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The analyses, opinions and findings of these papers represent the views of the authors, they are not necessarily those of the Banco de Portugal or the Eurosystem

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BANCO DE PORTUGAL
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Lisboa, 2021 • www.bportugal.pt

Working Papers | Lisboa 2021 • Banco de Portugal Av. Almirante Reis, 71 | 1150-012 Lisboa • www.bportugal.pt •
Edition Economics and Research Department • ISBN (online) 978-989-678-773-8 • ISSN (online) 2182-0422

Sovereign-Bank Diabolic Loop: The Government Procurement Channel

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September 2021

Abstract
We show that banks' lending exposure to firms with government procurement contracts can amplify the diabolic loop between sovereigns and banks. Using the fiscal austerity measures implemented during the 2010-2011 European sovereign debt crisis as a shock to government procurement, we find that banks with higher exposure to these firms reduced lending significantly more than banks with lower exposure, controlling for firm-specific credit demand. The reduction in credit supply is economically as important as the effect of banks' sovereign debt holdings, and affected both firms with and without government contracts. Firms with lending relationships with affected banks experienced lower sales growth, assets growth, employment growth, and investment. This decrease in real economic activity is likely to reduce tax revenue, further amplifying the diabolic loop.

JEL: G01, G20, G31, H57

Keywords: Credit supply, Government procurement, Investment, Employment, Financial crises, Bank-sovereign loop, Austerity.

Acknowledgements: We thank Rui Albuquerque (discussant), Murillo Campello, Tim Eisert (discussant), Karsten Müller (discussant), Jean-Stéphane Mésonnier, Orkun Saka, conference participants at the EFA 2021, Barcelona Summer Forum 2021, Lubrafin 2021, CEBRA 2021, and seminar participants at Banco de Portugal, Banque de France, Rotterdam School of Management, University of Sussex for their helpful comments and suggestions. These are our views and do not necessarily reflect those of Banco of Portugal or the Eurosystem. Bonfim acknowledges financial support from grants UID/GES/00407/2013 and PTDC/EGE-OGE/30314/2017 of the Portuguese Foundation for Science and Technology-FCT.

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1. Introduction

The diabolic loop between sovereigns and banks was at the center of the 2011-2012 sovereign debt crisis in euro area periphery countries such as Greece, Ireland, Italy, Portugal and Spain (Brunnermeier *et al.* 2016). The increase in sovereign risk reduced the value of banks' holdings of domestic sovereign debt, which negatively affected the solvency of banks and reduced their ability to extend loans. This increased the likelihood of bank bailouts, which in turn led to higher sovereign distress, triggering a "bailout loop". In addition, the reduction in credit supply led to a contraction in economic activity and therefore a reduction in tax revenue and sovereign solvency, leading to a "real-economy loop".

In this paper, we study a new source of banks' exposure to sovereign risk, which has been unexplored in the literature. Bank loan portfolios contain firms that have business relationships with the government through procurement contracts. If the government adopts fiscal austerity measures and cuts spending, these firms face a decrease in demand which may cause financial distress. Thus, there may be an increase in the probability that these firms default on their loans, which contributes to bank distress. This pressure on the banks can lead to a contraction in credit supply, which can affect not only firms with government procurement contracts but also firms without contracts with the government. Financial distress in firms impacted by this negative credit supply shock can in turn lead to lower tax revenues, forcing the government to cut spending even further and therefore amplifying the "real economy loop".

We examine the government procurement channel using as a laboratory the fiscal austerity measures imposed by the large-scale loan bailout by the European Commission, the International Monetary Fund (IMF) and the European Central Bank (jointly, the Troika) in Portugal in 2011. The bailout led to a sudden stop in government spending. From an identification perspective, this shock has the advantage of being clearly tied to the Troika's loan bailout package and the country's need of immediate funding to meet short-term obligations.

We use bank-firm matched data over the 2007-2015 period to estimate the effect of bank exposure to borrowers with government contracts on credit supply. The matched data allows us to compare credit outcomes for the same firm and quarter across banks with different levels of government exposure. In this empirical setting, the estimated difference in credit outcomes can be plausibly attributed to differences in bank exposures as the within-firm comparison absorbs firm-specific changes in credit demand.

We find that banks with higher exposure to borrowers with government contracts significantly reduce lending to firms in the post-bailout period (2011Q3-2015Q4) relative to the pre-bailout period (2007Q1-2011Q2). A one percentage point increase in government contract exposure leads to a 5.6% drop in total credit (including undrawn credit lines) after the bailout in our benchmark specification. This finding indicates that banks more exposed to firms with government contracts reduced lending more than less exposed banks after the bailout. Importantly, our

benchmark specification controls for bank exposure to the sovereign through bond holdings and loans. Comparing the two channels, we find that the indirect exposure to the sovereign arising from loans granted to firms with government contracts actually has a larger effect on total credit to firms than the direct sovereign debt channel previously studied in the literature (5.6% vs 3%). We conclude that the government procurement channel is at least as important as the sovereign bond holdings channel.[1]

We next examine whether banks cut lending supply mostly to firms with government contracts or whether they also cut lending supply to other firms in their loan portfolio without government contracts. We find that the reduction in credit supply affects both types of firms. Thus, we provide evidence of spillovers in credit markets even to firms without government procurement contracts. We also find a subsequent increase in the amount of overdue credit of firms with government contracts. However, there is no increase in the amount of overdue credit in the case of firms without government contracts, which is consistent with the notion that these firms are not directly affected by the reduction in government spending.

Our channel affects lending at the intensive margin but it can also affect lending relationships. We provide evidence of a deterioration in credit conditions at the extensive margin. We find that banks more exposed to firms with government contracts are more likely to drop lending relationships and are less likely to initiate new ones. The effects are significant for both firms with and without government contracts, but stronger for firms with government contracts.

Finally, we provide evidence that firms were not able to compensate this reduction in loans from affected banks with new loans from less affected banks, and that this reduction in credit supply had an impact on firm policies and performance. Controlling for credit demand as in Jiménez *et al.* (2014), we find that firms exposed to affected banks reduce asset growth, sales growth and investment in fixed assets and human capital after the bailout. The reduction in credit supply by affected banks also had a negative effect on profitability and productivity. These real effects plausibly led to reductions in tax revenue, triggering a negative "real-economy loop".

Our paper contributes to three strands of the literature. First, this paper is related to the literature on the sovereign-bank diabolic loop (Brunnermeier *et al.* 2016). This literature focuses on the banks' holdings of sovereign bonds during the European sovereign debt crisis (Ongena *et al.* (2019); Acharya *et al.* (2018); Altavilla *et al.* (2017)). There was a significant increase in sovereign bond holdings during the crisis, which is consistent with a financial repression (or moral suasion) mechanism (Becker and Ivashina (2017); Ongena *et al.* (2019)), with a carry trade strategy (Acharya and Steffen (2015); Crosignani *et al.* (2019)) or with informational asymmetries (Saka (2020)). Relative to this literature, the exposure

1. The estimates are similar when we control for other type of banks' exposures such as loans to the construction sector and state-owned enterprises. We also find similar estimates when we use only drawn credit to measure credit supply.

of banks to the government comes from exposure of the real sector to government procurement rather than from banks' sovereign bond holdings.

Second, this paper is related to empirical work on the bank lending channel, in particular whether shocks to a bank affect credit supply and real economic activity. The literature first used time-series correlation between changes in liquidity and changes in loans to show that liquidity shocks have real effects (e.g., Bernanke and Gertler (1995)). Concerns about confounding macro effects have led to the use of cross-sectional variation in liquidity supply across banks (e.g., Kashyap *et al.* (1994); Jayaratne and Strahan (1996); Black and Strahan (2002)) or natural experiments (e.g., Ashcraft (2005); Khwaja and Mian (2008); Paravisini (2008)). In particular, the 2007–2009 global financial crisis has been used as an experimental setting in which to study the effects of bank distress on credit supply (e.g., Ivashina and Scharfstein (2010); Santos (2010); Cornett *et al.* (2011); Iyer *et al.* (2013)) and firm valuation and real outcomes (Chodorow-Reich (2014); Carvalho *et al.* (2015)). Federico *et al.* (2019) examine the transmission of trade shocks to banks through the corporate loan portfolio, which then spillover to the corporate sector through a credit supply shock. In our setting, the shock to banks comes from the government sector rather than from the financial sector (e.g., financial crises), external sector (e.g., import competition) or natural experiments (e.g., nuclear bombing).

Finally, our paper is related to the literature on the links between firms and the government through procurement contracts. Government spending can improve firm outcomes, leading to more entrepreneurship (Danisewicz and Ongena 2020) and generating long-term positive effects for start-ups (Hvide and Meling 2019; Lee 2017). Improving payment efficiency on procurement can alleviate financial constraints and lead to job creation (Barrot and Nanda 2020). However, government spending can also be detrimental to firms. Morais *et al.* (2020) show that restrictions to highly indebted local governments can improve firms' access to bank loans, which would otherwise be channeled to the public sector. We contribute to this literature by documenting a new and important link between the public sector and firms. Sovereign distress and fiscal austerity create negative demand shocks to firms with procurement contracts (Adelino *et al.* 2020). These shocks negatively affect banks' risk, leading to a contraction on credit supply to all firms in the economy.

Overall, our findings show that the exposure of banks to the government procurement channel is important to explain the reduction in credit supply following a fiscal austerity shock and an aggregate demand shock. This reduction in credit supply is pervasive across firms in the economy, as firms that are not linked to the government through procurement contracts also suffer a reduction in credit supply. In addition, less affected banks do not seem to offset the reduction in credit supply. In a final step, we show that the reduction in banks' credit supply due to the government procurement channel affects the real economy. We show that firms linked to affected banks suffer a reduction in investment, employment and productivity. Our findings suggest that the government procurement channel through the banking system exacerbates the sovereign-bank diabolic loop.

Our results have important implications to the design of policies aiming to mitigate the diabolic loop between sovereigns and banks. The reform of prudential regulation of banks' sovereign bond holdings, debt mutualisation and the introduction of a union-wide safe asset weaken the diabolic loop but do not address the government procurement channel.

2. Methodology and Data

2.1. Sovereign Debt Crisis and Fiscal Austerity

Banks and governments are connected through several links. In crisis times, these links can exacerbate the transmission of shocks, creating sovereign-bank doom loops (Acharya *et al.* (2018); Altavilla *et al.* (2017); Farhi and Tirole (2018); Leonello (2018)). Firms are also exposed to shocks affecting the sovereign, either directly or indirectly. In a recent paper, Adelino *et al.* (2020) show that firms with business links to the government through procurement contracts were significantly affected by the fiscal austerity measures imposed during the 2010-2011 European sovereign debt crisis. In addition, firms can be indirectly affected through a reduction in credit supply due to an increase in sovereign credit risk that affects the banking sector. In this paper, we examine how these three players – sovereign, banks and firms – interact during a financial crisis. We show that these links play a key amplification role in the propagation of shocks to the economy.

Portugal was one of the euro area countries at the epicenter of the sovereign debt crisis in 2010-2011. In the Spring of 2010, soon after Greece asked for an international bailout, Portuguese banks experienced a sudden stop in international debt markets. International investors believed that the tensions experienced in Greece would soon also be felt in other periphery countries, such as Portugal and Ireland, and they became unwilling to rollover debt issued by Portuguese banks. Although Portuguese banks were heavily reliant on market funding (their average loan to deposit ratio stood close to 160% at the time), they were able to swiftly replace the lost market funding with ECB funding, which acted as a *de facto* lender of last resort (Alves *et al.* 2021).

