditional bank lending channel, banks need to recapitalize; one way for banks to do this is to lower risk-weighted-assets by shifting to safe (zero-weight) securities. If the bailout mechanism is primarily local, banks in distress should prefer domestic sovereign debt. In

¹⁹ We look at different ways of scaling domestic sovereign holdings, so some of the correlation can be driven by a common denominator.

this case, contraction in credit would not be due to the pressure to absorb local sovereign debt—there is no government pressure—the effect would be a result of banks increasing their demand for local sovereign debt. Similarly, in downturns, distressed banks are likely to have a higher need for liquidity (from a run on deposits; simply less deposits or more withdrawals; or, alternatively, higher draw-downs on the revolving lines), though the rest of the mechanism is the same. Again, in this case the fall in credit would be initiated by banks and not by local government. The fact that our results are not explained by weaker banks makes this alternative explanation unlikely.

Finally, we also look outside the banking sector. As mentioned before, financial repression is not constrained to the banking sector. There is ample anecdotal evidence that struggling governments also pressured local pension funds to place their liabilities.²⁰ The reporting of sovereign exposures of pension plans and insurance companies varies by country and by firm, and overall it is hard to assess the decomposition of sovereign holdings in domestic and foreign debt. One exception is Portugal for which we were able to collect a time series of domestic sovereign exposure through the insurance and pension regulatory agency. But although somewhat similar regulators exist in each country, domestic sovereign debt holding are not collected (or at least not until very recently) in a centralized way. We also searched through annual statements of largest insurers and pension funds in Germany, France, Spain and Italy. The results are reported in Table 7.

²⁰ For example, see “Spain Drains Fund Backing Pensions,” *Wall Street Journal*, January 3, 2013; “Portugal Plunders Pension Fund to Tackle Debt Cliff,” *Reuters*, May 22, 2013; “Italy’s Government Looks to Tap Pensions Funds,” *Wall Street Journal*, October 24, 2013.

As for the banks, we find a pattern of accumulation of domestic government debt for financial institutions in countries with high sovereign risk. French Public Service Additional Pension Scheme kept its share of domestic debt as a percentage of sovereign debt relatively constant between 2007 and 2012, and overall dropped the fraction of its portfolio invested in sovereign debt. The picture is somewhat similar for the largest German insurer, Allianz. In sharp contrast, Spanish Social Security Reserve Fund (a state pension fund) almost doubled its holdings of domestic debt (in relative terms, and actually, by 2012, nearly triples its holding of domestic sovereign debt in absolute terms), shifting almost its entire portfolio to national government debt. Between 2007 and 2007, Portugal's pension system increased its portfolio allocation to domestic debt by 6 percentage points (from 4% to 10%), increasing its share of domestic sovereign debt as a percentage of all sovereign holdings from 19% to 29%. The rise of insurance sector exposure to domestic debt was even more dramatic. These patterns are parallel to those observed for the banking sector, and indicate that the pressure to hold domestic sovereign debt was not attributable to shocks to individual financial firms, or even to a particular segment of the financial industry.

[TABLE 7]

To the degree that liquidity shocks are more critical for the banking sector, which has short term funding (and long term liabilities) and which issues undrawn credit lines that could be subject to a run (Ivashina and Scharfstein, 2010), the fact that other segments of the domestic financial sector in risky countries accumulate sovereign debt further weakens the liquidity shock to the banks as an explanation of our findings of depressed corporate loan supply during the crisis.

IV. Generalizing the results

Data for bank holdings of domestic government debt is only available after 2010. To extend our result to a longer period we look at the relationship between the evolution of local government debt, its risk, and debt choice at the firm level. Omitting banks allows us to capture a longer time period, but the measure of financial repression is less direct. The results are reported in Table 8. In Panel A, the variable of interest is the level of local government debt as a percentage of GDP, measured at end of the preceding year. We expect to find a negative coefficient: as more debt is issued by the local government, a larger fraction of firms issuing debt face a higher relative cost of bank credit and, consequently, *switch away* from loans to bonds. This is exactly what we find.

Specifications (1) through (3) correspond to different time periods. The negative association between government debt and bank lending is strongest in the crisis period (2007-2013), which is the period over which rising financial repression became a concern. The estimated magnitude for this period implies that a ten percentage point increase in the ratio of public debt to GDP predicts a 3.5 percentage point lower likelihood of new debt being bank loans.

In specifications (4) through (6) we focus on the linearity of the effects of financial repression for highly levered countries. This builds on the idea in Reinhart and Rogoff (2009) that, beyond a certain level, public debt can be damaging to a country's economic growth. We focus on country-quarters with public debt to GDP levels between 60% (the limit specified in the European fiscal rules) and 90%, 90% to 120%, and above 120%. We find that the crowding out of bank credit is largely concentrated in country-quarters with public debt to GDP levels in excess of 90%. The incremental effect is positive, economically large, and statistically significant at the 1% level for country-quarters with 90% to 120% debt to GDP, and above 120% debt to GDP. This finding is consistent with the use of financial repression as an indirect form of

government debt restructuring. It is also helpful for aggregate welfare assessments of our finding, given the result from a number of approaches summarized in Reinhart, Reinhart, and Rogoff (2012), which show that very high levels of public debt have a negative effect on economic growth.

In Panel B the variable of interest is the sovereign CDS spread. Given that the frequency of the data is now quarterly, CDS is measured as of the quarter preceding the quarter of the analysis. The results are very similar to an increase in debt: an increase in the risk of local debt leads to a larger fraction of firms substituting from loans to bonds. Over the crisis period, a one standard deviation change in the CDS spread corresponded to a 2.2 percentage point contraction in a firm's likelihood of obtaining a bank loan.

[TABLE 8]

Because the regressions above estimate based on variables that vary by country and quarter, we cannot saturate the regression with country-times-quarter fixed effects, which would otherwise be a simple way to control for any country-specific business cycle and similar effects. Instead, we examine second order implications of the hypothesis that sovereign debt may squeeze out private credit. Specifically, we attempt to isolate firms that are more affected by local (i.e., domestic) loan supply. Any variable that predicts tight lending conditions should impact these firms more.

We look at three different measures that identify firms that are more likely to be more exposed to local bank-credit conditions: (i) firms whose latest bank loan was not syndicated, (ii) firms whose last debt funding was below 250 million Euro; and (iii) firms that do not pay dividends. Each of these identifiers provides an imperfect classification of firms into those more or less likely to depend on local banks. Difference-in-difference results are reported in Table 9.

We combine an identifier for exposed firms with either sovereign debt or the log of the sovereign CDS spread. In each case, the average effect of sovereign debt or CDS is not identified as we include country-times-year fixed effects.

[TABLE 9]

In four out of six columns, the coefficients are negative and significant, suggesting that the debt mix of exposed firms is more strongly correlated with sovereign debt problems. This confirms that our main regressions pick up loan supply. Additionally, these results are consistent with an even larger impact of swings in loan supply due to sovereign debt for those firms that completely lack access to the bond market (and which therefore do not appear in our samples).

V. The mechanisms of financial repression

As mentioned earlier, there are multiple mechanisms through which government can pressure domestic banks to take on local sovereign debt. Fig.6 suggests that it is unlikely that an implicit bailout guarantee is the primary source of pressure on the banks in our sample. So, direct channels such as board seats or equity ownership are likely to be at play as well. In Fig. 7 we look at the relationship between the share of local banks with a government equity stake (horizontal axis) and the increase in the banks' holdings of local sovereign debt (vertical axis). We consider two alternative measures of government ownership of banks. The first measure is from the country-level survey conducted by the World Bank (see Barth, Caprio, and Levine, 2013, whose research team was instrumental to the design of this survey). The variable is the percentage of the banking system's assets in banks where the government owns no less than 50%

of equity.²¹ The data is available for several years, and we take the average of the period between 2008-2010. The second measure is from Iannotta, Nocera, and Sironi (2013), who use Bankscope data to track government ownership of banks from 2000 to 2009. They focus on European commercial banks with total assets of at least €10 billion in at least one fiscal year-end. The measure of government ownership is a continuous variable, that measure percent of banking sector equity controlled by the state.

