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Differential Crowding Out Effects of Government Loans and Bonds: Evidence from an Emerging Market Economy*

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Abstract

We provide the first empirical evidence that the "type" of bank lending to the government affects the extent of crowding out in an Emerging Market and Developing Economy (EMDE). For this purpose, we build a new dataset combining proprietary information on all loans granted by commercial banks to non-financial private firms and the government in Mexico, along with data on government bonds held by these banks. By exploiting heterogeneity in firms' exposure to different types of bank lending to the government within this unique dataset, we show for the first time that the size of crowding out of credit to small and medium-sized firms (SMEs) varies significantly across debt instruments. Specifically, we find that the crowding-out effect is around three times larger for bank loans than for bank holdings of government bonds. This reduced crowding-out effect of bonds is linked to banks' ability to use them as collateral in the interbank market, which helps them raise secured funding and reduces the need to curtail credit supply to firms. Our findings underscore the importance of well-developed sovereign bond markets in mitigating the adverse effects of government borrowing on credit access for SMEs, particularly in EMDEs where credit markets are underdeveloped and these firms are more credit-constrained.

JEL Codes: E44, H63, G20.
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1 Introduction

Since the publication of Keynes' "General Theory of Employment, Interest, and Money" in 1936, different schools of economics have presented contrasting arguments concerning the impact of fiscal policy. One crucial point of contention focuses on the possibility of a crowding out effect, whereby public spending could displace private credit and investment, thus reducing the size of the fiscal multiplier. This debate has gained relevance in the wake of the COVID-19 pandemic, as governments worldwide have increased their spending, resulting in historically high levels of sovereign debt.[1]

Given the growing interest in the fiscal multiplier and crowding out, recent studies have shown that foreign financing of public debt results in a lower crowding-out effect compared to domestic financing (Broner et al., 2022; Priftis and Zimic, 2021; Williams, 2018). However, a significant gap exists in the earlier and contemporary literatures about whether the size of crowding out depends on the instrument through which financing is provided. This paper fills this gap by studying the differential crowding-out effects of different types of lending provided to the government in an Emerging Market and Developing Economy (EMDE), notably Mexico. It compares the effects of lending to the government through bank loans versus banks' holdings of government bonds on credit supplied to small and medium-sized firms (SMEs). For this purpose, it builds a unique dataset combining information on all loans granted by commercial banks to non-financial private firms and the government in Mexico, along with data on government bonds held by these banks. To the best of our knowledge, this is the first paper to construct a dataset combining data on both loans to the government and holdings of government bonds for any country. Therefore, it is also the first one to estimate the differential crowding-out effects of two distinct forms of financing in the context of an EMDE.[2]

Our main finding is that lending to the government through bank loans leads to a crowding-out effect on SME credit that is three times greater than that resulting from banks' holdings of government bonds. This finding is particularly important for EMDEs for several reasons. First, government bond markets are underdeveloped in EMDEs, thus governments in these countries are more reliant on bank loans.[3] Second, firms, especially SMEs, are more

[1]The global public debt increased by $19.5 trillion in 2020 reaching a level that had been unprecedented in the period following the second world war. See https://www.bloomberg.com/graphics/2021-coronavirus-global-debt/.

[2]Combing these two types of data may be challenging since their nature is different and may be reported to different institutions. For example, in Mexico, loan data is informative on the quality of credit origination and is reported to the regulator (the National Banking and Securities Commission), while detailed bond data are transactional and are reported to the central bank.

[3]According to the Quarterly Public Sector Debt Statistics Database from the World Bank, public sector borrowing in the UK in the form of debt securities was 32 times higher than in the form of loans in 2020.

financially constrained in EMDE due to heightened concerns about information asymmetry and shallower credit markets (Gutierrez et al., 2023). Hence, it is especially important for EMDEs to mitigate crowding out to alleviate the potential negative effects of government borrowing on financial development, particularly concerning credit access for SMEs and firm investment. Finally, crowding-out effects lower the positive impact of public spending on economic activity, limiting the government's capacity to generate revenues and repay sovereign debt—an important issue since EMDEs have lower debt limits than advanced economies (AEs) (Reinhart and Rogoff, 2009).

Considering these points, Mexico is a particularly interesting case for investigating the differential crowding-out effects of the two forms of financing. Within the sovereign debt markets of EMDEs, Mexico's sovereign debt market stands out as one of the most liquid and well-developed around the globe.[4] This feature provides a unique opportunity to evaluate the benefits linked with such a market and to glean insights about the potential advantages for other EMDEs in developing sovereign debt markets with similar characteristics. Moreover, in Mexico, banks tend to hold government bonds and lend to the government through loans, allowing us to compare the two forms of financing.

What explains our results on differential crowding out effects? In a world with perfect capital markets, how public sector spending is financed is irrelevant for private sector crowding out(Friedman, 1978). However, in the presence of imperfect capital markets and frictions in financial intermediation, the type of contract used can influence the extent of crowding out. For instance, when banks face adverse selection frictions in securing external finance, government bonds may result in lower crowding out due to the safety and liquidity services they provide, mitigating adverse selection frictions(Krishnamurthy and Vissing-Jorgensen, 2012, 2015). Additionally, government bonds can serve as collateral for securing funding in the interbank market, compensating for the resources diverted to the government. Hence, government bonds can lead to a lower crowding out effect on private credit.

Lack of data availability has prevented researchers from identifying differential crowding-out implications. We circumvent this challenge by focusing on the heterogeneity in bank-based intermediation of loanable funds to the public sector in Mexico. We obtain proprietary data for commercial banks for 2011-2019 which allows us to observe banks' loans to the

However, for developing countries such as Colombia, Guatemala and Paraguay, the average ratio of public bonds to loan financing is around 3.

[4]The higher liquidity of the government bond market is reflected in the consistently lower bid-ask spreads on government bonds in Mexico. According to Bloomberg's data, the average bid-ask spread for the 10-year government bond was 7.1 basis points for India, Korea, South-Africa, Malaysia, China Thailand, Chile, Russia, Brazil, Peru, Philippines, Czechia, Turkey, Indonesia, Hungry, Slovenia, Pakistan, Romania and Colombia over 2011-2019 (the period with the most available information overlapping our period of analysis) and only 3 basis points for Mexico.

public sector, bank-firm private credit relationships, and banks' holdings of government bonds. Moreover, since these data are sufficiently disaggregated, we can address concerns regarding credit supply vs credit demand effects. Specifically, our granular dataset enables us to exploit time and cross-sectional heterogeneity in firms' exposure to changes in lending to the public sector.