Despite the support provided by the ECB, Portugal was signing its own bailout package one year later. For sure the problems were deeper than a temporary liquidity shock affecting the banking system, as the economy experienced a long period of feeble growth, weak competitiveness and productivity, and high indebtedness in all the sectors of the economy (Blanchard and Portugal (2017); Reis (2013)). With tensions rising in weaker euro area sovereigns, amidst rating downgrades, rising debt spreads and the inability to issue debt, the government had no alternative but to ask for a bailout from the European Commission, the IMF and the European Central Bank in the Spring of 2011. A package of fiscal austerity measures was swiftly implemented, with the goal of restoring the health of public finances. One immediate consequence was that public expenditure was severely curtailed within a

short horizon. Public consumption decreased 9.6% by 2014 when the country had already successfully exited from the financial assistance program.

Many firms that were suppliers of goods and services to the public sector suffered a strong demand shock. Figure 1 shows a decrease in the amount of government contract expenditure in the post-bailout period of four percentage points of GDP. This actually contrasts with the buoyancy in procurement in the period before the bailout, when the government adopted a series of measures to stimulate demand through an increase in public expenditure.

2.2. Government, Bank and Firm Links

We explore the links between the sovereign, banks and firms. Firms with government contracts suffered a large and sudden demand shock when austerity measures started to be implemented in 2011. In a bank-based economy, banks can be affected through their exposures to these firms. Bank liquidity shocks are captured by the *Government Contract*$_b$ variable, which is defined for each bank as the fraction of loans to firms with government contracts in the total corporate loan book in a given period.

Formally, bank's exposure to government contracts is calculated as:

$$Government\ Contract_b = \sum_{f=1}^{n} Weight_{ib,2011Q2} \tag{1}$$

where $Government\ Contract_b$ denotes the exposure to government contract of bank b; n denotes the number of firms with government contracts in bank b's credit portfolio in 2011Q2 and $Weight_{ib,2011Q2}$ denotes bank b's lending weight to firm i at 2011Q2.

Firms with larger contracts are more negatively affected by the demand shock. To account for this, we also consider a weighted version of the government contract exposure such that the loan exposure to each firm is weighted by the total amount of government contracts as a fraction of the firm's total assets:

$$Government\ Contract_b = \sum_{f=1}^{n} Weight_{ib,2011Q2} \times (\frac{Contract\ Amount_i}{Assets_{i,2011}}) \tag{2}$$

where $Contract\ Amount_i$ denotes Firm i's amortized contract amount at 2011Q2; $Assets_{i,2011}$ denotes Firm i's total assets in 2011. Note that we assume equally amortized payments, meaning that the government pays a fixed amount to the contracting firm each quarter throughout the contract term. For instance, for a 1 million euro contract paid in four quarterly installment, we assign 0.25 million euro to each quarter. Our results are robust to considering immediate payment by the government and most contracts are paid in less than 90 days.

Panel A of Figure 2 shows that banks' weighted exposure to firms with government contracts was close to reaching its peak when the Portuguese government asked for international financial assistance. Banks gradually became less exposed to these firms afterwards. The unweighted measure is more volatile, because all borrowers with government contracts are equally weighted regardless of the contract size. But it is also visible a fall in banks' exposure to firms with government contracts, though earlier than in the weighted version. This suggests that bank deleveraging happened slightly before, especially for firms with small government contracts. In this aggregate descriptive analysis we cannot disentangle demand and supply effects that might have contributed to this decrease. In our empirical analysis we will be able to do so, by exploring the granularity of our bank-firm matched data.

Panel B of Figure 2 shows that the decrease in exposure reflects mainly the decrease in contracts established with the central government. Exposures linked to contracts signed with the local government only decreased later. Panel C of Figure 2 shows that a large fraction of banks' exposure to government contracts comes from loans granted to firms operating in the construction sector.

The weighted measures offer a better aggregate picture of what happened in the Portuguese financial system during the period being analyzed. However, the unweighted measures will be used throughout most of the regressions, as their interpretation is more straightforward, allowing to better gauge the economic effects of fiscal austerity on the sovereign-bank doom loop through firms engaged in procurement. Note that our results remain robust to the weighted measure.

2.3. Empirical Strategy

Our goal is to provide evidence of a new channel of sovereign-bank transmission through the bank's exposure to firms with procurement contracts with the government. Firms selling a significant fraction of their products and services to the government may fall into financial distress when they face a large and sudden shock in demand coming from the implementation of austerity measures. This means that banks that are more exposed to these firms are more adversely affected and may decrease their credit supply more than banks that are less exposed to these firms.

To investigate the government procurement channel, we estimate the following equation:

$$\begin{aligned} Credit_{ibt} = & \boldsymbol{\beta}_1 Post \times Government\ Contract_b + \boldsymbol{\beta}_2 Post \times Sovereign\ Debt_b + \\ & \boldsymbol{\beta}_3 Post \times Construction_b + \boldsymbol{\beta}_4 Post \times SOE_b + \\ & \boldsymbol{\alpha} BankChar_{bt} + \rho_b + \gamma_{it} + \varepsilon_{ibt} \end{aligned} \tag{3}$$

where the dependent variable $Credit_{ibt}$ is the logarithm of one plus the credit granted to firm i, by bank b, in quarter t. To consider both the intensive and

extensive margins of credit growth, we fill up with zeros the quarters after a relationship is terminated.

The bank shock is captured by the $Government\ Contract_b$ variable, which is defined as the fraction of loans to firms with government contracts on the total corporate loan book of a given bank in each period. The exposure to government contracts is measured as of 2011Q2 when the financial assistance program was signed. Our coefficient of interest is β_1, which measures how the bank exposure to firms with government contracts affects their lending behavior after the bailout. $Post$ is a dummy variable that takes a value of one in the period 2011Q3-2015Q4, and zero otherwise.

The regression includes several control variables. First, we control for the direct channel of sovereign to bank transmission. The $Sovereign\ Debt_b$ variable includes the direct exposure of each bank to the public sector through loan and bond holdings, which has been the focus of most of the literature on the sovereign-bank loop (Acharya *et al.* (2018); Altavilla *et al.* (2017)). This exposure increased significantly after the Portuguese government lost access to international debt markets in the Spring of 2010 (Alves *et al.* 2021). This increase is consistent both with a financial repression (or moral suasion) mechanism (Becker and Ivashina (2017); Ongena *et al.* (2019)) and with a carry trade strategy (Acharya and Steffen (2015); Crosignani *et al.* (2019)).

Second, a large fraction of the firms hit by the impact of austerity measures on government procurement operates in the construction sector (Figure 2). Given that some banks may be more specialized in lending to this sector, we also control for the exposure of each bank to this sector ($Construction_b$).

Third, we control for another indirect exposure of banks to the public sector working through loans granted to state-owned enterprises (SOE_b). This channel is often less explored due to lack of available data, but it also feeds into the sovereign-bank doom loop.

Fourth, we control for potentially relevant time-varying bank characteristics ($BankChar_{it}$). All these exposure variables are measured as of 2011Q2. Unobservable time-invariant characteristics are captured through bank fixed effects (ρ_b). Finally, we saturate our estimations with firm-by-quarter fixed effects (γ_{it}), which allows us to control for time-varying firm-specific loan demand Khwaja and Mian (2008). Our estimates are thus driven by the comparison of loans to the same firm from two different banks in a given quarter.

To learn more about the reaction of banks to the shock throughout this period, we also estimate a dynamic model, which adapts equation (3) in a way that allows to examine the impact of the government exposure variables in each year:

$$
\begin{aligned}
Credit_{ibt} = & \sum_{\tau=2007,\tau\neq2010}^{2015} \boldsymbol{\beta}_{1\tau} Period_\tau \times Government\ Contract_b + \\
& \sum_{\tau=2007,\tau\neq2010}^{2015} \boldsymbol{\beta}_{2\tau} Period_\tau \times Sovereign\ Debt_b + \\
& \sum_{\tau=2007,\tau\neq2010}^{2015} \boldsymbol{\beta}_{3\tau} Period_\tau \times Construction_b + \\
& \sum_{\tau=2007,\tau\neq2010}^{2015} \boldsymbol{\beta}_{4\tau} Period_\tau \times SOE_b + \\
& \boldsymbol{\alpha} BankChar_{bt} + \rho_b + \gamma_{it} + \varepsilon_{ibt}
\end{aligned} \tag{4}
$$

While equation (3) allows us to understand how firms were heterogeneously affected due to the exposure of their banks to the sovereign shock, it is also important to investigate if firms were able to substitute potential adverse effects on access to credit with loans from other less affected banks. In order to evaluate the aggregate impact on access to credit at the firm level we estimate the following firm-level regression:

$$
\begin{aligned}
Credit_{it} = & \boldsymbol{\beta}_1 Post \times Government\ Contract_i + \boldsymbol{\beta}_2 Post \times Sovereign\ Debt_i + \\
& \boldsymbol{\beta}_3 Post \times Construction_i + \boldsymbol{\beta}_4 Post \times SOE_i + \boldsymbol{\alpha} BankChar_{it} + \\
& \boldsymbol{\chi} FirmChar_{it} + \boldsymbol{\zeta} CreditDemand_{it} + \rho_{mt} + \gamma_{jt} + \varepsilon_{it}
\end{aligned} \tag{5}
$$

where the dependent variable $Credit_{it}$ is the logarithm of one plus credit granted to firm i in quarter t. In this specification, the exposure variables are aggregated at the firm level, with weights given by the share of credit granted to the firm by each bank. Bank characteristics are also aggregated by firm using the same weights. Firm controls ($FirmChar_{it}$) include assets, age, profitability (EBIT/Assets), cash holdings (Cash/Assets), a loss dummy variable and liquidity (current ratio) at the annual frequency. All the variables are defined in the Appendix.

The firm-level regressions canot control for firm-specific loan demand using firm-by-quarter fixed effects, as in equation (3). However, we control for the firm-specific time-variant demand shocks using the estimates for γ_{it} from equation (3), as in Jiménez *et al.* (2014) and Cingano *et al.* (2016). The regressions also include municipality-by-quarter (ρ_{mt}) and industry-by-quarter (γ_{jt}) fixed effects.

Finally, it is crucial to understand if credit constraints arising from the banks' exposure to the sovereign shocks lead to changes in firm-level outcomes. We estimate real effects using the following regression:

$$\begin{aligned} Y_{it} = & \boldsymbol{\beta}_1 Post \times Government\ Contract_i + \boldsymbol{\beta}_2 Post \times Sovereign\ Debt_i + \\ & \boldsymbol{\beta}_3 Post \times Construction_i + \boldsymbol{\beta}_4 Post \times SOE_i + \boldsymbol{\alpha} BankChar_{it} + \\ & \boldsymbol{\chi} FirmChar_{it} + \boldsymbol{\zeta} CreditDemand_{it} + \rho_{mt} + \gamma_{jt} + \varepsilon_{it} \end{aligned} \tag{6}$$

where the dependent variable is firms' sales growth, assets growth, investment, employment growth, profitability, productivity, cash holdings or leverage. Other variables are defined as in equation (5).