The fact that the government can influence the banks does not necessary mean that it needs to do so. Our theory is that only countries with rising sovereign risk are likely to use the financial repression. To show this, we condition the sample on countries with CDS spreads above 100 basis points as of December 2010. (As expected, without this constraint, the relationship between state ownership of banks and the increase in sovereign debt holdings is much weaker.) As Fig. 7 illustrates, there is a positive relationship between depth of government control over the banking sector and likelihood that the local government debt will primarily show up on the balance sheet of the domestic banks. Excluding Portugal, which appears to be an outlier, makes the result even stronger.

While suggestive, this is unlikely to be the full picture of the channels by which governments exercise financial repression. For example, although according to the World Bank there are no Spanish banks which are majority owned by the government, it is well known that the government has considerable influence over the Spanish banking sector (Santos, 2013).

²¹ The specific question in the 2011 survey is: “13.7.1 What percent of the banking system's assets was in banks that were government-controlled (e.g., where government owned 50% or more equity) at the end of...? 2008 2009 2010”.

[FIGURE 7]

VI. Conclusions

The Euro area countries have experienced two financial crisis episodes in rapid succession: first, the financial crisis that spread from the US; and second, a longer and deeper crisis associated with sovereign debt problems, which is still unresolved. Especially in the second crisis, when sovereign debt issuance has been very challenging for many countries (yield spreads to German debt as well as CDS spreads have reached historic highs), an increasing share of newly issued sovereign debt has been absorbed by domestic banks. This is especially true in some of the countries with the highest debt levels and the most dramatic increase in spreads, such as Greece and Italy. We apply a methodology from Becker and Ivashina (2014)—which avoids credit demand variation by comparing new loans to new bond issuance—to assess the impact of sovereign debt on private credit formation. We document that sovereign debt holdings in domestic banks are strongly negatively associated with new loans to banks (as a share of new debt financing for firms).

Our results are consistent with financial repression, i.e., sovereign governments using various means to induce banks to take on sovereign debt. The results are less consistent with risk shifting or gambling for resurrection (although a combination is possible). We do not document the means by which sovereigns under pressure induce banks to buy bonds. These may include regulation (e.g., setting low capital requirements on sovereign debt), moral suasion, and ownership influence.

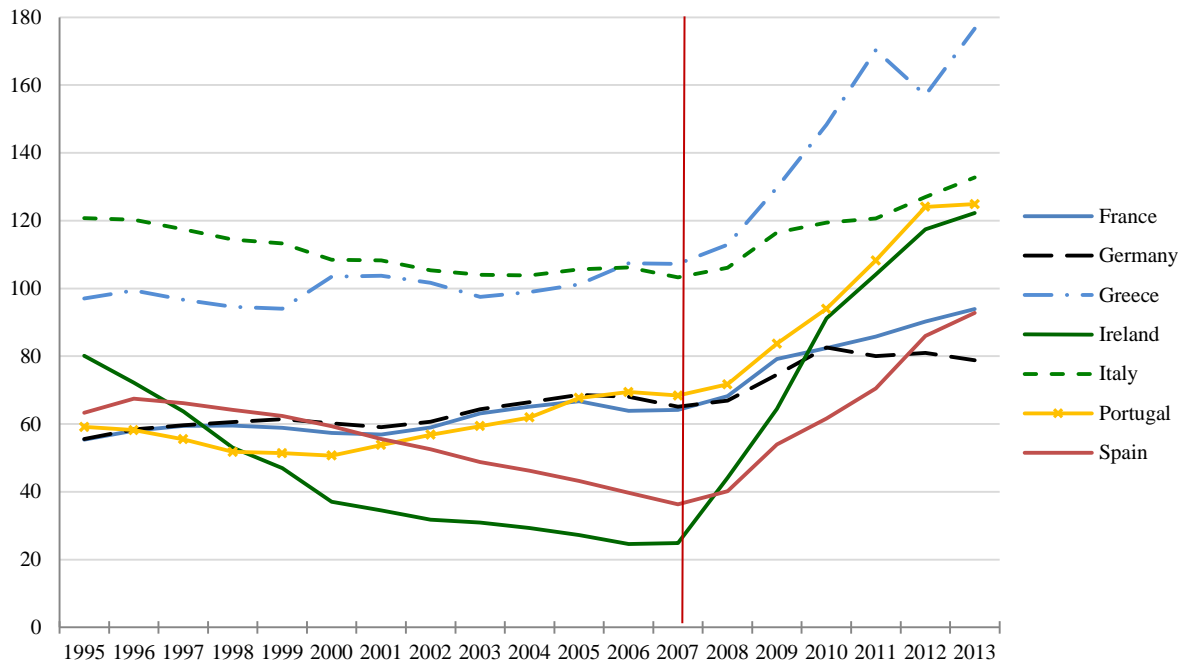
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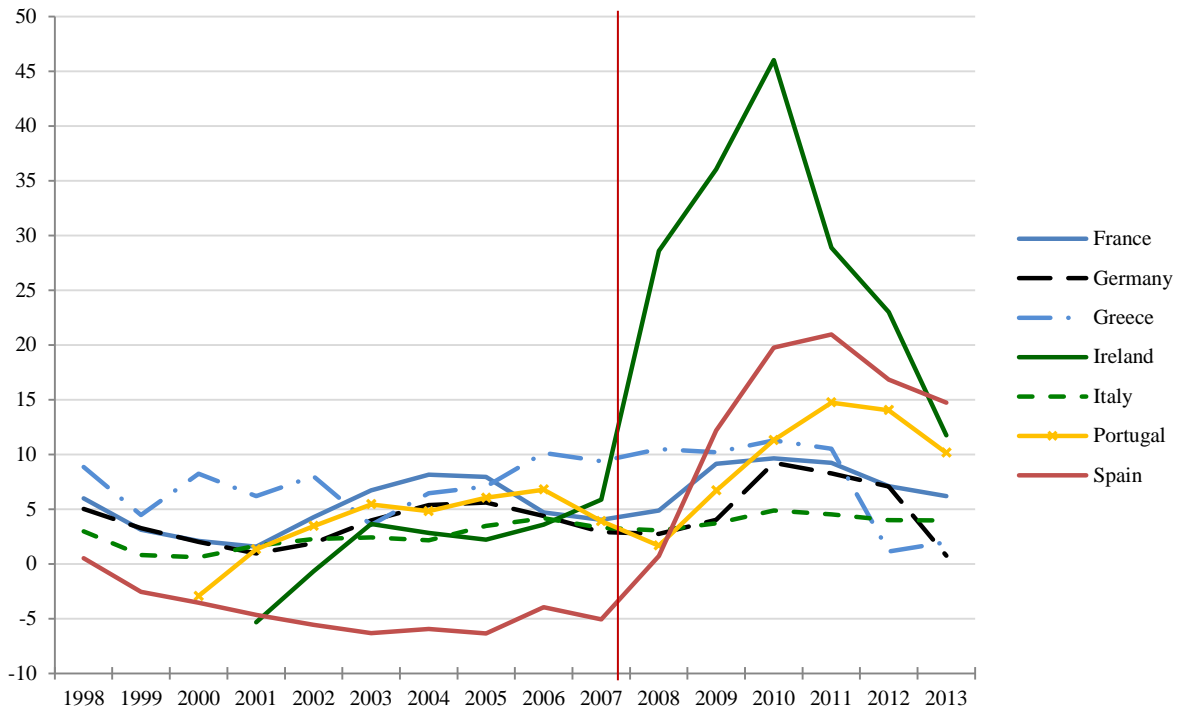
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FIGURE 1. THE EVOLUTION OF PUBLIC DEBT, 1995-2013