We conduct analysis at three levels: the bank level, the bank-firm level, and the firm level. The first level of analysis provides descriptive evidence, while the other two levels of analysis contain our preferred specifications to estimate the causal effect. Thus, we begin by presenting descriptive evidence of crowding-out effects using bank-level data. We find that an additional peso of bank lending to the government is associated with a 20-cent reduction in credit to SMEs. However, we uncover a novel stylized fact: this overall figure hides variations resulting from different forms of lending. More precisely, an additional peso of bank loans to the government is associated with a reduction of around 55 cents in SME credit, whereas an additional peso of banks' holdings of government bonds is associated with a much lower reduction of less than 10 cents.[5]

This negative link between banks' lending to the government and private credit to SMEs might reflect omitted variables driving firms' reduced demand for credit, which could simultaneously increase bank lending to the government. To address this concern, we exploit a proprietary dataset with loan-level data to isolate changes in credit supply. The identification strategy relies on the fact that a change in a firm's demand for credit should affect the financing it obtains from all banks and not only from those that increase their financing to the public sector (Khwaja and Mian, 2008; Morais et al., 2019). Using matched bank-firm level data and incorporating firm-time fixed effects, we find that a 1 percent increase in exposure to a bank's government lending results in a 0.37 percent reduction in the credit granted to the average firm borrowing from that bank, compared to the credit granted to the same firm by another bank that did not increase its public sector lending. This finding confirms that credit supply effects drive the negative effects on SME credit.

One drawback of the specification that includes firm-by-time fixed effects is that the estimation only considers firms that have loans with more than one bank at a given point in time. In our sample, these firms represent only 31% of all observations and may not be representative of all firms in the sample. To include all firms into our analysis, we follow Degryse et al. (2019) in our preferred specification by using state-by-industry-by-time fixed

[5]To further ensure that our bank-level results are not driven by omitted variables that simultaneously affect banks' exposure to the public sector and credit to private firms, we replicate the bank-level analysis using a Bartik-style measure of Government Lending Exposure at the bank level. We find that our results remain unchanged both quantitatively and qualitatively.

effects to proxy for common demand shocks, instead of firm-by-time fixed effects.[6] For the entire sample of firms, a 1 percent increase in exposure to a bank's government lending results in a 0.26 percent reduction in firm credit. We also find that a 1 percent increase in exposure to bank loans and holdings of government bonds leads to 0.47 and 0.16 percent reduction in credit granted to the average firm, respectively. Hence, consistent with our bank-level analysis, the loan-level analysis suggests that the crowding-out effect is around three times larger for bank loans than for bank holdings of government bonds.[7]

While the bank-firm-level analysis helps identify changes in credit supply, the aggregate crowding-out effect depends on a firm's ability to borrow from other lenders. This ability hinges on two factors: first, if a firm with multiple banking relationships can switch across lenders, its overall credit supply may not be affected; second, if all banks in a firm's existing network increase public sector lending and the firm can initiate a relationship with a new lender, its overall credit supply may remain unaffected. Hence, when analyzing crowding-out effects, it is crucial to understand what happens at the level of firms.

Thus, we aggregate loan-level data to the firm level for the entire sample. We construct a measure capturing the total exposure to the public sector of all banks a firm has relationships with. We find that as this exposure increases, the credit extended to the firm decreases. This decline suggests that the costs of switching lenders are high, as in most EMDEs, where informational asymmetries are more significant, resulting in firms often having relationships with one lender and facing difficulties forming relationships with new banks (Gutierrez et al., 2023).[8] Hence, the results at the firm level confirm that lending to the government does crowd out SME credit: a 1 percent increase in a firm's exposure to the government relates, on average, to a 0.33 percent reduction in its total credit. We also find, consistent with the bank- and bank-firm level analysis, that the crowding out effect is larger for bank loans: a 1 percent reduction in the exposure to public sector loans and bonds reduces firm credit by 0.47 and 0.15 percent, respectively, figures of similar magnitude as those obtained in the loan-level analysis. These findings confirm that the costs of switching lenders are high

[6]For the subsample of firms with more than one bank relationship, the specification that includes state-by-industry-by-time fixed effects provides almost the same point estimate than the more demanding one that incorporates firm-by-time fixed effects. This strongly suggests that state-by-industry-by time fixed effects constitute a good proxy for demand shocks at the firm level.

[7]The crowding-out effect at the loan level is slightly smaller for all firms than for the sub-sample of firms with more than one bank relationship. The larger coefficient captures that, given the same shock in one bank, these firms can easily switch to an alternative bank that knows them, did not reduce its credit supply to firms, and offers better credit conditions, an option that is more limited for firms that previously have credit with only one bank.

[8]In our sample, 79.69 percent of firms have relationships with just one bank during the entire period and only 5.51 percent of firms have relationships with 3 or more banks in at least one quarter. We also find that within firms that never had more than one relationship in a given period, only 3.7 percent formed a relationship with another bank, and on average each quarter fewer than 0.1% of the firms switched banks.

and, because this problem is more severe in EMDEs, underscore the significance of studying crowding-out effects in these economies.[9]

As noted above, the lower crowding-out of government bonds may stem from frictions in financial intermediation due to informational asymmetries, leading, for example, to problems of adverse selection. Additionally, it may result from the fact that bonds can be easily sold at any time in the secondary market, particularly in such a liquid debt market as Mexico's. This feature makes government bonds more liquid than loans, enabling banks to obtain funding to compensate for higher government lending. Moreover, bonds are considered safe and highly liquid assets, thus serving as collateral for securing funding in the interbank market and compensating for the resources diverted to the public sector. Thus, we conduct an additional exercise, providing support for this hypothesis by showing that a bank's interbank loans increase with its government bonds, but they are not affected by its government loans.

Our paper is motivated by the literature documenting the heterogeneous negative effects of public debt on private investment across countries. In their survey paper, Panizza and Presbitero (2013) argue that the link between public debt and growth is heterogeneous across countries and recommend that future research delves into the factors contributing to this heterogeneity.[10] Existing studies explore one dimension of this heterogeneity – who finances the public debt – and show that the magnitude of crowding out varies depending on the source of debt financing. For example, crowding-out effects are weaker when public debt is financed by foreign investors as opposed to domestic investors (Broner et al., 2022; Priftis and Zimic, 2021; Williams, 2018). Our paper contributes to this literature by focusing on how the financing is provided rather than on who finances it. While the question of who finances the public sector helps us learn about domestic resource constraints, the question of how the financing is provided relates to the frictions in the intermediation of government financing.