2.4. Data and Summary Statistics

2.4.1. Data Sources. We merge four administrative data sets on government contracts, loans, firms and banks.

To identify the set of firms which are directly affected by the fiscal austerity measures imposed in the Spring of 2011, we collect data from BASE, which includes information on all government procurement contracts since 2011. The database is managed by the Institute of Public Markets, Real Estate and Construction and includes information about the amount, date and duration of the contracts, as well as the identification of all the parties involved.

Using this identification, we are able to match firms with government contracts to the Credit Register, managed by Banco de Portugal. This data cover all loans granted by banks to non-financial firms at the quarterly frequency. This allows us to build bank-level exposure measures to firms with government contracts.

To capture the heterogeneity of the banks affected by exposures to firms severely hit by the austerity measures, we can match the Credit Register data with quarterly bank-level data from supervisory reports. Our sample includes only banks with a market share above or equal to 2% of the credit market, thus excluding small banks that are specialized in some regions or sectors. Bank characteristics include bank size (measured as the log value of total assets), non-performing loans as a fraction of credit, loan-to-deposit ratio, banks' market power, and return on assets (ROA).

We draw firm characteristics from the IES database. The database is a joint project of Banco de Portugal, Statistics Portugal, the Ministry of Finance and the Ministry of Justice and includes detailed yearly accounting information on all the firms operating in Portugal since 2006.

The final sample consists of a firm-bank panel at the quarterly frequency. We use information on government contracts in the period immediately before the bailout. Our firm-bank-quarter sample includes information on incorporated firms between 2007Q1 and 2015Q4. The firms included in the sample must have at least two bank relationships in 2011 (to allow for firm-by-quarter fixed effects to control for firm-specific loan demand, as in Khwaja and Mian (2008)).

2.4.2. Variables and Descriptive Statistics. Table 1 reports summary statistics of the variables.[2]. Panel A reports summary statistics of the firm-bank-quarter data, which includes 5,011,934 observations. We consider several types of bank exposure to the government. While our focus is on the exposures through loans granted to firms that had government contracts ($Government\ Contract$) we also control for direct exposures through sovereign bond holdings or loans ($Sovereign\ Debt$) and loans granted to state-owned companies (SOE). The mean $Sovereign\ Debt$ is 6.2% of total assets, which is actually smaller than the mean exposure to firms with $Government\ Contract$ (9.4%). This sovereign debt is comprised of bonds (4.2%) and loans (2%). Banks also have a sizable exposure to SOEs at 2.2%. We also control for the exposure to the construction sector ($Construction$), which represents 23.2% of banks' assets. All exposure variables are measured as of 2011Q2.

To study bank lending, we consider three credit variables: $Total\ Credit$ (which includes undrawn credit lines), $Credit\ Drawn$ and $Overdue\ Credit$. $Total\ Credit$ captures changes in loan supply more accurately because firms usually draw down previously committed credit lines as a liquidity insurance mechanism during crises (Ippolito *et al.* 2016). However, it might also be relevant to examine changes in firms' borrowing using only $Credit\ Drawn$.

When we collapse the data at the firm-quarter level (Table 1, Panel B), the sample includes 460,423 observations. Firm-level variables are winsorized at the bottom and top 1%. Firm-level variables include total assets, sales, capital expenditures (Capex), earnings before interest and taxes (EBIT), value added, number of employees, and age. We compute several financial ratios: Value Added/Employees, Capex/Assets, EBIT/Assets, Cash/Assets, a loss dummy (which takes the value one if the firm has negative operating income) and the current ratio (current assets/total assets). The median firm in the sample has 6 employees and roughly half a million of euros of sales. Since the data cover the population of firms, we are able to consider the entire spectrum of the firm size distribution, even with the restriction that each firm must have at least two bank relationships.[3]

Our identification strategy exploits the variation in bank exposure to firms with government contracts. Table 2, Panel A provides a comparison of banks with exposure to firms with government contracts above and below the median in the pre-crisis period (2007-2010) using the bank-firm matched sample. The banks that are more exposed to firms with government contracts are actually less exposed to the direct channels through which sovereign-bank links typically operate (i.e., bond holdings and loans granted to the government), thus reinforcing the importance of examining the government procurement channel. In addition, banks with high

2. Table A.1 in the Appendix provides variable definitions

3. Altavilla *et al.* (2020) show that Portugal is one of the euro area countries where borrowing from more than one bank is more common. Firms with at least two bank relationships represent 44% of the pool of borrowers and 80% of credit granted to non-financial firms.

government contract exposure are also more exposed to SOEs, but less to firms in the construction sector.

The group of high exposure banks also differs on other characteristics that we include as control variables. These banks are smaller, have less non-performing loans in their balance sheets, rely more on deposit funding and are significantly more profitable.

Panel B of Table 2 compares firms with and without government contracts in the pre-crisis period. We find that 14% of the firm-quarter observations have government contracts. Using the firm-level sample, we observe that firms in the two groups borrow from banks that have relatively similar exposure levels. However, firms with government contracts differ in a few dimensions relative to firms without government contracts. Firms with contracts are larger, older, more profitable, hold less cash, and have more current assets than firms without contracts.

3. Credit Supply Effects

3.1. Main Results

We first test whether the pre-bailout banks' exposure to firms with government contracts affects credit supply after the bailout estimating equation (3) at the firm-bank-quarter level. Table 3 presents the estimates of our difference-in-differences approach that compares loans before and after the bailout (the treatment) for banks with high exposure to firms with government contracts (treated banks) versus banks with low exposure to firms with government contracts (control banks).

Columns (1)-(3) report the results for credit growth at the firm-bank-quarter level, considering the total exposure of each bank to a firm (i.e., including undrawn credit lines). In column (1), we consider only the exposure variable related to government contracts, while controlling for potentially relevant time-variant bank characteristics, bank fixed effects and firm-by-quarter fixed effects. By using firm-by-quarter fixed effects, we are comparing loans granted to the same firm by two different banks in the same quarter. We find that the coefficient associated with the interaction variable $Post \times Government\ Contract$, β_1, is negative at 3.1% and statistically significant. This indicates that a one percentage point increase in government contract exposure leads to a 3.1% drop in credit supply after the bailout. This finding indicates that banks more exposed to firms with government contracts reduced lending more than less exposed banks after the bailout.

In column (2) we add banks' direct sovereign debt exposure through bond holdings and loans. When we control for sovereign debt exposure, we find that banks with more exposure also reduced lending to firms after the bailout. This confirms previous results on the importance of sovereign bond holdings in the sovereign-bank nexus (Altavilla *et al.* (2017); Acharya *et al.* (2018); Ongena *et al.* (2019); Campos *et al.* (2019)). Importantly, the new channel that we document in this paper remains economically and statistically important when we control for

sovereign debt exposure. The indirect exposure to the sovereign arising from loans granted to firms with government contracts actually has a larger effect on credit supply to firms at 4.7% versus the sovereign debt exposure at 2.5%.

In column (3) we control for the banks' exposures to the construction sector. This might be relevant because a large fraction of firms with government contracts operates in the construction sector (Figure 2, Panel C). Moreover, some banks have larger exposures to this pro-cyclical sector, thus making them more vulnerable when the economy enters a recession (Bonfim *et al.* 2020). Exposures to the construction sector are marginally statistically significant and negative, suggesting that banks more exposed to this sector lend less after the bailout. In this column we also control for the banks' exposure to state-owned enterprises (SOE), which might be considered another form of direct sovereign-bank exposure. However, this channel does not seem to affect bank lending.

Despite the potential relevance of exposures to the construction sector and SOE, our main coefficient of interest remains statistically significant and becomes economically larger. In this more complete specification, we find that a one percentage point increase in exposure to government contracts leads to a 5.6% drop in credit supply after the bailout.

Columns (4)-(6) of Table 3 report the same three specifications, but considering as dependent variable only the $Credit\ Drawn$ (thereby excluding the undrawn amount of credit lines). The results are entirely consistent, with the exception of the exposure to SOE, which becomes positive and marginally statistically significant, and construction, which is now not statistically significant. The effect of government contract exposure remains economically and statistically significant. If anything, the effects is slightly stronger at 5.7% in the most complete specification in column (6).

Finally, in columns (7)-(9) we examine the effects of the bank's exposures to the sovereign on loan quality as proxied by $Overdue\ Credit$. The estimate in column (7) suggests that banks that are more exposed to firms with government contracts show an increase in credit overdue after the bailout, but the estimates are only marginally significant when we control for the direct measures of sovereign exposure (column 9). The direct channel seems to work in the opposite direction, as banks with higher exposure to sovereign debt have less overdue credit after the bailout.

Figure 3 reports the coefficients $\beta_{1\tau}$ for each year in the sample (2010 is the reference year).[4] Panels A and B of Figure 3 show a contraction in credit supply almost immediately after the bailout. The drop in lending gets more pronounced over time as loans reach their maturity and firms ask for refinancing. Four years after the shock, the coefficients are below -10%. Crucially, the figure shows no evidence of preexisting differential trends as banks' exposure to firms with government contract does not seem to affect credit supply before the bailout. Panel C of Figure 3

4. We use the specification in column (3) of Table 3

reports the coefficients for the effects on credit overdue. The dynamic specification confirms that there are no consistent effects on loan performance as a result of banks' exposure to government contracts through firms in the loan portfolio, except for a temporary positive effect in 2013.

The results presented so far are anchored on the unweighted definition of government contract exposure. However, it might be relevant to consider also the importance of government contracts for the firm. In Table 4 we report the results using both the weighted and unweighted measures. In this case, the coefficients are standardized, to make the comparison of coefficients more legitimate across the two measures. The results show that the results are generally consistent. The coefficients on our variable of interest are always negative and statistically significant. In the weighted version, a one standard deviation increase in government contract exposure leads to a 7.8% decrease in credit supply (column 3). In the unweighted version, an increase of the same magnitude in government contract exposure leads to a 12.5% decrease in credit supply (column 6). If anything, the results using the unweighted measure underestimate the economic magnitude of the effects. However, we still prefer to use this variable as its interpretation is clearer than that of the weighted version. While the unweighted measure gives us a percentage exposure that can be compared with the direct exposures to the sovereign through bonds, loans and SOEs, the weighted measure does not have a meaningful scale. In the rest of the paper we refer only to the unweighted measure, but the conclusions remain always valid regardless of the measure used.

3.2. Firms with Contracts versus Firms without Contracts

So far we have examined the effects of banks' exposure to firms with government contracts on credit granted to all firms. However, it is possible that not all firms are affected in the same way. One important dimension to analyze is whether banks reduce lending more aggressively to firms with government contracts than to other similar firms with no contracts in the post-bailout period. There are at least two reasons that would support that behavior. First, these firms were particularly hit by the fiscal austerity measures and banks may wish to reduce their exposure due to risk management concerns. In addition, the banks that were not exposed to these firms should also share this risk concern and might adopt a similar lending policy. The second reason is related to the differential exposure that lies at the core of our identification strategy. The banks that are more exposed to these firms suffer larger shocks. As such, they might be more keen on mitigating their exposures to stop the flow of losses. A related reason is that more exposed banks may have an informational advantage over firms with government procurement contracts and move faster when they perceive that the fiscal austerity measures will hit these firms more severely.