A. Public debt/GDP (%)



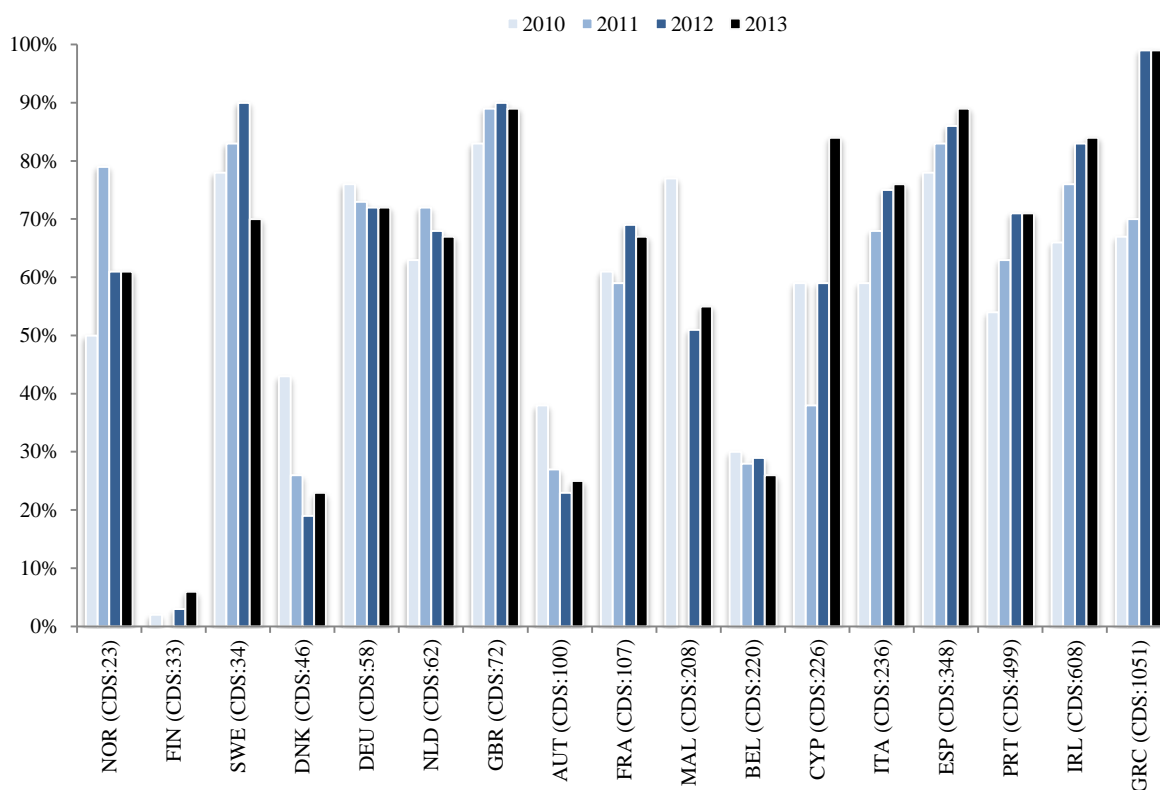
B. Public debt growth, national currency, 3-year rolling average (%)



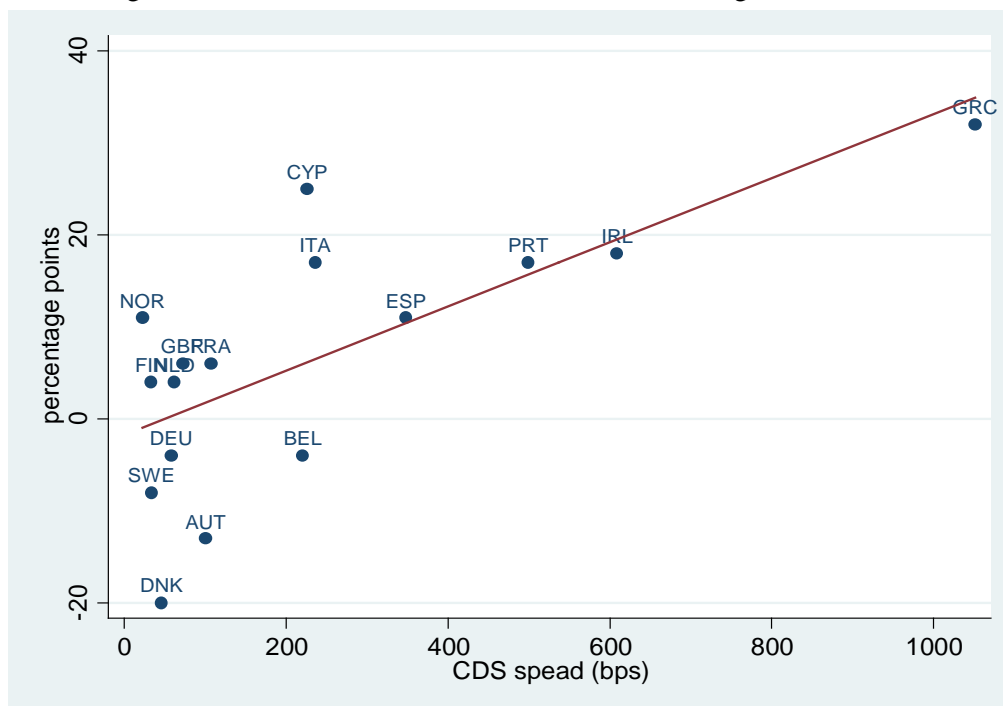
Notes: For public debt we use general government gross debt according to the convergence criteria set out in the Maastricht Treaty, which comprises currency, bills and short-term bonds, other short-term loans, and other medium- and long- term loans and bonds, defined according to ESA 95 and available through <https://stats.oecd.org/>.

FIGURE 2. FRACTION OF BANK-HELD SOVEREIGN BONDS HELD BY DOMESTIC BANKS

A. Domestic Banks' Share of Bank-Held Sovereign Bonds



B. Change in Domestic Banks' Share of Bank-Held Sovereign Bonds, 2013 vs. 2010



Notes: The figure is compiled from the European Central Bank, 2013 Transparency Exercise Summary Report. Countries are ranked based on CDS spreads measured in basis points as of December 2010.