The paper contributes to a nascent literature that uses micro data to estimate crowding-out effects of government borrowing.[11] For example, Huang et al. (2020) show that local public debt issuance crowds out private investment by tightening firms' funding constraints in China. Pinardon-Touati (2021) finds that bank lending to local government negatively

[9]We also conduct a battery of robustness tests to ensure that our results are not driven by the specific definition of exposure we use. We construct alternate measures of exposure and find that irrespective of how we define Government Lending Exposure at the firm level, bank loans always generate a significantly larger crowding out effect on credit to private firms.

[10]Eberhardt and Presbitero (2015) provide evidence on the heterogeneity in the relationship between public debt and economic growth empirically using data for 118 countries over the period 1960 to 2012.

[11]The discussion on crowding out goes back to (Friedman, 1972) but the availability of micro data has only recently allowed researchers to get causal estimates. This discussion is part of the broader literature on the effects of public debt on economic growth (Reinhart and Rogoff, 2010; Checherita-Westphal and Rother, 2012; Reinhart et al., 2012)

affects firm investment in France. Önder et al. (2024) shows that banks' holdings of government bonds reduce firm investment in Colombia.[12] Our contribution to this literature is fourfold: first, we focus on how the government is financed and quantify the relative crowding-out effects of two important forms of financing, while existing studies do not take this heterogeneity into account. Second, to do so, we build a unique dataset combining information on government loans and government bonds that, to the best of our knowledge, is rarely available to researchers. Third, we address this question in the context of Mexico, providing insights relevant to understanding crowding-out effects in other EMDEs, where this question is more pertinent, as opposed to most studies in the literature, which focus on AEs. Fourth, we present evidence for a mechanism – the use of government bonds as collateral in interbank markets – through which crowding out is mitigated.

Given that the lower crowding out of government bonds can be attributed, at least in part, to financial intermediaries using them as collateral to secure external funding, our study aligns with a large literature documenting banks face frictions in raising external finance, and these frictions affect their credit supply following monetary policy shocks (Kashyap and Stein, 2000; Van den Heuvel, 2002; Gambacorta and Shin, 2018). We extend these findings by showing that external financing frictions influence the differential crowding-out effects on SME credit following increased bank financing of the public sector.

Finally, our paper complements the literature on the bank-sovereign nexus, which studies how banks' holdings of sovereign bonds could negatively impact their ability to lend during crises as sovereign risk increases (Acharya et al., 2018; Bottero et al., 2020; Popov and Van Horen, 2015; Becker and Ivashina, 2018). Unlike these studies, which do not distinguish between loans and bonds and focus solely on credit dynamics in crisis periods, our analysis is applicable outside of crisis periods and makes the distinction between bank loans and bonds the central focus of the paper.

[12]Other recent contributions that use micro data to identify the causal effect of public debt on crowding out of firm credit include Akkoyun et al. (2020) and Hoffman et al. (2022). Several studies have also documented negative correlations between public debt and private credit. Becker and Ivashina (2018) shows that banks' holdings of sovereign bonds in Eurozone countries depressed corporate loan supply. Demirci et al. (2019) provides evidence of a negative relationship between government debt and corporate leverage in an international setting using data on 40 countries between 1990-2014. Graham et al. (2016) documents a negative correlation between government debt and corporate leverage of unregulated firms in the U.S. over the period 1920-2010. Huang et al. (2018) document a negative relationship between corporate investment and government debt using firm-level data for a sample of advanced and emerging economies. None of these studies, however, take differences in composition of public sector financing into account, and do not disentangle loan demand from loan supply.

2 Data Description

Our analysis combines data from three sources: (i) publicly available bank-level data extracted from the balance sheets and income statements of banks; (ii) confidential bank-level data on banks' holdings of government bonds; and (iii) confidential loan-level data on the entire universe of credit lines issued by commercial private banks to non-financial private firms and the government in Mexico.

2.1 Bank-Level data

For the conditional correlations we calculate in section 3, we use publicly available bank-level data retrieved from the Mexican financial regulator's website (Comisión Nacional Bancaria y de Valores, CNBV), encompassing balance sheet and income statements of banks for 2011Q2-2019Q2. This data provides information on various bank characteristics, including deposits, profitability, capital ratios and bank health indicators, such as the firm delinquency rate, and information on the interbank loans secured by each bank we use in the analysis of Section 4. We combine these data with confidential information on loans extended by commercial banks to the government by type of debt instrument and to SMEs.

Panel A of Table 1 shows summary statistics for the variables used in bank-level analysis. The sample has 34 banks. The share of SME credit in total assets of the average bank is 12.7%, while the corresponding share for the government is comparable and equals 10.39% (approximately 27 billion Mexican pesos at 2018 constant prices). Banks can channel funds to the government either through direct loans or by holding bonds. The average quarterly value of direct loans is around 17 billion pesos per bank over the sample period, while the average quarterly holdings of bonds is around 10 billion pesos.

However, there is significant variation across banks. At the 25th percentile, bank lending to the government is approximately 700 million Mexican pesos, while it reaches 22 billion pesos for a bank at the 75th percentile. Similar heterogeneity is observed for each lending form. For example, the bank at the 25th percentile of loans provides zero credit, whereas for a bank at the 75th percentile loans equal as much as 10 billion Mexican pesos. The 25th and 75th percentile values for bond holdings are 300 million and 11 billion Mexican pesos, respectively. In the bank-level analysis, we will leverage this heterogeneity to estimate conditional correlations between banks' lending to the government and the private sector.

2.2 Loan-level data

We use confidential loan-level data to construct an instrument for public sector lending and estimate its causal effect on private firm credit. In Mexico, every commercial bank is mandated to submit monthly reports to the regulator (the CNBV), providing detailed information on the universe of existing and new loans extended to all private firms. These reports contain information on the issuing bank (lender), the firm (borrower), the amount of outstanding loan, and other loan characteristics such as the annual interest rate and loan maturity. Using this information, we build a loan-level dataset encompassing 34 banks that can be matched to 451,044 firms with 607,169 matched bank-firm pairs over the sample period.