Table 5 reports the estimates of a set of specifications that are identical to those in Table 3, but estimated separately for the group of firms with government contracts and firms without government contracts. Both for total credit (columns

1 and 2) and credit drawn (columns 3 and 4), we find that banks more exposed to government contracts cut lending to both to firms with contracts and firms without contracts after the bailout. However, in all the specifications, the coefficients are larger for firms with contracts than for firms without contracts and the differences are statistically significant.

We conclude that even the firms without links to the public sector through procurement contracts were adversely affected in terms of access to credit from banks more exposed to firms with government contracts. This is evidence of a spillover of the effects of government contracts to firms without government contracts through the banking system. This spillover contributes to exacerbate the adverse effects of the sovereign-bank loop. While the effect on credit supply is pervasive across firms, banks that were more exposed to firms with government contracts cut lending more to firms at the origin of this specific shock.

When we examine the effects of the shock on credit overdue, we can see an interesting pattern. While we could not find robust evidence of changes in credit overdue after the shock as a result of the exposure to firms with government contracts, in Table 5, columns (5) and (6) show significant differences between firms with contracts and firms without contracts. We find a significant increase in credit overdue in the sample of firms with contracts, but the effect is insignificant in the sample of firms without contracts. It is not surprising to find an increase in overdue loans for firms that were hit by a large package of austerity measures. Importantly, these coefficients capture the differential effect on credit overdue arising from a link with (at least) two banks with different degrees of exposure to the shock. Thus, for the same firm, we observe a larger increase in credit overdue to the banks that are more exposed to the shock to start with, thus reinforcing the feedback loop.

As before, we estimate a dynamic version of the equations, to better capture how the transmission of the shock unfolds over time. Panels A and B of Figure 4 show that access to credit becomes more challenging for the firms with government contracts. The effects are immediate and much stronger than for the firms without contracts. Panel C of Figure 4 also confirms that the effects on credit overdue are only significant for firms with government contracts. The effects are statistically significant in 2012 and 2013 and then become statistically insignificant. Crucially, the figure shows no evidence of preexisting differential trends as banks' exposure to firms with government contract does not seem to affect credit supply before the bailout.

3.3. Lending Relationships

We have presented results on how bank exposure to government contracts affects credit supply. Even though the variables are constructed in a way that considers both the intensive and the extensive margin (due to the inclusion of observations with zeros before and after a lending relationship is initiated or dropped), the results are largely dominated by the evolution of credit within a firm-bank relationship. Thus, it is also important to examine more precisely the initiation and termination

of lending relationships, as these outcomes might have long lasting implications on the allocation of credit in the economy.

Table 6 presents the estimates of a linear probability model of dropped or new bank-firm relationships using a cross-sectional sample of bank-firm pairs. We present the results separately for the sample of firms without government contracts and firms with government contracts. In columns (1)-(2), the dependent variable is a dummy variable that takes a value of one if a firm i which has a lending relationship with bank b in the 12 months prior to the shock (2011Q2) drops this relationship with the bank during the post-shock period 2011Q3-2015Q4, and zero otherwise. In columns (3)-(4), the dependent variable is a dummy variable that takes a value of one if a firm i which has not borrowed from bank b in the 12 months prior to the shock (2011Q2) initiates a new lending relationship with the bank during the post-shock period 2011Q3-2015Q4, and zero otherwise.

The estimates in columns (1)-(2) indicate that banks more exposed to firms with government contracts are more likely to drop an existing lending relationship. As before, the estimates are significant for both firms with contracts and firms without contracts. This provides further support that the fiscal austerity shock affected not only firms with contracts but also firms without contracts, as affected banks cut lending across the board. However, the effect is more pronounced in the sample of firms with contracts. Thus, our results provide evidence of a spillover effect of the government procurement channel to firms without government contracts at the extensive margin through the banking system. Of course, firms with government contracts were hit by a twin shock: a sudden drop in demand arising from the fiscal austerity measures and a freeze in access to credit due to banks' exposure to this shock.

The results are not exactly the same for the other spectrum of the extensive margin, i.e., new lending relationships (columns 3 and 4). Banks with higher exposure to firms with government contracts are significantly less likely to establish new lending relationships with firms. However, the effect is statistically significant only in the sample of firms with contracts, suggesting a reallocation of credit away from firms with government contracts for the banks that were more exposed to the shock.

4. Firm Outcomes

4.1. Loan Effects

The bank-firm-quarter level analysis shows that firms are significantly constrained in their access to credit from banks more exposed to firms with government contracts after the bailout. A key issue is to understand if firms were able to compensate this reduction in credit supply with loans from other banks.

To examine this issue, we estimate equation (5) at the firm-quarter level. The banks' exposure variables are aggregated at the firm level. The weights are the share

of credit granted to each firm by each bank at the time of the shock. The firm-level regressions do not allow to control for firm-specific credit demand using firm-by-quarter fixed effects, but we control for firm-specific time-variant credit demand through the coefficients obtained in the estimation of equation (3) (Jiménez *et al.* 2014; Cingano *et al.* 2016).

In Table 7 we report the estimates separately for the samples of firms with contracts and firms without contracts. In columns (1) and (2) we report the baseline estimates for these two groups, for total credit. We find that firms were not able to substitute the drop in credit from the banks more exposed to firms with government contracts in both specifications. This indicates that banks less exposed to the shock were not willing (or able) to entirely substitute their more exposed peers. We also find that firms with contracts were significantly more affected than firms without contracts in terms of access to credit. The results are similar when we consider only credit drawn (columns 3 and 4).

The results on credit overdue (columns 5 and 6) suggest that a more complex mechanism was at work in this domain. While at the firm-bank level we find that credit overdue increased only for firms with contracts (Table 5), the firm-level estimates show that credit overdue increased mainly for firms without contracts. Taken together, these results suggest that there was a significant interplay between more and less affected banks. Firms with contracts could only have been able to counteract the increase in credit overdue with the affected banks if there was a decrease in credit overdue with less affected banks. One possibility is that less affected banks were willing to forego or postpone some of the losses that could arise from these firms with contracts. This result would be consistent with evergreening (Blattner *et al.* 2021). For firms without contracts, we see the opposite pattern. While these firms do not have significant increases in credit overdue with the more affected banks, they have significantly higher levels of credit overdue than firms without contracts.

4.2. Real Effects

In a final step, we examine the impact of the banks' credit supply reduction due to the government procurement channel on firm policies and performance. We consider several firm outcomes: sales growth, asset growth, investment, employment, earnings before interest and taxes (EBIT) and value added. Table 8 reports the estimates separately for the samples of firms with contracts and firms without contracts.

Panel A presents the estimates for $Sales\ Growth$ and Panel B presents the estimates for $Asset\ Growth$. In the case of sales growth, we find that the interaction variable $Post \times Government\ Contract$ coefficient is negative but only significant in the case of firms without contracts. In the case of assets growth, the effect is negative and significant in all specifications. Asset growth declines 1.1% for firms with and without contracts, for a one percentage point increase in government exposure after the bailout.

Panel C presents the estimates for investment ($CAPEX/Assets$). We find that the interaction variable coefficient is negative and significant for both firms with contracts and firms without contracts. The results indicate that firms cut investment as a consequence of a reduction in credit supply from from banks exposed to firms with government contracts after the bailout, regardless of whether they were themselves exposed to the demand shock or not. A one percentage point increase in the government contract exposure variable leads to an investment reduction of 0.2% in corporate investment.

Panel D presents the estimates for investment in human capital. We find that the interaction variable coefficient is negative for $Employment\ Growth$ for all firms, for both types of firms. The estimates indicate that employment shrinks by about 0.6% for one percentage point increase in the bank's exposure to firms with government contracts.

Panels E and F examine the effect of the credit supply reduction due to the government procurement channel on profitability ($EBIT/Assets$) and productivity ($Value\ Added/Employees$). The effects are also negative but insignificant in all cases. Finally, Panel G and H look at cash holdings and leverage. For these two variables, borrowing from banks more exposed to government contracts also does not lead to significant changes. The only noteworthy exception is an increase in cash holdings for firms without contracts. These firms may be less negatively affected by the shock, thereby being able to build cash buffers for precautionary motives during a crisis.

In short, we find that firms suffered a reduction in sales, growth, investment and jobs due to their banks' exposure to firms with government contracts.[5] Banks with higher exposure to firms with government contracts reduced credit supply, which in turn affected firm polices and performance. The effects are visible for both firms with contracts and firms without contracts.

5. Conclusion

We study the link between credit supply and the bank loan portfolio exposure to firm's with procurement contracts with the government. We exploit the variation due to the 2010-2011 sovereign debt crisis, when fiscal austerity measures implemented in European periphery countries led to a large and unanticipated shock to government spending.

We show that banks with higher pre-crisis exposure to firms with government contracts reduce lending significantly more than banks with lower exposure to these firms. The contraction in credit supply affects firms with government contracts but there are also spillovers to firms without government contracts. In addition,

5. We also examine if there are direct effects on firms' performance, comparing similar firms with and without government contracts. Using a propensity score matching estimator, we find that firms with government contracts showed a decrease in sales, investment and exports after the bailout.

firms were not able to substitute this reduction in loans by borrowing from less affected banks. As a result, the reduction in credit supply due to the government procurement channel generates adverse effects on the real economy. We find that firms exposed to affected banks have significantly lower sales, assets growth, employment growth, investment and performance.

Our findings identify a new and important channel that exacerbates the diabolic loop between sovereign and bank risk. The banks' exposure to firms with government contracts operates beyond and above the exposure to sovereign bonds and can have an important effect on credit supply during fiscal austerity shocks. This new channel can contribute to deepen the recessionary effects of a sovereign crises through a reduction in credit supply that lead to a decline in economic growth and therefore a reduction in tax revenue, which also negatively impacts the government solvency.