FIGURE 3. EVOLUTION OF EUROPEAN CORPORATE CREDIT SUPPLY

A. Share of bank debt as a percentage of total new corporate debt financing

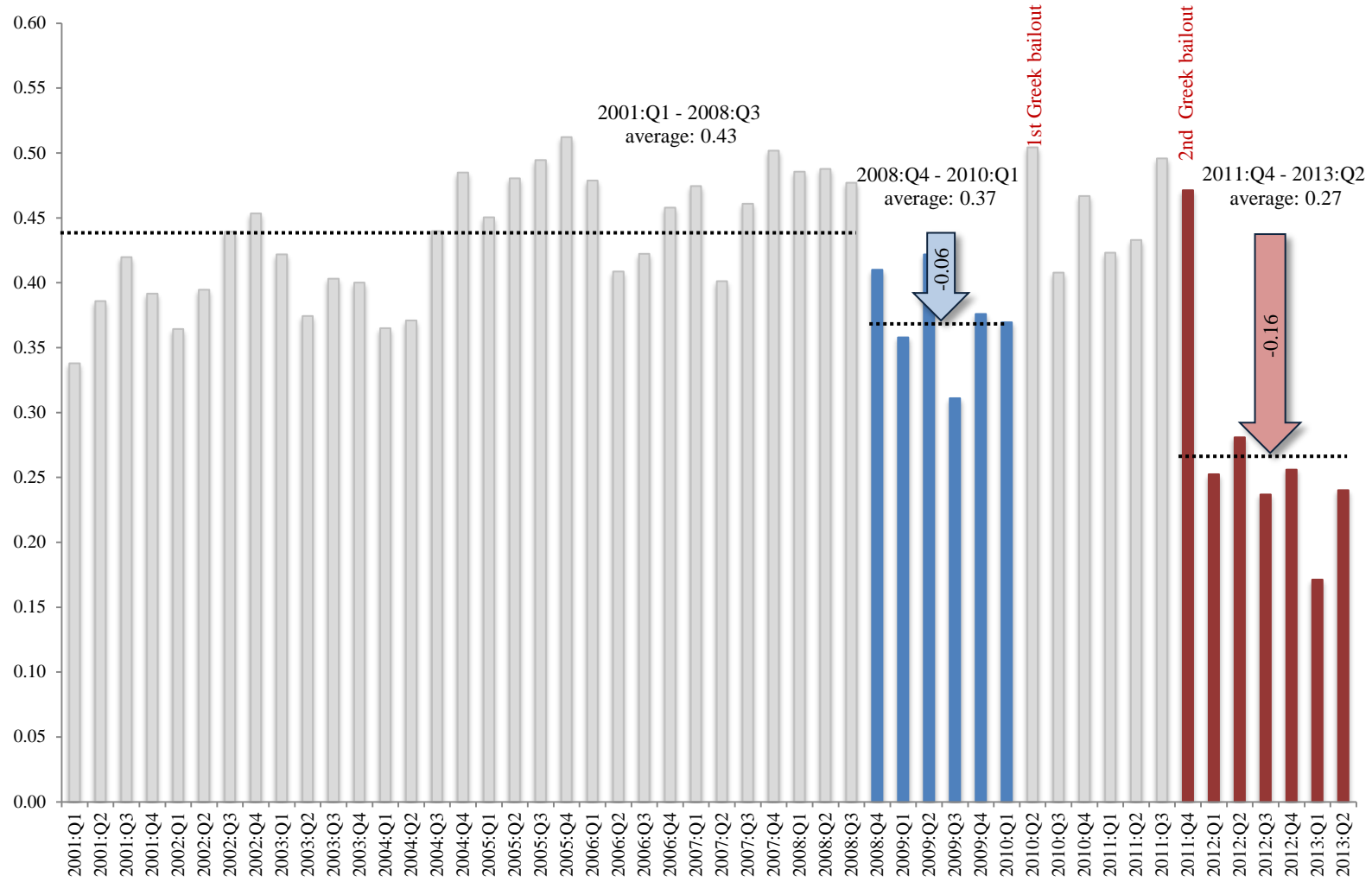
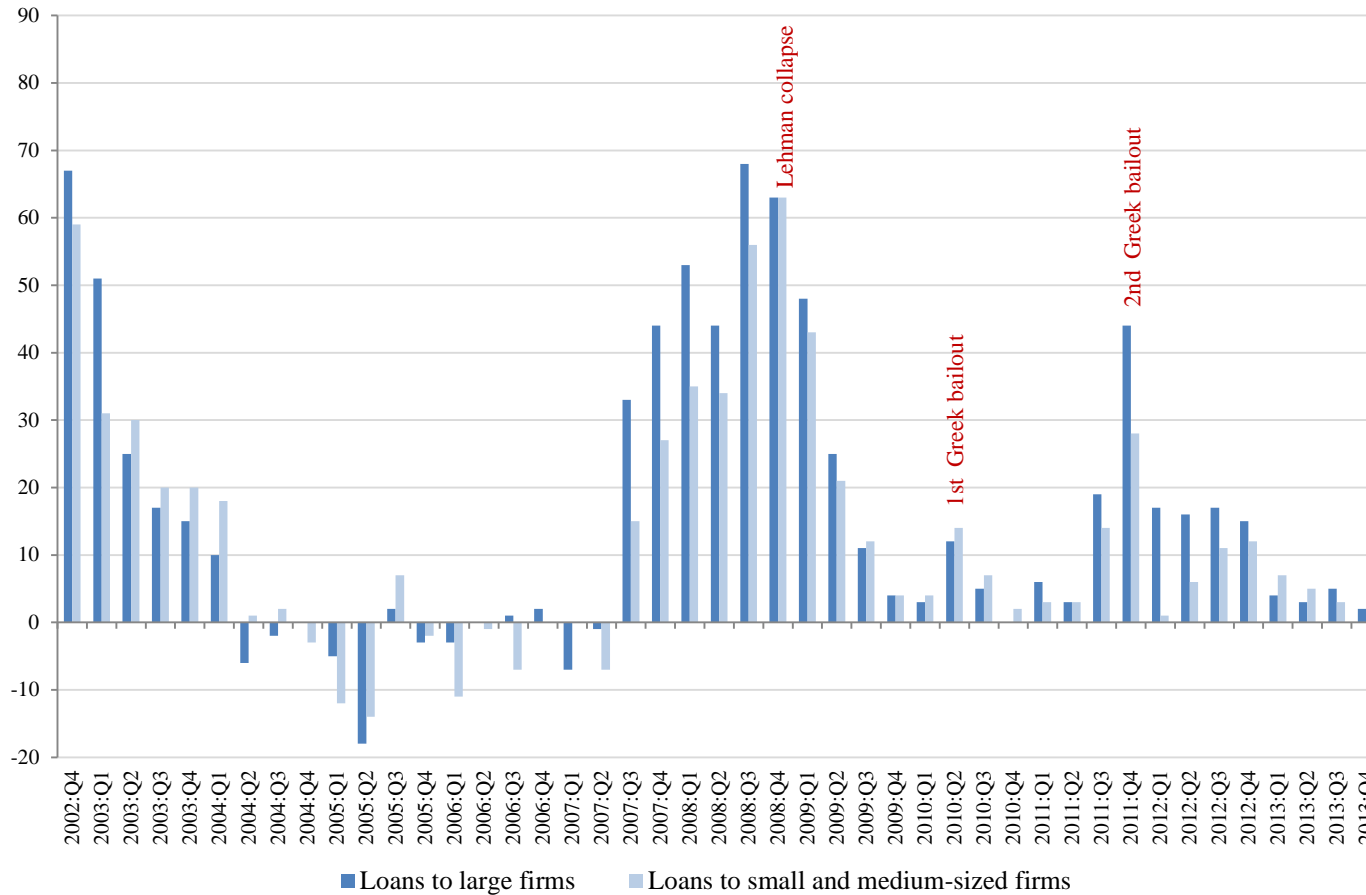