Using this monthly data, we build a firm-bank-level dataset at quarterly frequency for 2011Q2-2019Q2. We aggregate all credit received by each firm from each bank in each month, computing the monthly credit volume for each bank-firm pair. This volume is then averaged over the three months within each quarter. The resulting quarterly credit dataset at the bank-firm level is merged with the bank-level information on deposits, profitability, and the other indicators mentioned above. We restrict the sample to SMEs, identified based on their credit history using the same definition the central bank employs in its flagship reports: a firm is considered an SME if it has never obtained a loan exceeding 100 million pesos at 2018 constant prices (approximately 5 million USD in 2018).

The average credit for a firm-bank pair in the sample is 854,993 Mexican pesos. On average, each firm has relationships with 1.2 banks and less than 17% of firms have relationships with more than 2 banks. Less than 0.1% of firms that have relationship with just one bank switch lenders in a given quarter. This indicates that SMEs face challenges in establishing new bank relationships and switching lenders, a common issue in most EMDEs, where informational asymmetries play a crucial role in lending.

For the bank-firm-level analysis, we build three measures of bank exposure to the government. The first quantifies a bank's total exposure to the government, calculated as the sum of direct loans to the government and government bond holdings normalized by total private credit (excluding each firm's credit, as explained in Section 3.2). The second measure captures banks' exposure solely through direct loans to the government, defined as a bank's direct loans normalized by its total private credit. The third gauges exposure solely through government bond holdings, defined as the bank's holdings of government bonds normalized by its total private credit. In constructing these measures, we normalize public sector lending by private credit, not the bank's size, to emphasize the importance of changes in exposure for firm credit. For instance, a bank with a small public sector credit to total assets ratio but a high ratio of public credit to private credit may not be perceived as highly exposed

when using the exposure measure based on asset size. However, a slight increase in public sector credit from this bank could exert a large effect on private credit, given the high ratio of public credit to private credit.

Panel B of Table 1 shows the summary statistics for all variables used in the bank-firm level analysis. The average total exposure of banks to the public sector is 0.24 over the sample period while the average exposure through direct loans and bond holdings is 0.16 and 0.08 respectively. Similar to the summary statistics on banks' lending to the government, these values suggest that the average bank is more exposed to the public sector through public sector loans than bond holdings. However, there is wide variation across banks. We also find significant variation in banks' exposure to public sector over time. We exploit this within- and across-bank heterogeneity in banks' exposure to the public sector in the empirical analysis to understand the link between banks' lending to de government and bank credit to SMEs.

2.3 Firm-level data

To estimate crowding out at the firm level, we construct a firm-quarter dataset. This panel has 5,560,425 firm-quarter observations and 411,519 firms. In this analysis, the main dependent variable is bank credit received by a firm from all banks in a given quarter and the main independent variable is its exposure to the government, constructed as the weighted average of its past creditors' government exposure (see Section 3.2). Panel C of Table 1 shows summary statistics for all variables used in the firm-level analysis.

3 Empirical Strategy and Results

Endogeneity issues arising from omitted variable bias pose a challenge in identifying the causal effect of bank lending to the public sector on private sector credit. Relying solely on macroeconomic data might not suffice, necessitating the use of more granular information to exploit variation at more disaggregated levels. For instance, a negative correlation between aggregate bank lending to the public sector and private credit could be driven by omitted variables like weak aggregate demand. A decrease in aggregate demand might reduce firms' demand for credit, prompting banks to increase their lending to the public sector and offset, at least partially, this negative impact.

To circumvent these issues, we rely on granular micro data at the bank- and at the firm- levels and loan-level information on bank-firm relationships. This granular information enables us to construct panel data with multiple cross-sections over time and thus introduce

time fixed effects to address some of the endogeneity concerns stemming from omitted variable bias. These concerns may be associated with aggregate factors that often coincide with increases in bank lending to the public sector and may be common to all banks, such as inflation, investment uncertainty, currency depreciation, or expectations of future recessions. However, these factors cannot explain the cross-sectional differences in lending across banks with different Government Lending Exposures and should be captured by the time-fixed effects. We also incorporate bank-fixed effects and additional bank-level controls to account for banks' idiosyncratic positions in lending to the public sector as well as any changes in this lending that may be linked to variations in their financial health. Hence, our granular dataset enables us to exploit time and cross-sectional heterogeneity in banks' exposure to changes in lending to the public sector.

In the bank-firm level specification, our granular dataset enables us to control for changes in credit demand at the level of firms and over time. We compare the differential response of credit supply to firms that borrow from exposed banks and firms that do not borrow from these banks. In some specifications, we introduce firm-bank fixed effects that control for unobserved time-invariant heterogeneity in firm-bank pairs, thus exploiting the variation within the same bank-firm pair over time. In others, we introduce firm-time fixed effects and achieve identification by exploiting variation within the same firm and same time across multiple banks with different exposure to the public sector. In the firm-level analysis, we introduce firm fixed effects to control for time-invariant heterogeneity across firms and state-sector-time fixed effects to control for time-varying unobserved factors correlated with the demand for credit.

3.1 Crowding out at the bank level

We start the analysis with some descriptive correlations at the level of banks. To study conditional correlations between lending to the public sector and credit to private firms, we control for a host of fixed effects and bank-level characteristics, and consider the following specification:

$$\text{Firm Credit}_{bt} = \alpha + \gamma_t + \theta_b + \beta \text{Lending to the Public Sector}_{bt} + \psi X_{bt-1} + \epsilon_{bt} \qquad (1)$$

where Firm Credit_{bt} is the credit provided by bank b to private firms at time t; and, since banks can lend to the public sector by providing loans or by holding government bonds, we consider three measures of $\text{Lending to the Public Sector}_{bt}$: (i) the credit provided by bank b to the public sector at t; (ii) the bank's holding of government bonds at t; and (iii) the sum of (i) and (ii). The coefficient of interest, β, measures the change in credit to

private firms (specifically, SMEs) associated with a one peso increase in lending to the public sector. We add year-quarter fixed effects, γ_t, to control for common shocks across banks, that is macroeconomic shocks, that could affect banks' lending to the public and private sectors simultaneously, and bank fixed effects, θ_b, to ensure that the results are not driven by time-invariant bank characteristics, including banks' business models.