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Panel A: Bank-Firm Matched Sample						
	Mean	Q1	Median	Q3	Std. Dev.	Observations
Bank Exposure Variables						
Government Contract	0.0943	0.0805	0.0873	0.1039	0.0229	5,011,934
Sovereign Debt	0.0621	0.0398	0.0693	0.0776	0.0308	5,011,934
Sovereign Bond	0.0421	0.0362	0.0410	0.0518	0.0249	5,011,934
Sovereign Loan	0.0200	0.0108	0.0190	0.0259	0.0139	5,011,934
Construction	0.2317	0.2033	0.2491	0.2568	0.0627	5,011,934
SOE	0.0217	0.0134	0.0202	0.0228	0.0128	5,011,934
Bank Characteristics						
Bank Size (€ billion)	53.2829	19.4370	47.4770	85.4040	37.0278	5,011,934
Non-Performing Loans	0.0673	0.0220	0.0482	0.0845	0.0716	5,011,934
Loan-to-Deposit	0.9380	0.8611	0.9245	0.9864	0.4013	5,011,934
Market Power	0.1006	0.0400	0.0887	0.1676	0.0669	5,011,934
Bank ROA	0.0177	-0.0857	0.0903	0.2243	0.9001	5,011,934
Credit Variables						
Total Credit (€ thousand)	427.2720	16.7200	54.6230	196.8750	3,622.7729	5,011,934
Credit Drawn (€ thousand)	388.9627	15.0000	50.0000	180.3429	3,270.4805	5,011,934
Overdue Credit (€ thousand)	15.8193	0.0000	0.0000	0.0000	502.1080	5,011,934
Panel B: Firm-Level Sample						
	Mean	Q1	Median	Q3	Std. Dev.	Observations
Firm Exposure Variables						
Government Contract	0.0929	0.0832	0.0905	0.1013	0.0166	460,423
Sovereign Debt	0.0667	0.0528	0.0666	0.0802	0.0232	460,423
Sovereign Bond	0.0453	0.0361	0.0457	0.0539	0.0192	460,423
Sovereign Loan	0.0214	0.0140	0.0207	0.0278	0.0108	460,423
Construction	0.2320	0.2052	0.2370	0.2540	0.0464	460,423
SOE	0.0214	0.0161	0.0206	0.0254	0.0093	460,423
Firm Characteristics						
Assets (€ thousand)	4,850.3291	215.2669	557.3177	1,629.3199	117,586.7554	460,423
Sales (€ thousand)	3,005.3899	145.3182	419.2017	1,311.4418	47,652.7365	460,423
Capex (€ thousand)	125.1147	0.0000	3.6639	38.5146	8,925.3517	460,423
EBIT (€ thousand)	176.9727	-1.6035	13.3638	53.2163	10,707.3656	460,423
Value Added (€ thousand)	705.9891	38.8105	117.6152	339.9169	9,753.9487	460,423
Employees	21.9546	3.0000	6.0000	15.0000	179.0372	460,423
Value Added/Employees (€ thousand)	30.1172	10.6956	17.8404	28.0162	515.5236	460,423
Capex/Assets	0.0366	0.0000	0.0069	0.0477	0.1390	460,423
EBIT/Assets	-0.0112	-0.0041	0.0284	0.0617	0.3683	460,423
Firm Age	16.1117	8.0000	13.0000	22.0000	11.7660	460,423
Cash/Assets	0.0979	0.0103	0.0375	0.1155	0.1513	460,423
Loss Dummy	0.1750	0.0000	0.0000	0.0000	0.3800	460,423
Current Ratio	0.6745	0.4948	0.7362	0.9032	0.2665	460,423

Table 1. Summary Statistics

Notes: This table reports the mean, first quartile (Q1), median, third quartile (Q3), standard deviation and number of observations of each variable for the bank-firm matched sample in Panel A and firm-level sample in Panel B. The bank-firm matched sample at the quarterly frequency over the 2007-2015 period is drawn from the Portuguese credit register and contains banks with a market share of at least 2 percent of the credit market. Firms included in the sample should be present in 2011 with at least two bank relationships and have yearly data available to calculate firm characteristics over the sample period 2007-2015. Bank exposure variables are measured as of 2011Q2. Firm exposure variables are constructed based on the bank exposure variables as the weighted average across all banks with whom the firm has a lending relationship. Firm-level variables are winsorized at the 1st and 99th percentiles. Variable definitions are provided in Table A.1 in the Appendix.

Panel A: Banks with High versus Low Government Contract Exposure								
	High Government Exposure Banks			Low Government Exposure Banks			T-test	Wilcoxon signed rank test
	Mean	Median	Observations	Mean	Median	Observations		
Bank Exposure Variables								
Government Contract	0.1101	0.1039	1,151,440	0.0793	0.0824	1,257,228	0.0000	0.0000
Sovereign Debt	0.0502	0.0537	1,151,440	0.0720	0.0776	1,257,228	0.0000	0.0000
Sovereign Bond	0.0337	0.0410	1,151,440	0.0485	0.0517	1,257,228	0.0000	0.0000
Sovereign Loan	0.0165	0.0190	1,151,440	0.0235	0.0259	1,257,228	0.0000	0.0000
Construction	0.2235	0.2329	1,151,440	0.2358	0.2491	1,257,228	0.0000	0.0000
SOE	0.0271	0.0305	1,151,440	0.0175	0.0202	1,257,228	0.0000	0.0000
Bank Characteristics								
Bank Size (€ billion)	31.8946	34.6190	1,151,440	70.1913	85.4040	1,257,228	0.0000	0.0000
Non Performing Loans	0.0248	0.0190	1,151,440	0.0404	0.0235	1,257,228	0.0000	0.0000
Loan-to-Deposit	0.9408	0.9273	1,151,440	1.0049	0.9980	1,257,228	0.0000	0.0000
Market Power	0.0626	0.0810	1,151,440	0.1382	0.1760	1,257,228	0.0000	0.0000
Bank ROA	0.2654	0.1879	1,151,440	0.1155	0.1585	1,257,228	0.0000	0.0000
Credit Variables								
Total Credit (€ thousand)	323.7476	50.0000	1,151,440	585.5772	71.7420	1,257,228	0.0000	0.0000
Drawn Credit (€ thousand)	284.2209	46.0000	1,151,440	499.7499	63.1535	1,257,228	0.0000	0.0000
Overdue Credit (€ thousand)	3.0558	0.0000	1,151,440	6.9843	0.0000	1,257,228	0.0000	0.0151

Table 2. Mean and Median Tests

Panel B: Firms with Government Contracts versus Firms without Government Contracts								
	Contract			No Contract			T-test	Wilcoxon signed rank test
	Mean	Median	Observations	Mean	Median	Observations		
Firm Exposure Variables								
Government Contract	0.0941	0.0915	28,996	0.0924	0.0900	178,020	0.0047	0.0600
Sovereign Debt	0.0681	0.0684	28,996	0.0665	0.0664	178,020	0.0000	0.0000
Sovereign Bond	0.0445	0.0452	28,996	0.0455	0.0460	178,020	0.0000	0.0000
Sovereign Loan	0.0235	0.0230	28,996	0.0210	0.0202	178,020	0.0000	0.0000
Construction	0.3565	0.3644	28,996	0.3640	0.3700	178,020	0.0000	0.0000
SOE	0.0228	0.0215	28,996	0.0211	0.0204	178,020	0.0000	0.0000
Firm Characteristics								
Assets (€ thousand)	13,630.5827	1,234.1259	28,996	3,059.1135	503.9105	178,020	0.0000	0.0000
Sales (€ thousand)	9,874.3868	1,265.9775	28,996	1,808.4600	404.7728	178,020	0.0000	0.0000
Capex (€ thousand)	429.9947	34.2701	28,996	102.7796	8.1351	178,020	0.0000	0.0000
EBIT (€ thousand)	842.1038	46.5537	28,996	109.2963	14.8792	178,020	0.0000	0.0000
Value Added (€ thousand)	2,240.5052	373.6861	28,996	453.6169	115.0498	178,020	0.0000	0.0000
Employees	62.1657	15.0000	28,996	15.2155	6.0000	178,020	0.0000	0.0000
Value Added/Employees (€ thousand)	32.6626	23.7760	28,996	33.10471	18.1234	178,020	0.8864	0.0000
Capex/Assets	0.0597	0.0263	28,996	0.0601	0.0153	178,020	0.6388	0.0000
EBIT/Assets	0.0446	0.0416	28,996	0.0126	0.0332	178,020	0.0000	0.0000
Firm Age	17.3569	15.0000	28,996	13.9668	11.0000	178,020	0.0000	0.0000
Cash/Assets	0.0868	0.0404	28,996	0.1037	0.0414	178,020	0.0000	0.0019
Loss Dummy	0.0706	0.0000	28,996	0.1425	0.0000	178,020	0.0000	0.0000
Current Ratio	0.7126	0.7623	28,996	0.6720	0.7303	178,020	0.0000	0.0000

Table 2. *Continued*

Notes: This table compares the pre-crisis (2007-2010) characteristics of banks with above the median (high) and below the median (low) government contract exposure in Panel A and firms with government contracts (Contract) and without government contracts (No Contract) in Panel B. Panel A is based on the bank-firm matched sample. Panel B is based on the firm-level sample. The table reports number of observations, mean, median, p-values of two-sample t-test for the difference in means and Wilcoxon signed-rank test for the difference in medians. The sample includes only banks with a market share of more than 2 percent of the credit market in Portugal. Bank exposure variables are measured as of 2011Q2. Firm exposure measures are constructed based on the bank exposure variables as the weighted average across all banks with whom the firm has a lending relationship. Firm-level variables are winsorized at the 1st and 99th percentiles. Variable definitions are provided in Table A.1 in the Appendix.

	Panel A: Total Credit			Panel B: Credit Drawn			Panel C: Overdue Credit		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Post × Government Contract	-3.058***	-4.734***	-5.458***	-3.520***	-4.847***	-5.729***	1.622***	1.307***	0.754*
	(0.395)	(0.505)	(0.741)	(0.436)	(0.532)	(0.767)	(0.253)	(0.342)	(0.446)
Post × Sovereign Debt		-2.461***	-2.993***		-1.949***	-2.226***		-0.463	-0.993***
		(0.416)	(0.505)		(0.330)	(0.386)		(0.304)	(0.349)
Post × Construction			-0.416*			0.089			-0.518***
			(0.231)			(0.251)			(0.169)
Post × SOE			0.652			2.415*			-0.049
			(1.248)			(1.397)			(0.910)
Bank Size	-0.116***	-0.050*	-0.030	-0.110***	-0.058**	-0.052**	-0.096***	-0.084***	-0.062***
	(0.041)	(0.027)	(0.026)	(0.038)	(0.027)	(0.026)	(0.031)	(0.029)	(0.023)
Non-Performing Loans	0.413***	0.420***	0.438***	0.272*	0.277**	0.319**	1.311***	1.312***	1.320***
	(0.155)	(0.135)	(0.127)	(0.156)	(0.141)	(0.134)	(0.111)	(0.106)	(0.099)
Loan-to-Deposit	0.039***	0.036***	0.035***	0.031***	0.028***	0.029***	-0.003	-0.003	-0.005
	(0.007)	(0.007)	(0.007)	(0.007)	(0.006)	(0.006)	(0.004)	(0.004)	(0.004)
Market Power	4.044***	3.011***	2.675***	4.300***	3.481***	3.734***	4.081***	3.887***	3.408***
	(0.648)	(0.623)	(0.719)	(0.590)	(0.574)	(0.694)	(0.408)	(0.400)	(0.454)
Bank ROA	-0.008	-0.011*	-0.009*	-0.008	-0.010*	-0.009*	-0.016***	-0.016***	-0.015***
	(0.007)	(0.005)	(0.005)	(0.006)	(0.006)	(0.006)	(0.004)	(0.004)	(0.003)
Firm × Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	5,011,934	5,011,934	5,011,934	5,011,934	5,011,934	5,011,934	5,011,934	5,011,934	5,011,934
Adjusted R^2	0.457	0.457	0.457	0.423	0.423	0.423	0.588	0.588	0.588

Table 3. Bank-Firm Credit Supply Results

Notes: This table presents the estimates of credit supply regressions using the quarterly bank-firm matched sample over the 2007-2015 period. The sample includes only banks with a market share of more than 2 percent of the credit market in Portugal. The dependent variables are the log of one plus total credit, credit drawn, and overdue credit in Panel A, Panel B and Panel C, respectively. The government contract exposure is the fraction of firms in the loan portfolio with government contracts. Post is a dummy variable that takes a value of one for firm-bank observations in the period 2011Q3-2015Q4, and zero otherwise. The bank exposure variables (government contract exposure, sovereign debt exposure, construction exposure and SOE exposure) are measured as of 2011Q2. Bank controls are measured at the quarterly frequency. The regressions include firm-by-quarter fixed effects and bank fixed effects. Standard errors clustered at bank-quarter level are reported in parentheses. ***, ** and * indicate statistical significance at the 1%, 5% and 10% level, respectively.