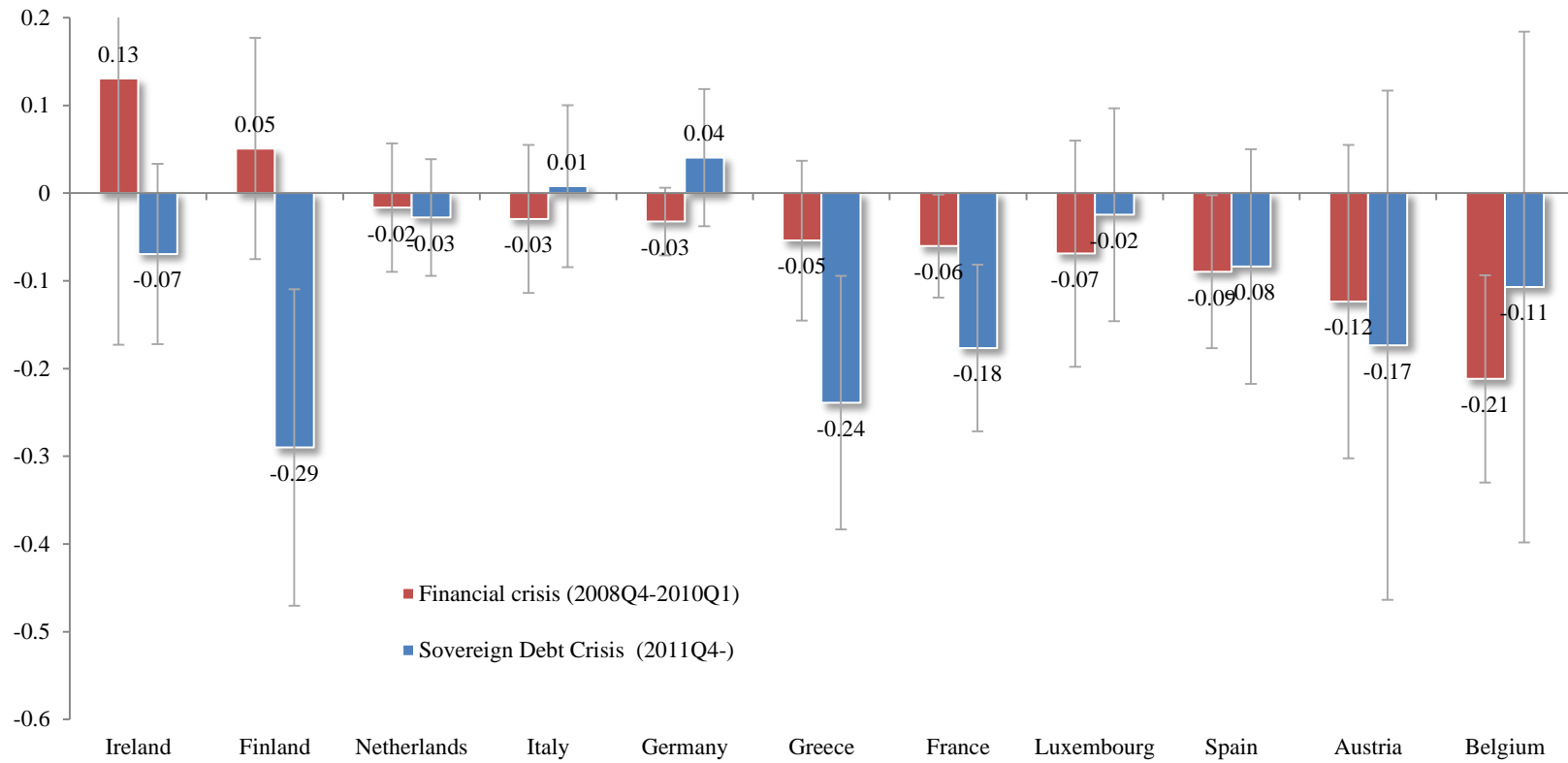
FIGURE 3. – CONTINUED

B. Net percentage of Banks Tightening Credit Standard for New Loans or Credit Lines to Enterprises



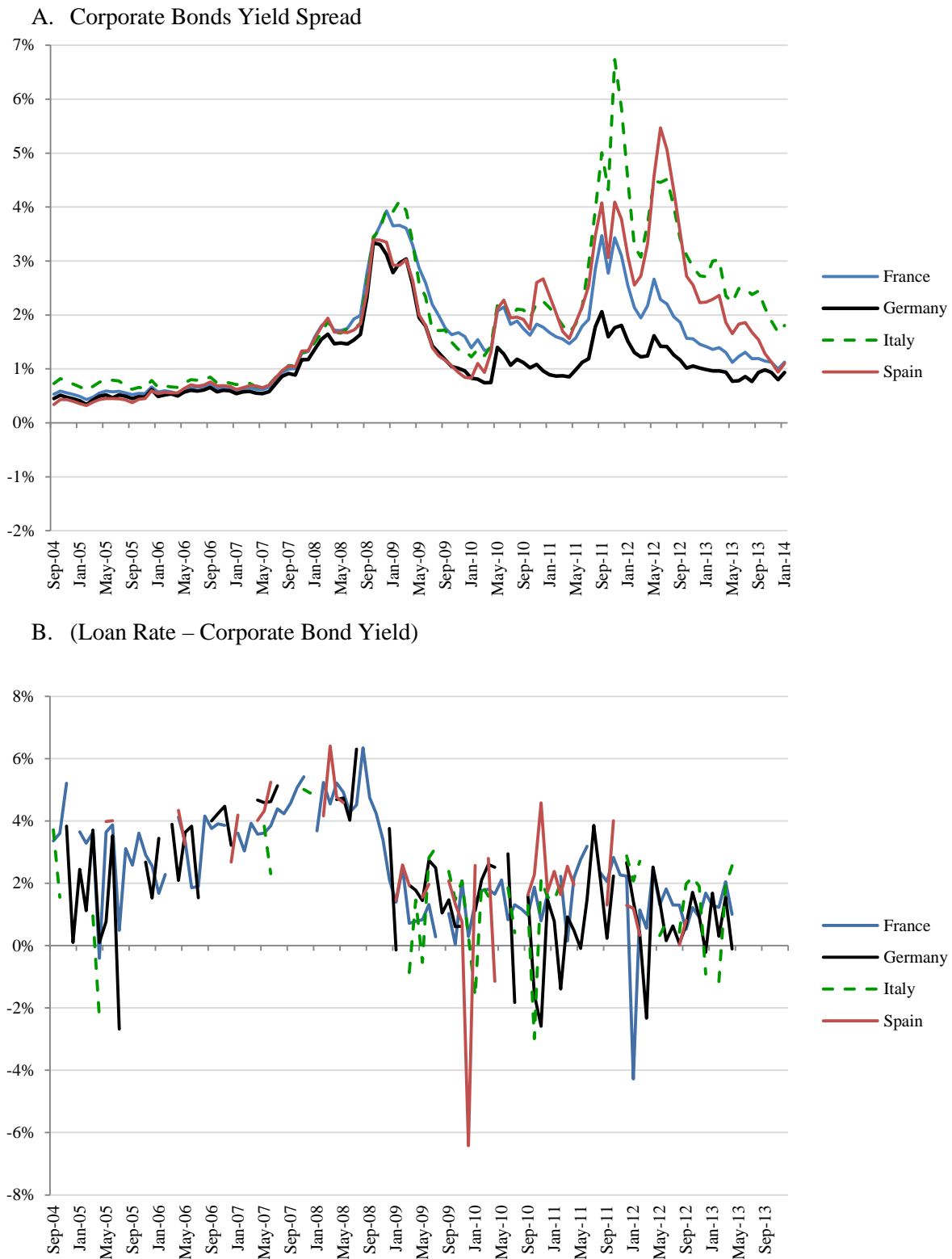
Notes: The figure shows two alternative measures of conditions of bank credit supply. Panel A plots the number of firms issuing new bank loans as a fraction of all firms issuing new debt in a given quarter (Bank debt/Total debt). Data on tightening in lending standards comes from the ECB Euro area bank lending survey and corresponds to the net percentage of banks tightening credit standard for new loans or credit lines to enterprises.

FIGURE 4. LOAN SUPPLY: CROSS-COUNTRY COMPARISON



Notes: The figure shows coefficients on indicators for a country during two crisis episodes. Only EURO-area countries with sufficient data to estimate both coefficients are reported. Countries are sorted by the first coefficient.

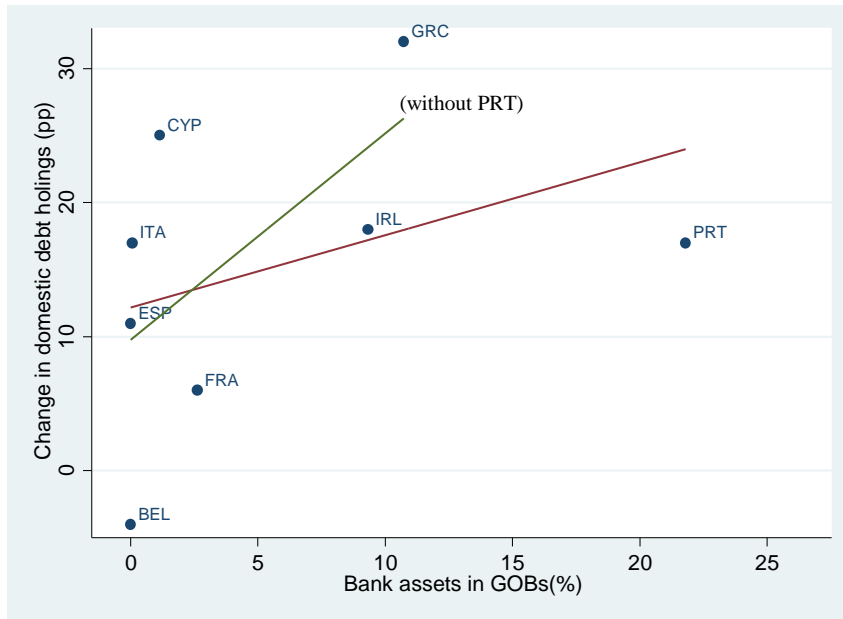
FIGURE 5. EVOLUTION OF BOND AND LOAN RATES