Although this bank-level analysis is not intended to be causal, there is a concern regarding potential correlations between changes in lending to the public sector and bank characteristics that may impact a bank's financial health, thus influencing correlations with changes in SME credit. Therefore, it may be important to introduce bank characteristics in our specification of equation (1), particularly those characteristics that are correlated with changes in a bank's lending to the public sector. For instance, the fact that a bank experiences a low capital ratio in one period might prompt it to raise its lending to the public sector and reduce its private credit to manage portfolio risk. To assess whether it is the case that bank characteristics correlate with changes in public sector financing, we use the following regression:

$$\Delta\text{Lending to the Public Sector}_{bt} = \alpha + \beta X_{bt-1} + \epsilon_{bt} \tag{2}$$

where X_{bt-1} refers to either a bank's size; its short- or long-term deposit ratio; its profitability (return on assets, return or equity); its capital ratio; or the average delinquency rate of credit to private firms. The variables are lagged to evaluate if bank characteristics in the previous period explain contemporaneous changes in lending to the public sector. Columns (1) and (2) in Panel A of Online Appendix Table A2 show the results for changes in loans to the public sector and columns (3) and (4) show the results for public sector bonds. We find that the lags of two variables, the short-term deposit funding ratio and the capitalization index, relate significantly to changes in public sector financing. These results underscore the importance of introducing bank characteristics in our regression of equation (1), addressing concerns that omitting these variables may affect correlations with changes in SME credit and thus our results. In our different specifications for (1), we introduce not only the two bank characteristics that we have found statistically significant in (2) but also the remaining bank characteristics presented in Table A2.

After incorporating all these controls into equation (1), we can interpret the coefficient of interest, β, as the differential change in SME credit provided by a bank that increased its lending to the public sector and a bank that did not, controlling for factors that could affect the demand for credit and changes in other bank-characteristics that may affect SME credit supply. For example, a negative value of β would indicate that a bank increasing its lending to the public sector between two quarters reduced its credit to SMEs.

We estimate equation (1) with quarterly data for 2011:Q2-2019:Q2 and present the results in Table 2. Panels A shows results for total lending, and Panel B and C show the results of separate estimations for bank loans and bank holdings of government bonds, respectively. In Panel D, we show results for a specification where we introduce the two forms of lending in the same regression. This strategy allows us to account for cases where banks substitute one type of lending for the other or cases where they increase government loans and government bonds simultaneously. That is, it allows us to address potential bias arising from the correlation between the two forms of lending. We progressively add controls: Column (1) controls for the deposit ratio, column (2) adds the capitalization index, column (3) controls for return on assets, return on equity, and bank health, and column (4) adds bank assets.

The results show there is a strong and robust negative correlation between bank lending to the public sector and bank credit to SMEs. Column (3) of Panel A suggests that an additional peso of lending to the public sector reduces the credit provided to these firms by 19 cents. This result is consistent with a large literature documenting that government borrowing crowds out private credit. More importantly, this first approach suggests there is a significant difference in the magnitude of crowding-out effects depending on the type of lending employed. Column (3) of Panel C indicates that an additional peso of government loans is associated with a reduction of about 52 cents in credit to private SMEs; in contrast, the reduction in SME is of only 0.1 cents and not statistically significantly different from 0 for government bonds (column (3) of Panel C). The fact that the heterogeneity in SME credit reduction depends on the type of lending considered is the first novel fact we document in this paper.

One concern when interpreting the coefficients in Panel B and C of Table 2 could be that the two forms of lending to the public sector might be correlated. Thus, in Panel D of Table 2, we estimate the value of β from equation (1) for each type of lending to the public sector, holding the other type fixed. Results from column (3) of Panel D suggest that holding public bond holdings fixed, an additional peso in loans to the public sector is associated with about 52 cents reduction in credit to private SMEs. Similarly, holding loans to the public sector fixed, an additional peso in the bank's bonds is associated with only a 3 cents reduction in credit to SMEs that it is not statistically significantly different from zero. Hence, the magnitude of the coefficients are almost the same as in Panel B and C, suggesting that size of the estimated crowding out in these columns were neither under nor overestimated.

While informative, the negative correlation between lending to the public sector and private credit to SMEs at the bank level cannot be interpreted as causal. This is because banks that increase their exposure to the public sector might also have relationships with firms that simultaneously reduce their demand for bank credit. In such a scenario, the

negative relationship cannot be considered an estimate of crowding out. Hence, in the following section, we control for firm demand for private credit.

3.2 Controlling for demand for credit using loan-level data

To account for firm demand for private credit, we use confidential loan-level data, which enables us to observe changes in the credit received by a firm that maintains relationships with multiple banks. Our identification strategy relies on the assumption that shifts in a firm's demand for credit should influence its borrowing from all banks, rather than solely from those banks more exposed to the public sector.

A firm is exposed to lending to the public sector through its relationships with banks. Thus, we define the exposure of a firm i due to its relationship with bank b at time t as follows:

$$\text{Government Lending Exposure}_{ibt} = \frac{\text{Lending to the Government}_{bt}}{\text{Private Credit}_{bt-1} - \text{Firm Credit}_{ibt-1}} \tag{3}$$

where firm credit$_{ibt-1}$ is the loan volume (credit) featuring the relationship between firm i and bank b during the previous quarter; Lending to the Government$_{bt}$ is the amount in real pesos that the bank lends to the public sector via loans and bond holdings at t; and Private credit$_{bt-1}$ is the amount in real pesos that the bank lent to the private sector in the previous quarter (consumer loans, mortgages, and firm credit). Thus, Government Lending Exposure$_{ibt}$ captures the lending provided to the public sector by bank b at t relative to the private credit it provided in the previous quarter. We employ the lagged value of private credit in the denominator, as using the contemporaneous value might artificially inflate the measure of exposure. This is because private sector credit tends to decrease contemporaneously with lending to the public sector, as shown in Section 3.1. To measure exposure to the public sector only through loans and bonds, we change the definition of Lending to the Public Sector$_{bt}$ to include only the corresponding lending form. This is our preferred measure of Government Lending Exposure; however, we also run the regressions using other measures, such as lending to the public sector normalized by assets or by past private credit without subtracting firm-specific credit, and find that our results are robust (see Section 5).