	Panel A: Weighted Measure			**Panel B: Unweighted Measure**		
	(1)	(2)	(3)	(4)	(5)	(6)
Post × Governmen Contract	-0.058***	-0.085***	-0.078***	-0.070***	-0.108***	-0.125***
	(0.009)	(0.012)	(0.014)	(0.009)	(0.012)	(0.017)
Post × Sovereign Debt		-0.059***	-0.062***		-0.076***	-0.092***
		(0.013)	(0.013)		(0.013)	(0.016)
Post × Construction			-0.018			-0.026*
			(0.017)			(0.015)
Post × SOE			-0.046***			0.008
			(0.013)			(0.016)
Bank Size	-0.089**	-0.025	-0.024	-0.116***	-0.050*	-0.030
	(0.035)	(0.027)	(0.027)	(0.041)	(0.027)	(0.026)
Non-Performing Loans	0.475***	0.500***	0.403***	0.413***	0.420***	0.438***
	(0.156)	(0.141)	(0.132)	(0.155)	(0.135)	(0.127)
Loan-to-Deposit	0.039***	0.036***	0.035***	0.039***	0.036***	0.035***
	(0.007)	(0.007)	(0.006)	(0.007)	(0.007)	(0.007)
Market Power	3.698***	2.765***	2.256***	4.044***	3.011***	2.675***
	(0.627)	(0.628)	(0.710)	(0.648)	(0.623)	(0.719)
Bank ROA	-0.007	-0.008	-0.008	-0.008	-0.011*	-0.009*
	(0.007)	(0.006)	(0.006)	(0.007)	(0.005)	(0.005)
Firm × Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	5,011,934	5,011,934	5,011,934	5,011,934	5,011,934	5,011,934
Adjusted R^2	0.457	0.457	0.457	0.457	0.457	0.457

Table 4. Bank-Firm Credit Supply Results: Weighted vs Unweighted Exposures

Notes: This table presents the estimates of credit supply regressions using the quarterly bank-firm matched sample over the 2007-2015 period. The sample includes only banks with a market share of more than 2 percent of the credit market in Portugal. The dependent variables are the log of one plus total credit. In Panel A, the government contract exposure is measured as the fraction of firms in the loan portfolio with government contracts, weighted by the size of a firm's government contracts relative to the firm's total assets. In Panel B, the government contract exposure is measured as the fraction of firms in the loan portfolio with government contracts. Post is a dummy variable that takes a value of one for firm-bank observations in the period 2011Q3-2015Q4, and zero otherwise. The bank exposure variables (government contract exposure, sovereign debt exposure, construction exposure and SOE exposure) are measured as of 2011Q2. Bank controls are measured at the quarterly frequency. The regressions include firm-by-quarter fixed effects and bank fixed effects. Standard errors clustered at bank-quarter level are reported in parentheses. ***, ** and * indicate statistical significance at the 1%, 5% and 10% level, respectively.

	Panel A: Total Credit		**Panel B: Credit Drawn**		**Panel C: Overdue Credit**	
Sample	No Contract	Contract	No Contract	Contract	No Contract	Contract
	(1)	(2)	(3)	(4)	(5)	(6)
Post × Government Contract	-5.298***	-6.198***	-5.360***	-7.363***	0.291	2.872***
	(0.718)	(0.908)	(0.748)	(0.902)	(0.441)	(0.560)
Post × Sovereign Debt	-2.881***	-3.607***	-2.075***	-2.996***	-1.110***	-0.369
	(0.491)	(0.642)	(0.403)	(0.379)	(0.342)	(0.466)
Post × Construction	-0.458**	-0.288	0.010	0.396	-0.484***	-0.602***
	(0.222)	(0.302)	(0.242)	(0.315)	(0.175)	(0.193)
Post × SOE	0.814	-1.122	2.162	2.431	0.395	-1.713
	(1.194)	(1.647)	(1.346)	(1.737)	(0.929)	(1.073)
[1em] Bank Controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm × Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4,178,969	832,965	4,178,969	832,965	4,178,969	832,965
Adjusted R^2	0.448	0.447	0.418	0.410	0.588	0.574
	Test of Differences					
	Contract - No Contract		Contract - No Contract		Contract - No Contract	
Post × Government Contract	-0.900*		-2.003***		2.581***	
	(0.471)		(0.461)		(0.367)	
Post × Sovereign Debt	-0.727**		-0.921***		0.741**	
	(0.365)		(0.274)		(0.319)	
Post × Construction	0.170		0.386**		-0.118	
	(0.169)		(0.164)		(0.152)	
Post × SOE	-1.936**		0.269		-2.108***	
	(0.967)		(0.924)		(0.805)	

Table 5. Bank-Firm Credit Supply Results: Firms with Contract vs. Firms without Contract Firms

Notes: This table presents the estimates of credit supply regressions using the quarterly bank-firm matched sample over the 2007-2015 period. The sample includes only banks with a market share of more than 2 percent of the credit market in Portugal. The results are shown separately for the sample of firms without government contracts (No Contract) and firms with government contracts (Contract). The dependent variables are the log of one plus total credit, credit drawn, and overdue credit in Panel A, Panel B and Panel C, respectively. The bank exposure variables (government contract exposure, sovereign debt exposure, construction exposure and SOE exposure) are measured as of 2011Q2. Post is a dummy variable that takes a value of one for firm-bank observations in the period 2011Q3-2015Q4, and zero otherwise. The regressions include the same bank controls at the quarterly frequency as in Table 3 (coefficients not shown). The regressions include firm-by-quarter fixed effects and bank fixed effects. Standard errors clustered at bank-quarter level are reported in parentheses. ***, ** and * indicate statistical significance at the 1%, 5% and 10% level, respectively.

	Panel A: Dropped		**Panel B: New**	
Sample	No Contract	Contract	No Contract	Contract
	(1)	(2)	(3)	(4)
Government Contract	1.795***	2.828***	-0.100	-0.605***
	(0.083)	(0.175)	(0.070)	(0.157)
Sovereign Debt	-1.410***	-0.743***	0.320***	0.111
	(0.069)	(0.149)	(0.059)	(0.134)
Construction	-1.532***	-1.927***	1.233***	1.492***
	(0.070)	(0.148)	(0.059)	(0.133)
SOE	0.054	-0.376	-1.732***	-3.233***
	(0.174)	(0.371)	(0.148)	(0.332)
Bank Controls	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Observations	201,340	37,419	201,340	37,419
Adjusted R^2	0.308	0.311	0.006	0.067
	Test of Differences			
	Contract - No Contract		Contract - No Contract	
Government Contract	1.033***		-0.504***	
	(0.197)		(0.169)	
Sovereign Debt	0.667**		-0.209	
	(0.167)		(0.143)	
Construction	-0.395**		0.259*	
	(0.166)		0.142	
SOE	-0.430		-1.501***	
	(0.416)		0.356	

Table 6. Dropped and New Bank-Firm Relationship Results

Notes: This table presents the estimates of a linear probability model of dropped or new bank-firm relationships using a cross-sectional sample of bank-firm pairs. The sample includes only banks with a market share of more than 2 percent of the credit market in Portugal. The results are shown separately for the sample of firms without government contracts (No Contract) and firms with government contracts (Contract). In Panel A, the dependent variable is a dummy variable that takes a value of one if firm *i* who has a relationship with bank *b* in the 12 months prior to the shock (2011Q2) discontinues its relationship with the bank during the post-shock period 2011Q3-2015Q4. In Panel B, the dependent variable is a dummy variable that takes a value of one if firm *i* who has not borrowed from bank *b* in the 12 months prior to the shock (2011Q2) establishes a new relationship with the bank during the post-shock period 2011Q3-2015Q4. The bank exposure variables (government contract exposure, sovereign debt exposure, construction exposure and SOE exposure) and bank controls are measured as of 2011Q2. The regressions include firm fixed effects. Standard errors are reported in parentheses. ***, ** and * indicate statistical significance at the 1%, 5% and 10% level, respectively.

	Panel A: Total Credit		Panel B: Credit Drawn		Panel C: Overdue Credit	
Sample	No Contract	Contract	No Contract	Contract	No Contract	Contract
	(1)	(2)	(3)	(4)	(5)	(6)
Government Contract	4.106***	5.350***	3.222***	3.983***	2.326***	0.787
	(0.208)	(0.549)	(0.217)	(0.597)	(0.304)	(0.668)
Post × Government Contract	-2.429***	-3.988***	-2.404***	-3.811***	2.986***	2.100*
	(0.223)	(0.577)	(0.232)	(0.614)	(0.456)	(1.139)
Other Bank Exposures	Yes	Yes	Yes	Yes	Yes	Yes
Post × Other Bank Exposures	Yes	Yes	Yes	Yes	Yes	Yes
Bank Controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm Controls	Yes	Yes	Yes	Yes	Yes	Yes
Credit Demand	Yes	Yes	Yes	Yes	Yes	Yes
Municipality × Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry × Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,462,400	245,458	1,462,400	245,458	1,462,400	245,458
Adjusted R^2	0.881	0.883	0.874	0.871	0.871	0.842
	Test of Differences					
	Contract - No Contract		Contract - No Contract		Contract - No Contract	
Post × Government Contract	-1.560**		-1.407**		-0.866	
	(0.610)		(0.646)		(1.209)	

Table 7. Firm Credit Supply Results

Notes: This table presents the estimates of credit supply regressions using the quarterly firm-level sample over the 2007-2015 period. The estimates are shown separately for the sample of firms without government contracts (No Contract) and firms with government contracts (Contract). The sample includes only banks with a market share of more than 2 percent of the credit market in Portugal. The dependent variables are the log of one plus total credit, credit drawn, and overdue credit in Panel A, Panel B and Panel C, respectively. The firm-level sample is constructed from the bank-firm matched sample. The credit amount is aggregated at the firm level across all banks with whom the firm has a lending relationship. The bank exposure variables (government contract exposure, sovereign debt exposure, construction exposure and SOE exposure) are constructed as the weighted average of the corresponding bank-level variable according to the share of credit granted to the firm by each bank as of 2011Q2. Post is a dummy variable that takes a value of one for firm-bank observations in the period 2011Q3-2015Q4, and zero otherwise. The regressions include the same bank controls at the quarterly frequency as in Table 3 (coefficients not shown). Credit demand at the quarterly frequency is the firm-specific time-variant demand shocks following Jiménez et al. (2014) and Cingano et al. (2016), estimated from the firm-bank credit supply regressions. The bank controls and credit demand are constructed each quarter as the weighted average of the corresponding bank-level variable according to the share of credit granted to the firm by each bank. Firm controls at the annual frequency include assets, age, profitability (EBIT/Assets), cash holdings (Cash/Assets), a loss dummy variable and liquidity (current ratio). The regressions include municipality-by-quarter and industry-by-quarter fixed effects. Standard errors clustered at bank-quarter level are reported in parentheses. ***, ** and * indicate statistical significance at the 1%, 5% and 10% level, respectively.