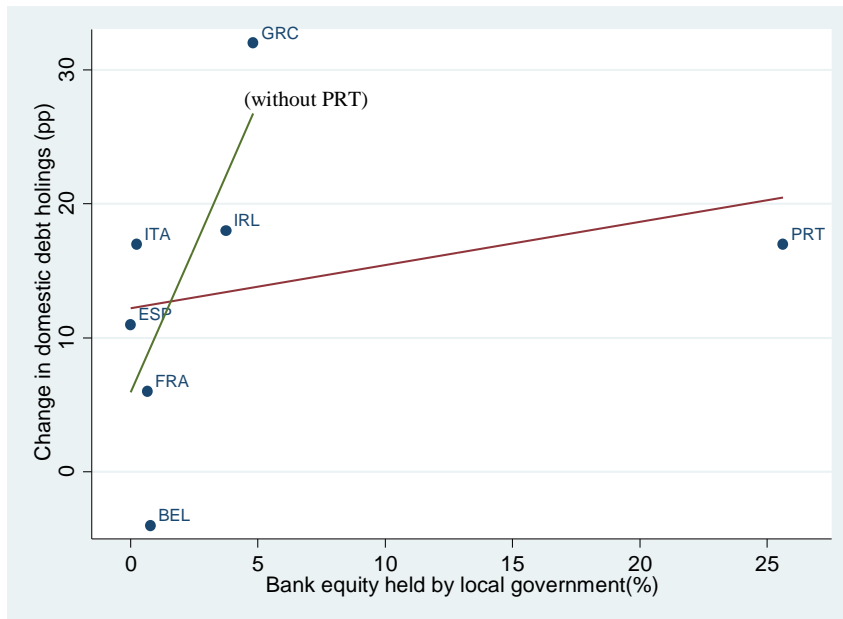
Notes: Panel A plots corporate yield spread over 5-year ECB yield curve spot rate; corporate bond yield corresponds to Barclays Aggregate Corporate yield as reported by Morningstar Direct. Panel B looks at the difference between yields on new loan and bonds issues. Bond yields are from SDC Platinum. Loan rates are rate on large new loans (“loans over 1 million euro at floating rate and up to 1 year initial rate fixation”) reported by ECB. Loans are typically placed at par and are priced as a fixed spread over an interbank overnight rate (i.e., variable rate). To make yields across loans and bonds comparable, we adjust bond yield by the rate on the EURIBOR swap matched by maturity. Swap data is from Datastream

FIGURE 6. THE ROLE OF GOVERNMENT-OWNED BANKS

A. World Bank Global Financial Development Report 2013



B. Bankscope, 2000-2009



Notes: The figure plots change in domestic banks' share of bank-held sovereign bonds from 2010 to 2013 (vertical axis) against: a) percent of the banking system's assets that is in government-controlled banks, i.e., where government owned 50% or more equity; and b) percent of the large banks equity held by the local government. The first measure of government ownership of banks is compiled from the World Bank Global Financial Development Report 2013. It is based on the survey data, and corresponds to the average for the period from 2008-2010. The second measure is from Iannotta, Nocera, and Sironi (2013), who collected bank ownership information from 2000-2009 from Bankscope. The sample is constrained to European countries with CDS spread above 100 basis point as of December 2010.

TABLE 1—SAMPLE DISTRIBUTION OF LOAN VS. BOND CHOICE

Country		Part of EBA stress testing	Loan officers survey data start	Bank share (mean)	Obs.
European Union (Eurozone):					7,762
Austria	AUT	Yes	--	0.432	125
Belgium	BEL	Yes	2010:Q4	0.544	153
Finland	FIN	Yes	--	0.496	330
France	FRA	Yes	2008:Q1	0.359	1,849
Germany	DEU	Yes	2003:Q1	0.320	1,954
Greece	GRC	Yes	--	0.472	289
Ireland	IRL	Yes	2003:Q1	0.394	117
Italy	ITA	Yes	2003:Q1	0.265	914
Luxembourg	LUX	Yes	2003:Q1	0.373	117
Netherlands	NLD	Yes	2003:Q1	0.348	1,042
Portugal	PRT	Yes	2003:Q1	0.432	139
Spain	ESP	Yes	2003:Q1	0.399	696
Slovenia	SVN	Yes	2007:Q2	0.844	18
Estonia	EST	--	2011:Q1	0.579	19
European Union (other):					4,460
Denmark	DNK	Yes	--	0.568	95
Hungary	HUN	Yes	--	0.583	55
Czech Republic	CZE	--	--	0.592	19
Poland	POL	Yes	--	0.710	61
Sweden	SWE	Yes	--	0.323	657
U.K.	GBR	Yes	--	0.445	3,573
Europe (other):					1,387
Switzerland	CHE	--	--	0.423	746
Norway	NOR	Yes	--	0.446	470
Russia	RUS	--	--	0.474	171
Total				0.392	13,609

Year	Bank share (mean)	Obs.
1996	0.324	556
1997	0.329	539
1998	0.318	598
1999	0.309	745
2000	0.305	802
2001	0.366	853
2002	0.411	830
2003	0.403	860
2004	0.455	895
2005	0.516	934
2006	0.420	929
2007	0.468	853
2008	0.464	671
2009	0.352	751
2010	0.441	783
2011	0.492	856
2012	0.268	815
2013	0.212	339
Total	0.392	13,609

Notes: These tables present distribution of our core dependent variable $L_{it} = 1$ if a firm i receives a loan and $L_{it} = 0$ if a firm issues a bond in quarter t . If in a given quarter a firm did not have a new loan or bond issue, it is not included in the sample.

TABLE 2—WITHIN-FIRM EVIDENCE ON LOAN VS. BOND CHOICE

	(1)	(2)	(3)	(4)	(5)	(6)
Tightening in lending standards	-0.061** (0.025)	--	--	--	--	--
Aggregate lending growth	--	0.208*** (0.075)	--	--	--	--
Non-performing loans	--	--	-7.468*** (0.948)	--	--	--
Loan allowances	--	--	--	-28.265*** (5.411)	--	--
GDP growth	--	--	--	--	0.858** (0.264)	--
Bank stock-index	--	--	--	--	--	5.554*** (1.514)
Fixed effects						
Firm (c_i)	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	4,510	11,590	13,270	13,270	13,433	13,347
R-squared	0.48	0.43	0.40	0.42	0.39	0.39
Clusters (It)	97	331	376	376	377	358
Mean (L_{it})	0.385	0.399	0.397	0.397	0.390	0.390

Notes: The dependent variable is $L_{it} = 1$ if a firm i receives a loan and $L_{it} = 0$ if a firm issues a bond in quarter t . If in a given quarter a firm did not have a new loan or bond issue, it is not included in the sample. The table reports the results of our linear regressions. Specifications (1) through (3):

$$L_{it} = c_i + \beta S_{it},$$

where c_i is firm fixed effects and S_{it} is a quarterly country-level measure of macroeconomic conditions. Data on tightening in lending standards comes from ECB and corresponds to the net percentage of banks tightening credit standard for new loans or credit lines to enterprises. Country-level measures of *Aggregate lending growth*, *Non-performing*, and *Loan allowances* are compiled from Bankscope. Lending growth is measured as a four-quarter rolling-window growth in aggregate loans outstanding. Non-performing loans and loan allowances are scaled by total loans, and correspond to the assets-weighted average for the banks within a given country. *GDP growth* is real change in per capita GDP, determined quarterly (measured with respect to the same quarter the year prior to avoid seasonality); the data is collected from the Eurostat website. *Bank stock-index* is a logarithm of an equally weighted stock index. Errors are heteroskedasticity-robust and clustered by country*year.