Using the definition in equation (3), we estimate the causal effect of banks' lending to the public sector on bank credit supply to SMEs using the following specification:

$$\ln(\text{Firm Credit}_{ibt}) = \beta \times \text{Government Lending Exposure}_{ibt} + \psi X_{bt-1} + \gamma Z_{ibt-1} + \epsilon_{ibt} \tag{4}$$

where ln(Firm Credit$_{ibt}$) is the log of the credit provided by bank b to firm i at quarter

t. Government Lending Exposure$_{ibt}$ is the measure of exposure as defined above; X_{bt-1} is the set of bank-level controls as defined in Section 3.1; γZ_{ibt-1} is a set of variables that control for loan characteristics, including weighted loan maturity, the share of loans with fixed interest rate, and the share of dollar-denominated loans. Notice that our dependent variable in equation (4) is in logs, so that the coefficient of interest, β, can be interpreted as a semi-elasticity. That is, β is the percentage change in the credit of SME i due to a 1 percentage point increase in its exposure to lending to the public sector.

For identification, we saturate the model with various fixed effects following Morais et al. (2019). First, we introduce firm-bank fixed effects that control for unobserved time-invariant heterogeneity in firm-bank pairs, and thus, address the concern that endogenous matching between banks and firms could be driving our results. In this case, identification is achieved by exploiting the variation within the same bank-firm pair over time. This variation will arise from the time-series component of changes in banks' exposure to the public sector. For each firm-bank pair, we expect that an increase in the bank's Government Lending Exposure over time leads to a reduction in the credit the firm receives from the bank.

We also estimate equation (4) including firm-time fixed effects in the spirit of Khwaja and Mian (2008). In this specification, identification is achieved by exploiting variation within the same firm and same time across multiple banks with different exposure to the public sector. This specification can only be estimated for firms that have relationships with more than one bank in a given quarter. Since only 16.9 percent of the firms in our sample have relationships with at most one bank in a given quarter, this specification significantly reduces the sample size. To address the concern that our results could be driven by sample selection arising from this specification, we also estimate equation (4) for the full sample of firms but instead of using firm-time fixed effects to control for demand effects, we add state-sector-time fixed effects to control for changes in demand for credit (Degryse et al., 2019).

Table 3 presents the results. Panel A, B, and C of Table 3 shows results for total Government Lending Exposure, Government Lending Exposure through loans, and Government Lending Exposure through public bond holdings, respectively. Panel D shows results for each type of public sector financing, holding the other fixed. All columns control for bank- and loan-level characteristics. We start with a less demanding specification in Column (1) that controls for bank, firm, and time fixed effects. We see from column (1) that, across all panels, the coefficient on the Government Lending Exposure measure is negative and statistically significant, suggesting that an increase in banks' exposure to the public sector is associated with a reduction in bank credit to SMEs. Furthermore, the decline in private credit is highest when banks' exposure to the public sector increases through direct loans to the public sector as opposed to holdings of public sector bonds. This finding at the loan level

is consistent with the bank-level results which also suggest that the extent of crowding out is the highest for bank credit to the public sector. Specifically, a 1 percent increase in total Government Lending Exposure of a bank relates, on average, to a 0.18 percent reduction in credit of firms that have a relationship with that bank, while a 1 percent reduction in the exposure to public sector credit and bonds reduces firm credit by 0.58 percent and 0.14 percent respectively.

In column (2), we add bank-firm fixed effects. This allows us to exploit the variation within the same firm and bank over time, and controls for unobserved, time-invariant factors related to firm heterogeneity (such as size, industry, location) and bank heterogeneity (size, business model, location). The rationale to include these fixed effects is to control for the endogenous matching of banks with firms – it is possible that banks with increases in public sector financing may have borrowers with different characteristics, and the results could be biased if changes in firm credit are related to these characteristics and not to changes in the exposure of these banks. Thus, we saturate our loan-level specification with fixed effects at the bank-firm level to address this concern by exploiting only the variation within the same firm and bank over time. After controlling for firm-bank fixed effects, we find that the correlation between Government Lending Exposure and private credit remains negative, statistically significantly different from zero and of similar magnitude to that in column (1). It implies that within each bank-firm pair, as the bank's exposure to the public sector increases over time, the bank extends a lower amount of credit to the corresponding firm in the bank-firm pair. This specification may still not address concerns about demand effects driving this negative correlation as within each bank-firm pair, an increase in the bank's Government Lending Exposure could be driven by a negative aggregate demand shock, which would also negatively affect the firm's demand for credit.

Hence, in column (3), we control for state-sector-time fixed effects. These effects control for demand shocks affecting firms in the same industry in a given region at a given time. The idea is that an aggregate demand shock should have a similar effect on the demand for credit for firms in the same industry and the same location. Column (3) shows that the coefficient on Government Lending Exposure (with all three measures) does not change much in comparison with previous columns. To further control for firm-specific seasonality, we add firm-quarter fixed effects in column (4) and find that the coefficients barely change.

One may still argue that the demand of firms in the same location and industry may be differentially affected by an aggregate demand shock or by a firm-specific idiosyncratic shock. If that is the case, state-sector-time fixed effects may not be able to completely absorb firm-specific demand effects. Hence, in column (5), we saturate the model with the most stringent set of fixed effects that can reasonably control for firm demand but still allow us

to retain the full sample of firms. Specifically, we add firm-year fixed effects in addition to state-sector-time, firm-bank, and firm-quarter fixed effects. Firm-year fixed effects control for unobserved annual changes in firm demand and should resemble firm-time fixed effects if variation in shocks to firm demand stems from across-year variation rather than within-year variation. Results for this specification show a robust negative relationship between firm credit and bank exposure to the public sector. The crowding out through banks' exposure to government loans is 75 percent larger compared to crowding out through banks' exposure to public bonds (0.37 percent vs 21.6 percent).

In column (6), we finally estimate the specification with firm-time fixed effects. Adding firm-time fixed effects allows us to identify the effect from the differential change in credit of a firm that has a relationship with a bank that increased public sector financing compared to the change in credit of the same firm with another bank that did not increase it. This specification can only be estimated for the subsample of firms that have multiple bank relationships, the sample size in column (6) is less than a third of the sample size in columns (1) through (5). Despite the significant reduction in the sample size, the coefficient remains negative and statistically significant. In particular, a 1 percent increase in a bank's lending to the government results in a 0.37 percent reduction in the credit of the average firm in that bank, compared to the credit of the same firm from another bank that did not increase government lending. We also find that a 1 percent increase in a bank's lending to the government through loans is associated with a 0.49 percent reduction in its credit to the average firm. On the other hand, a 1 percent increase in banks' holdings of government bonds leads to only a 0.31 percent reduction in credit to the average firm. Thus, consistent with our bank-level analysis, the loan-level analysis suggests that the crowding out effect of bank loans is at least 60 percent larger than that of banks' holdings of government bonds.