	Panel A: Sales Growth		Panel B: Asset Growth		Panel C: CAPEX/Assets		Panel D: Employment Growth	
Sample	No Contract	Contract	No Contract	Contract	No Contract	Contract	No Contract	Contract
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Government Contract	1.693***	0.648	0.833***	1.073**	0.238***	0.255***	0.644***	0.623***
	(0.460)	(0.832)	(0.204)	(0.446)	(0.036)	(0.075)	(0.101)	(0.227)
Post × Government Contract	-2.237***	-0.879	-1.087***	-1.139**	-0.165***	-0.198**	-0.655***	-0.639**
	(0.527)	(0.858)	(0.217)	(0.463)	(0.048)	(0.089)	(0.127)	(0.280)
Other Bank Exposures	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Post × Other Bank Exposures	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Credit Demand	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Municipality × Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry × Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	381,175	65,117	394,706	65,419	394,706	65,419	376,176	64,776
Adjusted R^2	0.038	0.078	0.088	0.129	0.084	0.111	0.068	0.095
			Test of Differences					
	Contract - No Contract		Contract - No Contract		Contract - No Contract		Contract - No Contract	
Post × Government Contract	1.358		-0.052		-0.033		0.015	
	(0.996)		(0.505)		(0.100)		(0.304)	

Table 8. Firm Real Effects

	Panel E: EBIT/Assets		Panel F: Value Added/Employees		Panel G: Cash/Assets		Panel H: Debt/Assets	
Sample	No Contract	Contract	No Contract	Contract	No Contract	Contract	No Contract	Contract
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Government Contract	0.088	0.224**	0.986***	1.145**	0.075	0.135	-0.528	-0.331
	(0.065)	(0.095)	(0.231)	(0.529)	(0.055)	(0.125)	(0.912)	(0.233)
Post × Government Contract	-0.106	-0.208	-0.405	-0.613	0.115**	-0.002	1.668	0.750
	(0.130)	(0.155)	(0.253)	(0.522)	(0.055)	(0.115)	(5.679)	(0.838)
Other Bank Exposures	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Post × Other Bank Exposures	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Credit Demand	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Municipality × Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry × Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	394,706	65,419	348,020	62,935	394,706	65,419	394,706	65,419
Adjusted R^2	0.069	0.058	0.340	0.338	0.161	0.134	0.006	0.036
	Test of Differences							
	Contract - No Contract		Contract - No Contract		Contract - No Contract		Contract - No Contract	
Post × Government Contract	-0.102		-0.208		-0.117		-0.918	
	(0.201)		(0.573)		(0.126)		(5.753)	

Table 8. *Continued*

Notes: This table presents the estimates of real effects regressions using the annual firm-level sample over the 2007-2015 period. The estimates are shown separately for the sample of firms without government contracts (No Contract) and firms with government contracts (Contract). The sample includes only banks with a market share of more than 2 percent of the credit market in Portugal. The dependent variables are sales growth in Panel A, asset growth in Panel B, the Capex/Assets ratio in Panel C, the employment growth rate in Panel D, the EBIT/Assets ratio in Panel E, the Value-added/Employees ratio in Panel F, the Cash/Assets ratio in Panel G, and the Debt/Assets ratio in Panel H, respectively. The bank exposure variables (government contract exposure, sovereign debt exposure, construction exposure and SOE exposure) are constructed as the weighted average of the corresponding bank-level variable according to the share of credit granted to the firm by each bank as of 2011Q2. Post is a dummy variable that takes a value of one for firm-bank observations in the period 2011Q3-2015Q4, and zero otherwise. The regressions include the same bank controls at the annual frequency as in Table 3 (coefficients not shown). Credit demand at the annual frequency is the firm-specific time-variant demand shocks following Jiménez et al. (2014) and Cingano et al. (2016), estimated from the firm-bank credit supply regressions. The bank controls and credit demand are constructed each year as the weighted average of the corresponding bank-level variable according to the share of credit granted to the firm by each bank. Firm controls at the annual frequency include assets, age, profitability (EBIT/Assets), cash holdings (Cash/Assets), a loss dummy variable and liquidity (current ratio). The regressions include municipality-by-year and industry-by-year fixed effects. Standard errors clustered at firm level are reported in parentheses. ***, ** and * indicate statistical significance at the 1%, 5% and 10% level, respectively.

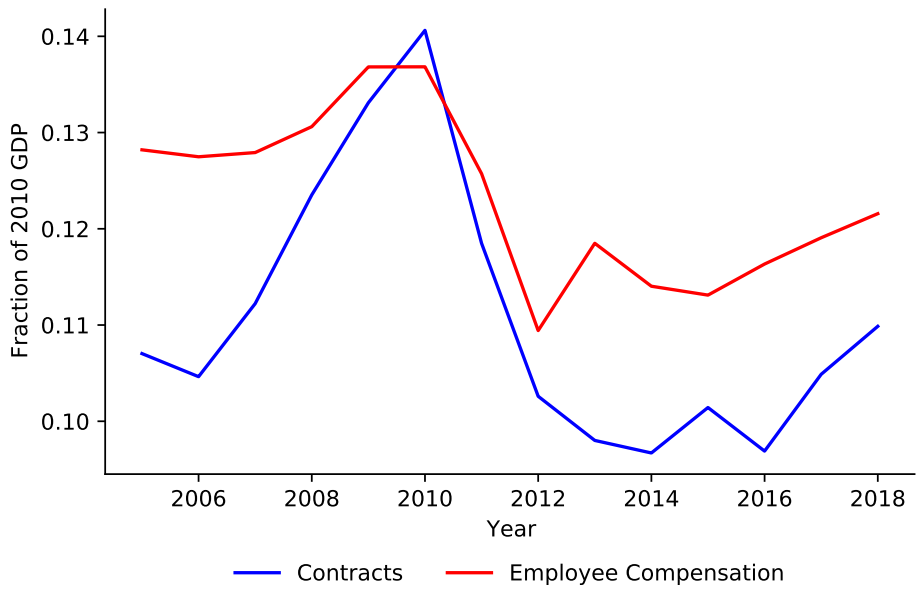
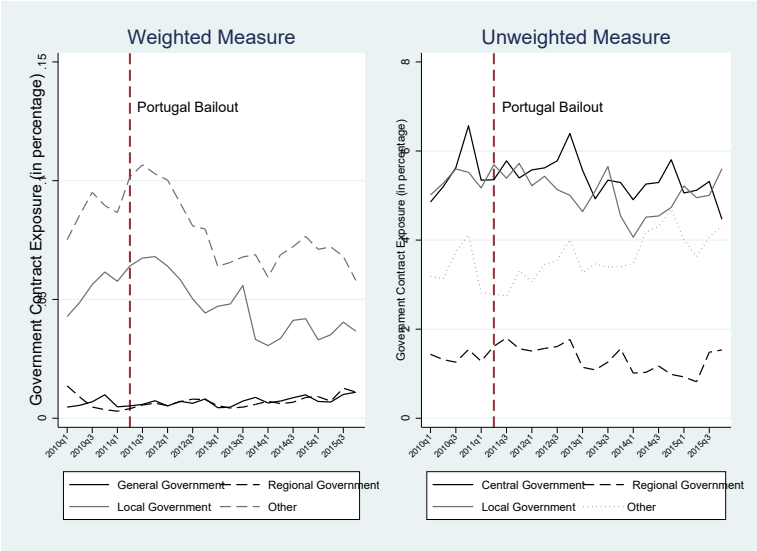


Figure 1: Government Spending in Contracts and Employee Compensation

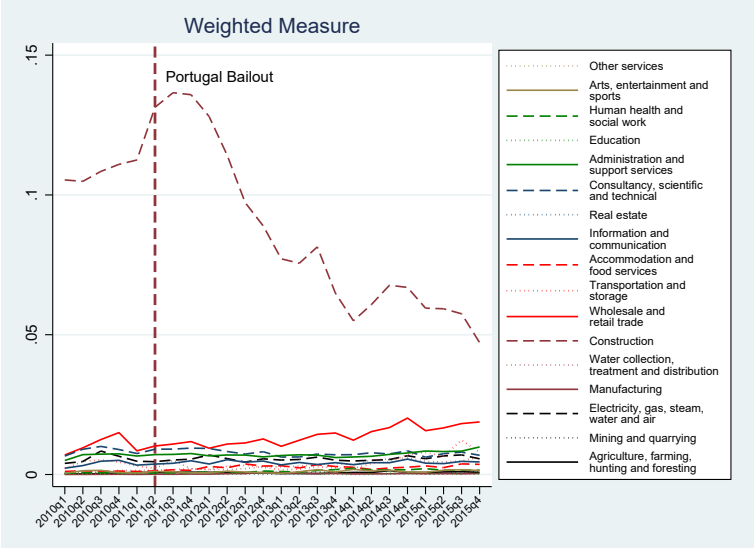
Note: This figure plots the aggregate amount of government spending in procurement contracts and in employee compensation as a fraction of 2010 GDP.

(a) Panel A: Overall

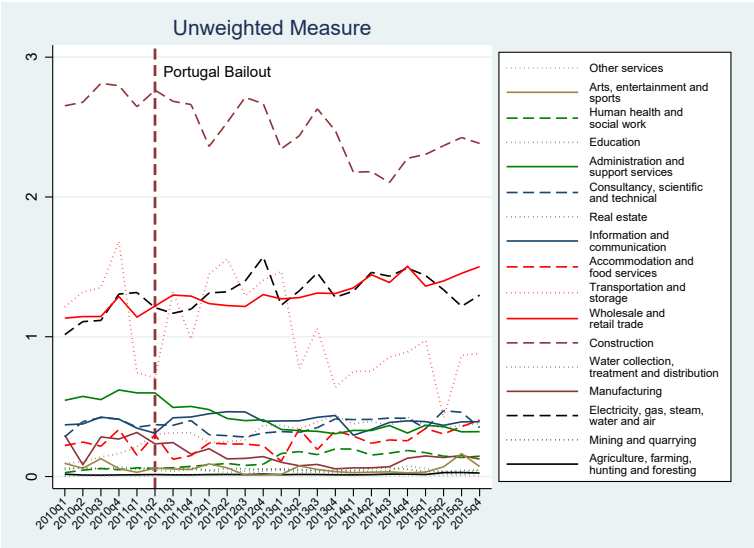


(b) Panel B: Government Type

Figure 2: Aggregate Bank Exposure to Government Contracts



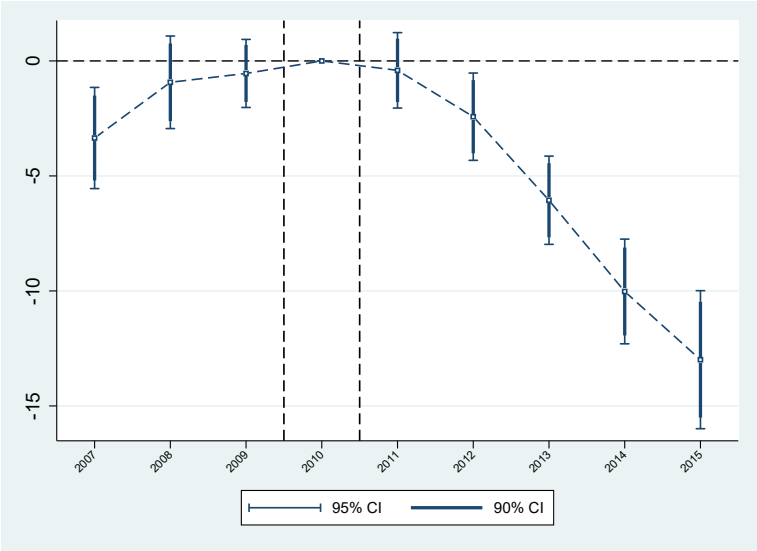
(c) Panel C: Sector - Weighted Measure



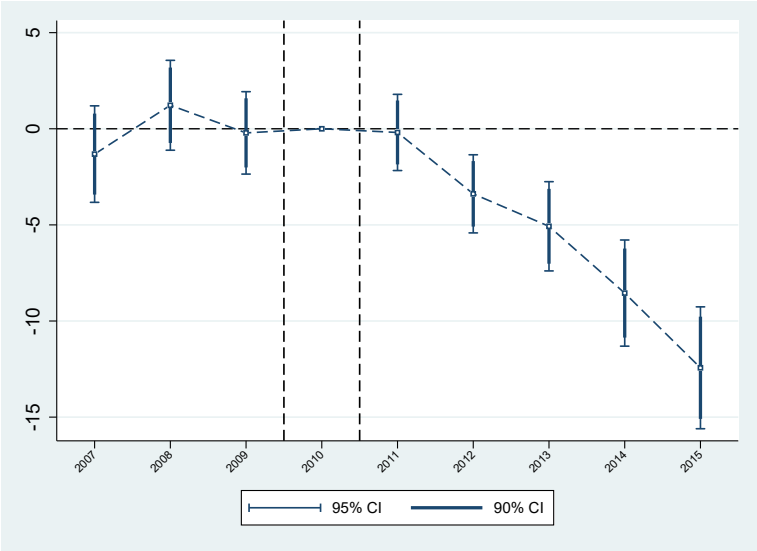
(d) Panel D: Sector - Unweighted Measure