*** Significant at the 1 percent level.

** Significant at the 5 percent level.

* Significant at the 10 percent level.

TABLE 3—BANKS' BALANCE SHEETS AND BANK CREDIT SUPPLY

Sample:	2010-2013 (1)	2010-2013 (2)	2010-2013 (3)	1997-2013 (4)	2007-2013 (5)	2007-2013 (6)
Domestic government debt held by banks:						
(% of risk-weighted assets)	-0.933*** (0.186)	--	--	--	--	--
(% of risk-weighted assets) * Country CDS spread	--	-3.047*** (0.840)	--	--	--	--
(% of common equity) * Country CDS spread	--	--	-0.640*** (0.193)	--	--	--
All sovereign debt held by banks (% bank assets)	--	--	--	-0.547*** (0.182)	-11.141*** (1.447)	-26.388*** (2.849)
Fixed effects						
Firm (c_i)	Yes	Yes	Yes	Yes	Yes	Yes
Year (D_t)	No	No	No	No	No	Yes
Obs.	2,562	1,810	1,810	13,266	4,725	4,725
R-squared	0.61	0.68	0.66	0.40	0.57	0.58
Clusters	72	51	51	376	133	133
Mean (L_{it})	0.376	0.352	0.352	0.400	0.414	0.414

Notes: The dependent variable is $L_{it} = 1$ if a firm i receives a loan and $L_{it} = 0$ if a firm issues a bond in quarter t . If in a given quarter a firm did not have a new loan or bond issue, it is not included in the sample. Specifications (1), (4) and (5) correspond to:

$$L_{it} = c_i + \beta B_{IT}$$

where c_i is firm fixed effects and B_{IT} is domestic bank-sector holding of sovereign debt measured on semiannual or annual frequency. Specification (6) also includes year fixed effects D_T . Specifications (2) and (3) correspond to:

$$L_{it} = c_i + \beta B_{IT} * CDS_{IT-1}$$

Local government debt holdings are from EBA. Total sovereign debt holdings are from Bankscope. CDS data is from Markit. Errors are heteroskedasticity-robust and clustered by country*year.

*** Significant at the 1 percent level.

** Significant at the 5 percent level.

* Significant at the 10 percent level.

TABLE 4— RELATIONSHIP BANKS’ BALANCE SHEETS AND BANK CREDIT SUPPLY, 2010-2013

Sample:	(1)	(2)	(3)	(4)
Domestic government debt held by banks:				
(% of risk-weighted assets)	-0.584*** (0.120)	--	--	-0.901** (0.415)
(% of risk-weighted assets) * Country CDS spread	--	-0.263** (0.130)	--	--
(% of common equity) * Country CDS spread	--	--	-0.035 (0.034)	--
Fixed effects				
Bank (D_j)	Yes	Yes	Yes	Yes
Year-quarter (D_t)	Yes	Yes	Yes	Yes
Obs.	4,251	4,195	4,185	2,148
R-squared	0.16	0.16	0.16	0.18
Mean (L_{it})	-0.09	-0.09	-0.09	-0.07

Notes: The analysis in this table focuses on matching between specific banks and firms. The dependent variable is the residual from the firm fixed effect regression of $L_{it} = 1$ if a firm i receives a loan and $L_{it} = 0$, estimated for the full sample period 1996-2013. The results reported in this table relate the estimated residual to the firm’s *relationship* bank’s holdings of domestic sovereign debt; the period of the analysis is 2010-2013. A relationship between a firm and a bank is taken to exist if a bank was a lead or co-lead in a syndicated loan taken out in the last five years. As before, a firm appears in the sample (i.e., the residual is computed) if in a given period it loan or a bond. Specification (1) corresponds to:

$$\hat{L}_{it} = D_t + D_{j|(i,t)} + \beta B_{j|(i,t)t},$$

where \hat{L}_{it} is the residual after firm fixed effects (c_i), D_t is year-quarter fixed effects, $D_{j|(i,t)}$ is bank fixed effects for the bank j for which firm i had a relationship at time t , and B_{jt} is the relationship bank’s holdings of its home country’s sovereign debt. Specifications (2) and (3) correspond to:

$$\hat{L}_{it} = D_t + D_{j(i,t)} + \beta \log(B_{it} * CDS_{c(j)t}),$$

where $CDS_{c(j)t}$ is the sovereign CDS spread of the bank’s home country. Specification (4) only includes firms with a unique relationship bank. Local government debt holdings are from EBA. Total sovereign debt holdings are from Bankscope. CDS data is from Markit. Errors are heteroskedasticity-robust and clustered by country*year. Outliers for exposure * CDS (top and bottom 1%) have been excluded.

*** Significant at the 1 percent level.

** Significant at the 5 percent level.

* Significant at the 10 percent level.

TABLE 5—FINANCIAL REPRESSION VS. RISK-SHIFTING, 2010-2013

	(1)	(2)	(3)	(4)	(5)	(6)
Bank holdings:						
Domestic government debt	-0.918** (0.363)	--	-0.890*** (0.263)	--	-1.533*** (0.300)	--
Greek government debt	2.416 (34.306)	--	--	--	--	--
3 riskiest EURO-area countries (except domestic)	--	--	-0.444* (0.254)	--	--	--
German government debt	--	--	--	--	1.001*** (0.352)	--
Domestic government debt held by banks * Country CDS spread	--	-0.131** (0.059)	--	-0.223*** (0.069)	--	-0.187*** (0.062)
Greek government debt * Greek CDS spread	--	4.952** (7.760)	--	--	--	--
3 riskiest EURO-area countries * Country CDS spread	--	--	--	0.326 (1.875)	--	--
German government debt * German CDS spread	--	--	--	--	--	-4.661* (2.578)
Fixed effects						
Firm (c_i)	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	1,784	1,477	1,804	1,477	1,784	1,477
R-squared	0.68	0.70	0.68	0.69	0.682	0.673
Mean (L_{it})	0.349	0.346	0.349	0.346	0.349	0.346

Notes: The purpose of this table is to distinguish the effect of holding local (financial repression hypothesis) vs. riskiest (risk-shifting hypothesis) sovereign debt. Specifications (1) and (2) are similar to specifications (1) and (2) in Table 3 but add holdings of Greek debt (Greek firms are excluded). In columns (3) and (4), instead of Greek debt, we measure the holdings by a country's banks of sovereign debt from the three highest CDS spread countries except the domestic sovereign. Sovereign CDS Spreads are measured at end of preceding year. In columns (2) and (6), we use German debt (German firms are excluded). Errors are heteroskedasticity-robust and clustered by country*year.

*** Significant at the 1 percent level.

** Significant at the 5 percent level.

* Significant at the 10 percent level.