The specification that includes firm-time fixed effects has the limitation of only considering firms with relationships with more than one bank. For these firms, crowding-out effects are likely to be larger than for firms borrowing from only one bank. This is the case if firms with multiple bank relationships can easily borrow from another bank in response to a reduction in the credit supply of one bank due to an increase in government lending. In effect, the economic magnitude of the coefficients of crowding out are smaller in columns (1)-(5) compared to column (6). However, this difference in magnitudes of crowding out estimates could arise either because in previous columns we fail to control for firm-specific demand or because of a larger crowding out effect on firms included in this selected sample. To evaluate which one is the case, in column (7) we re-estimate the specification from column (5) only for those firms that have multiple bank relationships. Comparing the coefficients in columns (6) and (7) shows that these two specifications produce almost the same results.

This suggests that the set of fixed effects in column (7) – bank-firm, firm-year, firm-quarter, and state-sector-time – are indeed a reasonable proxy to control for demand effects. These results suggest that the larger negative effects in column (6) are driven by sample selection, and that we can use the estimates from column (5) to infer the magnitude of crowding out for the full sample of SMEs, given that the specification in column (5) reasonably controls for demand effects.

3.3 Estimating crowding out at the firm level

While the analysis in Section 3.2 helps us isolate the credit supply effect of lending to the public sector, it does not give an accurate estimate of crowding out at the firm-level. In the absence of financial frictions in the credit market, firms should be able to costlessly switch from its current bank to another one that did not increase its Government Lending Exposure. In this case, the fall in credit supply from one bank should be offset by an increase in credit from another bank, leading to small overall crowding-out effect at the firm level, even if there is a large crowding-out effect at the loan-level. Hence, we use the following specification to better understand the magnitudes of crowding out effects at the firm level:

$$\ln(\text{Firm credit}_{it}) = \alpha_i + \beta(\text{Firm Gov. Lending Exposure}_{it}) + \psi X_{it-1} + \gamma Z_{it-1} + \eta_{it} \quad (5)$$

The dependent variable $\ln(\text{Firm credit}_{it})$ is the log of firm credit received by firm i from all banks it has borrowing relationships with. X_{it-1} is the set of weighted bank-level controls; and Z_{it-1} is the set of weighted loan-level controls aggregated at the firm level (using shares of loan volume from each bank in the previous period as shares). Firm Government Lending Exposure_{it} is the average exposure of firm i to changes in lending to the public sector defined by its previous banking relationship. It is constructed as the weighted average of Government Lending Exposure of all banks that have a relationship with firm i at time t. The weight of each bank b depends on the share of that bank in total bank credit received by firm i in the previous quarter. Formally, considering B as the set of banks that the firm had credits with in the past period:

$$\text{Firm Government Lending Exposure}_{it} = \sum_{B} w_{ib,t-1}\text{Government Lending Exposure}_{ibt} \quad (6)$$

The main variable of interest in equation (5), β, captures the effect of a percent change increase in a firm's Government Lending Exposure (through its banks) on the total loan volume received by the firm from all banks it has relationships with. If a firm can easily switch across multiple lenders, we should expect β to be zero. However, if there are frictions

in the credit market, β should be negative – an increase in public sector borrowing through the banking sector should have a significant and negative impact on bank credit received by non-financial firms.

We include firm fixed effects in equation (5) to control for time-invariant heterogeneity across firms that could be correlated with their demand for credit. Since equation (5) is estimated at the firm-time level, we cannot include firm-time fixed effects in this specification. However, we include state-sector-time fixed effects to control for time-varying unobserved factors correlated with firm demand for private credit. This is similar to the specification in (Morais et al., 2019) that also uses credit register data for Mexico and uses location-sector-time fixed effects to control for changes in firm demand for credit.

Table 4 presents the results for equation (5). Panels A, B, and C of Table 4 show results for total Government Lending Exposure, Government Lending Exposure through bank loans, and Government Lending Exposure through public bond holdings respectively. Panel D shows results for each type of lending to the public sector, holding the other fixed. All columns include loan- and bank-specific controls aggregated at the firm-level.

Column (1) includes firm and time fixed effects to control for unobserved firm- and time-specific factors that affect demand for private credit. The coefficient on Government Lending Exposure is negative and statistically significantly different from zero for all three measures of exposure. Consistent with the bank- and bank-firm-level results, the coefficient on public credit exposure is more than twice as large as the coefficient on public bonds exposure. In terms of the magnitudes, it is smaller than the previous estimates at the bank-firm-level but still statistically significantly different from zero. This is expected given that at the firm level, some firms can switch banks to make up for reduced credit supply from one bank due to the increase in its lending to the public sector.

Since equation (5) is estimated at the firm-time level, we cannot include firm-time fixed effects to control for demand effects, however, as we saw in Section 3.2, state-sector-time fixed effects are a reasonable proxy to control for demand for credit. Hence, in column (2), we add state-sector-time fixed effects to control for firms' demand for credit. The coefficient on Government Lending Exposure of the firm remains negative and statistically significant in column (2). Finally, we estimate an even more demanding specification and include firm-quarter fixed effects in addition to state-sector-time fixed effects. Firm-quarter fixed effects control for changes in firm-specific demand in certain quarters, for instance, end of year spike in firm demand would be captured by these fixed effects. We find that even after controlling for firm-quarter fixed effects, the magnitude of crowding out estimate barely changes. Specifically, a 1 percent increase in a firm's Government Lending Exposure relates, on average, to a 0.33 percent reduction in the total credit of that firm, while a 1

percent reduction in the exposure to public sector credit and bonds reduces firm credit by 0.47 percent and 0.15 percent respectively. The magnitudes are similar to the ones from the loan-level analysis, and confirm the limited ability of firms to switch lenders in EMDEs.

4 Mechanisms

In this section, we investigate whether the lower crowding out effect of government bonds is because government bonds help banks raise new funding. If banks could provide financing to the government by raising funds, either in the internal capital markets or by raising new equity, then increased lending to the government may have a smaller crowding-out effect on SME credit. In what follows, we argue that government bonds and bank loans to the government have different attributes that differentially affect banks' ability to raise new funding.