Figure 2: *Continued*

Notes: This figure shows the aggregate bank credit exposure to firms with government contracts (in percentage, both weighted and unweighted) at the quarterly frequency. Panel A shows the overall government contract exposure, Panel B shows the government contract exposure by government type, and Panel C shows the government contract exposure by sector at the 2-digit industry code (NACE2). The vertical dashed lines denote the quarter when Portugal entered into the Financial Assistance Program (i.e., Portuguese Bailout). The sample includes only banks with a market share of more than 2 percent of the credit market in Portugal.

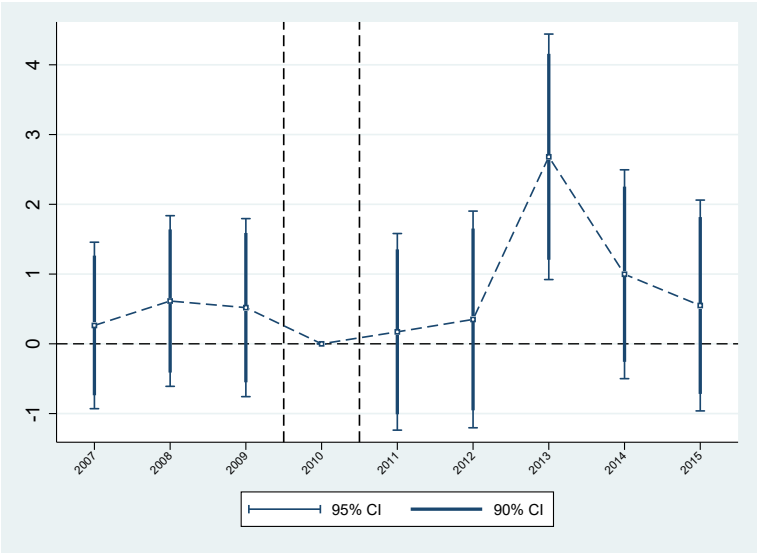


(a) Panel A: Total Credit



(b) Panel B: Credit Drawn

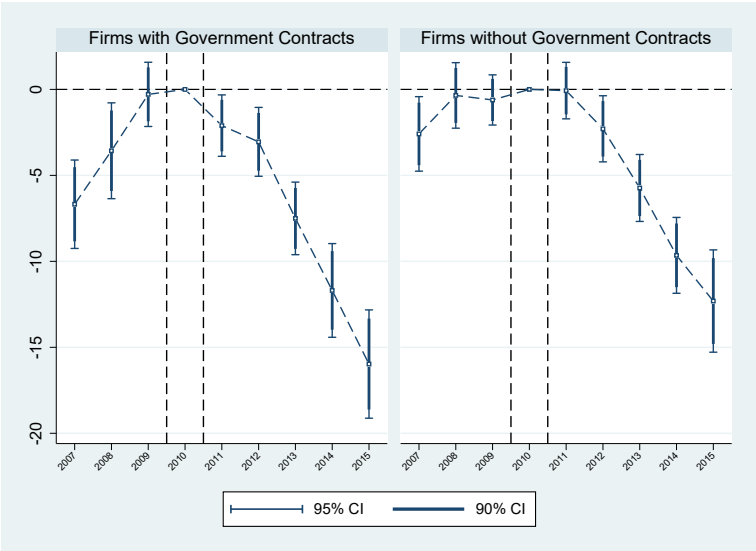
Figure 3: Effects of Government Contract Exposure: Full Sample



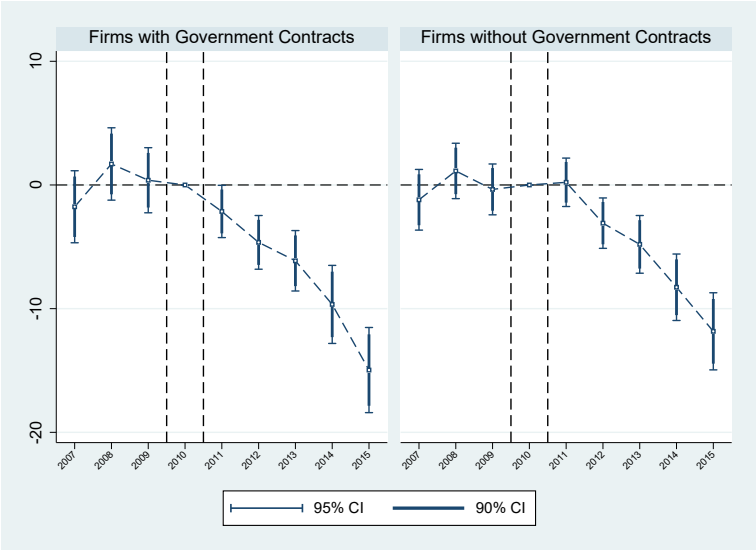
(c) Panel C: Overdue Credit

Figure 3: *Continued*

Notes: This figure shows point estimates and confidence intervals of the government contract exposure coefficient using the quarterly bank-firm matched sample over the 2007-2015 period and a dynamic difference-in-differences regression, which corresponds to columns (3), (6), and (9) of Table 3. The sample includes only banks with a market share of more than 2 percent of the credit market in Portugal. The dependent variables are the log of one plus total credit, credit drawn, and overdue credit in Panel A, Panel B and Panel C, respectively. Standard errors clustered at bank-quarter level are reported in parentheses.

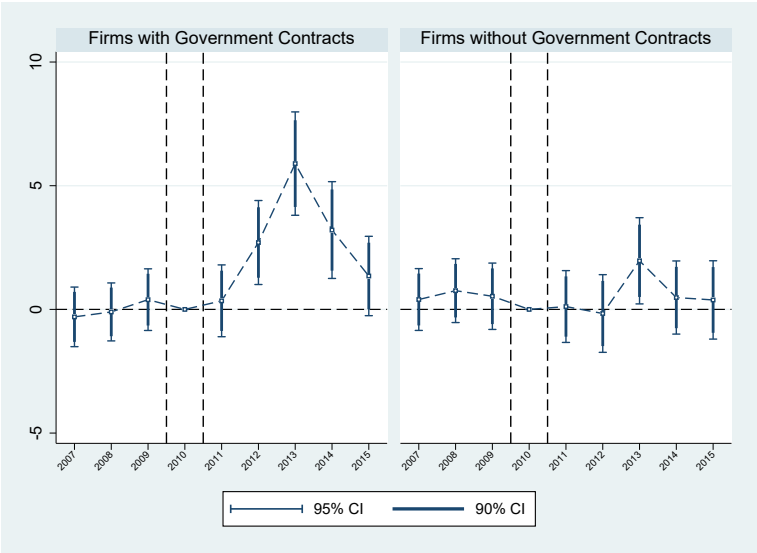


(a) Panel A: Total Credit



(b) Panel B: Credit Drawn

Figure 4: Effect of Government Contract Exposure: Firms with Contract vs. Firms without Contract



(c) Panel C: Overdue Credit

Figure 4: *Continued*

Notes: This figure shows point estimates and confidence intervals of the government contract exposure coefficient using the quarterly bank-firm matched sample over the 2007-2015 period and a dynamic difference-in-differences regression, which corresponds to Table 5. The results are shown separately for the sample of firms without government contracts (No Contract) and firms with government contracts (Contract). The sample includes only banks with a market share of more than 2 percent of the credit market in Portugal. The dependent variables are the log of one plus total credit, credit drawn, and overdue credit in Panel A, Panel B and Panel C, respectively. Standard errors clustered at bank-quarter level are reported in parentheses.

Appendix: Variable Definitions

Bank Exposures	
Government Contract	Bank exposure to firms with government contracts, i.e., the ratio of each bank's lending to firms with government contracts outstanding to the bank's total lending.
Sovereign Debt	Bank's exposure to domestic sovereign debt, i.e., the ratio of sovereign debt holdings to total assets.
Sovereign Bond	Bank's exposure to domestic sovereign bonds, i.e., the ratio of sovereign bond holdings to total assets.
Sovereign Loan	Bank's exposure to domestic sovereign loans, i.e., the ratio of sovereign loans to total assets.
Construction	Bank's exposure to the construction industry, i.e., the ratio of lending to construction firms to total lending.
SOE	Bank's exposure to state-owned enterprises (SOEs), i.e., the ratio of lending to SOEs to total lending.
Bank Characteristics	
Bank Size	Logarithm of bank's total assets.
Non-Performing Loans	Ratio of non-performing loans to total loans.
Loan-to-Deposit	Ratio of total loans to total deposits.
Market Power	Share of a bank's loan portfolio in total loans granted by all financial institutions.
Bank ROA	Ratio of profits to total assets.
Credit Characteristics	
Total Credit	Logarithm of one plus firm's credit outstanding, including undrawn credit facilities.
Credit Drawn	Logarithm of one plus firm's credit outstanding, excluding undrawn credit facilities.
Overdue Credit	Logarithm of one plus firm's overdue credit.
Firm Characteristics	
Assets Growth	Growth rate of total assets.
Sales Growth	Growth rate of sales.
Employees Growth	Growth rate of the number of employees.
Capex/Assets	Ratio of capital expenditure to total assets.
EBIT/Assets	Ratio of earnings before interest and taxes to total assets.
Value Added/Employees	Ratio of value added to total employees, where value added is the difference between sales (turnover plus remaining income) and production costs (i.e., costs of goods sold and material consumed plus cost related to supplies and external services and indirect taxes).
Cash/Assets	Ratio of cash reserves to total assets.
Debt/Assets	Ratio of total debt to total assets.
Firm Size	Logarithm of total assets.
Firm Age	Logarithm of the number of years elapsed since firm's foundation.
Cash/Assets	Ratio of cash and bank deposits to total assets.
Loss Dummy	Dummy variable that takes the value of one if net operating income is negative and zero otherwise.
Current Ratio	Ratio of total current assets to total assets.

Table A.1. Variable Definitions

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