TABLE 6—BANK RISK

	Obs.	Domestic sovereign debt							
		% of risk-weighted assets			% of total sovereign debt			Growth	
		2011	2012	2013	2011	2013	(2013 -2011)	2011-12	2011-13
<u>Full sample:</u>									
Total capital (% risk-weighted assets), lagged	64	0.603***	0.159	0.216*	-0.103	-0.329***	-0.011	-0.124	-0.371
Core tier 1 capital ratio (%), 2010	63	0.502***	0.377***	0.286**	-0.097	-0.128	-0.046	-0.240*	-0.308**
Core tier 1 capital ratio (%), 2011E, ECB baseline scenario	63	0.332**	0.246*	0.167	-0.059	-0.111	-0.062	-0.241*	-0.304**
Core tier 1 capital ratio (%), 2011E, ECB adverse scenario	63	0.180	0.110	0.048	-0.075	-0.141	-0.081	-0.208	-0.244
Tier 1 Capital (% RWA), 2010	63	0.502***	0.388***	0.313**	-0.147	-0.165	-0.036	-0.237*	-0.267**
CDS (lagged), senior secured debt	33	-0.025	-0.033	-0.135	0.332*	0.399**	0.153	0.158	0.216
CDS (lagged), senior unsecured debt	29	0.151	0.033	0.014	0.377**	0.464**	0.226	0.105	0.173
<u>Country CDS spread >100 bps as of December 2010:</u>									
Total capital (% risk-weighted assets), lagged	32	0.414**	0.062	0.110	-0.188	-0.291	0.035	-0.032	-0.394**
Core tier 1 capital ratio (%), 2010	32	0.306	0.025	-0.114	-0.030	-0.032	0.009	-0.203	-0.245
Core tier 1 capital ratio (%), 2011E, ECB baseline scenario	32	0.330*	0.050	-0.061	0.001	-0.073	-0.067	-0.205	-0.204
Core tier 1 capital ratio (%), 2011E, ECB adverse scenario	32	0.316*	0.048	-0.025	-0.023	-0.105	-0.075	-0.190	-0.145
Tier 1 Capital (% RWA), 2010	32	0.156	0.008	-0.085	-0.199	-0.148	0.030	-0.178	-0.086
CDS (lagged), senior secured debt	16	-0.051	-0.260	-0.388	0.378	0.335	0.075	-0.105	-0.109
CDS (lagged), senior unsecured debt	13	-0.046	-0.171	-0.119	0.318	0.474	0.362	-0.068	-0.028

Notes: This table looks at cross-sectional correlation between bank health and local sovereign bonds holdings. Capital adequacy measures are from ECB. CDS rates are from Markit. Unless otherwise indicated, bank risk is measured as of the end of the previous year. CDS Spreads correspond to the last quarter average. Statistically significant correlations that would support larger domestic sovereign debt holding being characteristic of undercapitalized banks are highlighted in grey.

*** Significant at the 1 percent level.

** Significant at the 5 percent level.

* Significant at the 10 percent level.

TABLE 7—EVOLUTION OF DOMESTIC SOVEREIGN DEBT HOLDINGS OUTSIDE OF THE BANKING SECTOR

Pension and insurance sector	Source	2006	2007	2008	2009	2010	2011	2012	2013
Domestic government debt (% of all sovereign debt)									
PRT: Insurance	Instituto de Seguros de Portugal (ISP)	23%	22%	23%	22%	46%	50%	66%	
PRT: Pensions	Instituto de Seguros de Portugal (ISP)	20%	19%	14%	18%	30%	32%	29%	
ESP: Social Security Reserve Fund (Pensions)	Ministerio de Empleo y Seguridad Social	55%	51%	56%	77%	88%	90%	97%	97%
DEU: Allianz (Insurance)	www.allianz.com	14%	14%	22%	25%	22%	20%	16%	16%
FRA: Public Service Additional Pension Scheme (Pensions)	www.rafp.fr	55%	41%	32%	30%	41%	43%		
Domestic government debt (% of assets)									
PRT: Insurance	Instituto de Seguros de Portugal (ISP)	6%	5%	6%	5%	13%	16%	25%	
PRT: Pensions	Instituto de Seguros de Portugal (ISP)	5%	4%	4%	4%	8%	8%	10%	
ESP: Social Security Reserve Fund (Pensions)	Ministerio de Empleo y Seguridad Social	55%	51%	56%	77%	88%	90%	97%	97%
DEU: Allianz (Insurance)	www.allianz.com	1%	1%	3%	5%	5%	5%	4%	4%
FRA: Public Service Additional Pension Scheme (Pensions)	www.rafp.fr	47%	41%	31%	24%	22%	28%	24%	

TABLE 8—GOVERNMENT DEBT AND BANK CREDIT SUPPLY

A. Government debt/GDP

Sample:	1996-2012	1996-2006	2007-2012	1996-2012	1996-2006	2007-2012
	(1)	(2)	(3)	(4)	(5)	(6)
Government debt/ GDP	-0.222** (0.086)	-0.261* (0.139)	-0.352*** (0.096)	--	--	--
Government debt > 60% GDP	--	--	--	-0.003 (0.020)	0.011 (0.023)	-0.050 (0.044)
Government debt > 90% GDP	--	--	--	-0.132*** (0.040)	0.002 (0.082)	-0.153*** (0.058)
Government debt > 120% GDP	--	--	--	-0.287*** (0.060)	--	-0.328*** (0.073)
Fixed effects						
Firm (c_i)	Yes	Yes	Yes	Yes	Yes	Yes
Quarter (D_t)	No	No	No	No	No	No
Obs.	12,217	7,645	4,572	12,217	7,645	4,572
R-squared	0.39	0.48	0.54	0.39	0.48	0.54
Clusters	340	210	131	341	210	131
Mean (L_{it})	0.392	0.388	0.391	0.387	0.381	0.396

B. Risk of government debt

Sample:	1996-2012	1996-2006	2007-2012
	(1)	(2)	(3)
Government CDS	-0.121*** (0.025)	-0.514* (0.268)	-0.114*** (0.028)
Fixed effects			
Firm (c_i)	Yes	Yes	Yes
Quarter (D_t)	No	No	No
Obs.	6,591	2,277	4,314
R-squared	0.38	0.65	0.56
Clusters	216	88	128
Mean (L_{it})	0.409	0.414	0.405

Notes: The dependent variable is $L_{it} = 1$ if a firm i receives a loan and $L_{it} = 0$ if a firm issues a bond in quarter t . If in a given quarter a firm did not have a new loan or bond issue, it is not included in the sample. The table reports results of the linear regressions. Specifications in this table correspond to:

$$L_{it} = c_i + \beta S_{it},$$

where c_i is firm fixed effects and S_{it} is a quarterly country-level measure of government debt or the sovereign CDS spread at the previous calendar year end. Debt indicators in columns (4) to (6) are equal to one if Government debt is more than or equal to 60%, but less than 90%, of GDP; between 90% and 120% of GDP; and above 120%. The omitted category is observations where Government debt is below 60% of GDP. Errors are heteroskedasticity-robust and clustered by country*year.

*** Significant at the 1 percent level.

** Significant at the 5 percent level.

* Significant at the 10 percent level.

TABLE 9—GOVERNMENT DEBT AND BANK CREDIT SUPPLY: CROSS-BORROWER VARIATION

Firm exposure measure:	No previous syndicated bank loan		Last debt funding less than €50M		No stock dividends	
	(1)	(2)	(3)	(4)	(5)	(6)
Government debt*Exposed	-0.216*** (0.050)	--	0.040 (0.026)	--	-0.311** (0.149)	--
Government CDS*Exposed	--	-0.708* (0.369)	--	-0.687*** (0.220)	--	0.132 (0.096)
Fixed effects						
Firm (c_i)	Yes	Yes	Yes	Yes	Yes	Yes
Country*quarter (D_{it})	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	12,217	7,169	12,701	6,735	3,310	2,773
R-squared	0.26	0.21	0.16	0.14	0.20	0.21
Clusters	341	216	333	213	157	146
Mean (L_{it})	0.390	0.409	0.372	0.397	0.463	0.446

Notes: The dependent variable is $L_{it} = 1$ if a firm i receives a loan and $L_{it} = 0$ if a firm issues a bond in quarter t . If in a given quarter a firm did not have a new loan or bond issue, it is not included in the sample. The sample includes all loans and bonds issued between 1996 and 2012. Specifications (1) through (6) correspond to:

$$L_{it} = c_i + D_t + \beta S_{it} * Exposed_i,$$

where c_i is firm fixed effects and D_t is quarter fixed effects. D_{it} is a quarterly country-level measure of government debt. $Exposed_i$ identifies firms that are likely to depend more on the local bank-credit conditions. Errors are heteroskedasticity-robust and clustered by country*year.

*** Significant at the 1 percent level.

** Significant at the 5 percent level.

* Significant at the 10 percent level.