We first consider the frictions in the interbank market. If there were no frictions, banks that provide financing to the public sector could do so by borrowing from other banks that are not exposed to the public sector. In the absence of capital market frictions, this would lead to a reallocation of capital in the credit market and we would not see any crowding out. However, in a world with asymmetric information about bank types, interbank lending has to be collateralized. A key difference between bank loans to the public sector and banks' holdings of public bonds is that public bonds are considered safe and highly liquid assets and, thus, can be used as collateral, for example, in the interbank market. This implies that banks that finance the public sector by holding government securities are able to use the borrowed funds from the interbank market to provide financing to the public sector, which may lead to a lower reduction in private credit supply compared to banks that finance public sector debt by originating loans to the government.

We test this hypothesis formally by estimating the following equation:

$$\text{Interbank loans}_{bt} = \alpha + \gamma_t + \theta_b + \beta \text{Public Sector Financing}_{bt} + \psi X_{bt-1} + \epsilon_{bt} \qquad (7)$$

where the coefficient of interest, β, captures the relationship between interbank loans and our measures of public sector financing, and the rest of the variables are as defined in equation (1). The data for interbank loans comes from the public bank-level data, as described in Section 2. Table 5 reports the results. Panels A, B, and C show results for total Government Lending Exposure, Government Lending Exposure through bank loans to the public sector, and Government Lending Exposure through public bond holdings, respectively. Panel D shows results for each type of lending to the public sector, holding the other fixed. All columns

include bank and time fixed effects, and we progressively add controls following Table 2. Column (1) controls only for lagged deposits, column (2) adds the bank capitalization ratio as an additional control, and column (3) includes ROA, ROE, and firm credit delinquency rate as controls, and column (4) adds assets and contains the full set of bank-level control variables. Results in column (4) suggest that interbank borrowing goes up when banks lend to the public sector through government bonds, but we do not see any such increase in interbank loans for bank credit to the government. The ability of banks to borrow in the interbank market using government bonds as collateral could partly explain the lower crowding out of private credit when banks finance the public sector through bonds. However, these results have to be interpreted as suggestive results since the point estimates are not statistically significantly different between bank loans to the public sector and banks' holdings of public sector bonds.

5 Robustness checks

5.1 Bank-level analysis using a Bartik-style measure of Government Lending Exposure

In the bank-level analysis, one might be worried that the changes in the exposure of banks to the public sector are not exogenous. For example, for some banks, an increase in exposure to the public sector could be related with an omitted variable, such as economic growth, that also affects demand for firm credit, introducing bias to the estimated coefficient despite all the controls that are included in these regressions. To assess the validity of our identification strategy, Table 6 presents additional results where we replicate the analysis from Table 2 using a Bartik-style measure of government lending exposure at the bank level. Specifically, to construct this measure, for each bank we first take the yearly national change in each type of lending to the government and multiply it by the share of the total lending to the government provided by that bank in the previous year. We call this the "synthetic expected change" in lending to the government. Then, we add this synthetic expected change to the government lending exposure of the bank from the previous year to obtain the bank's financing to the public sector for a given quarter. This exposure measure is exogenous to other bank-specific characteristics that might vary over time and that are not included in

our regressions. Formally, we estimate this synthetic exposure as

$$\begin{aligned}\text{Synthetic Government Lending}_{bt} = &\text{Share}_{b,t-4} \times \Delta\text{Total Bank Lending} \\ &\text{to the Government}_t \\ &+ \text{Lending to the Government}_{b,t-4}\end{aligned} \tag{8}$$

where $\text{Share}_{b,t-4}$ is the share of bank b in total financing provided to the public sector by all banks during the previous year; ΔTotal Bank Lending to the Government$_t$ is the national change in total bank financing provided to the public sector during year t in real pesos; and Public Sector Financing $(\text{PSF})_{b,t-4}$ is the amount of public sector financing for bank b during the previous year. In summary, our synthetic public sector financing measure reflects the expected public sector financing of each bank in each period given its previous shares in public sector financing and the national annual change in public sector funding provided by the entire banking system. We estimate this measure separately for government loans and government bonds.

Results from Table 6 show that our results are robust to this alternative measure. The point estimates are of similar magnitude and are not statistically different from the ones estimated from equation (1). This exercise allays concerns that the changes in banks' public sector financing are driven by some unobserved variable at the bank level that is not included in our large set of controls and that could bias our results.

5.2 Alternate measures of Government Lending Exposure

In this section, we test whether our main results are contingent on the definition of government lending exposure. In Section 3, we define a firm's government lending exposure as the total government lending exposure of all banks it has relationships with, where each bank's government lending exposure is defined as the total lending to de government provided by the bank normalized by its past private sector financing, excluding past credit extended to the firm whose exposure is being measured. This was done to make the bank's government lending exposure orthogonal to the firm. However, one might be concerned that this measure might not accurately capture changes in banks' exposure to the public sector. To address this concern, we consider three alternative definitions of government lending exposure and test whether our results are robust to these measures.

The first concern with our exposure measure is that a portfolio reallocation driven by private demand for credit might change banks' government lending exposure and may not necessarily reflect higher lending to the government. For example, if private credit fell in the past period because of low demand for private credit then the government lending exposure

measure would increase even if bank lending to the government remained the same. To address this concern, we construct an alternative government lending exposure measure by normalizing banks' lending to de government by lagged total assets. The new measure of government lending exposure at the firm bank is constructed as:

$$\text{Firm Government Lending Exposure}_{it} = \sum_b w_{ib,t-1} \text{Government Lending Exposure}_{ibt} \quad (9)$$

where

$$\text{Government Lending Exposure}_{ibt} = \frac{\text{Lending to the Government}_{bt}}{\text{Total Assets}_{bt-1} - \text{Firm Credit}_{ibt-1}}$$

Panel A of Table 7 reports results for equation (4) estimated using this alternate exposure measure separately for government lending exposure through bonds and loans, controlling for the other. Column (1) includes firm and time fixed effects, column (2) includes firm and state-sector-time fixed effects, and column (3) includes firm-quarter and state-sector-time fixed effects. All columns control for bank- and loan-level controls as in Table 4. Across all columns, the coefficient on the new exposure measure is negative and significant. Furthermore, the coefficient on government lending exposure through bank loans is still larger than the coefficient on government lending exposure through bonds. These results suggest that our main result on the differential crowding out effects of lending to the government is not being driven by weaker demand for credit from the private sector.

Another concern with our exposure measure is that some large firms might be systemically important for banks and excluding credit to a firm might make the government lending exposure measure artificially large for those firms. To test whether this is the case, we re-estimate equation (5) with an alternative government lending exposure measure that does not exclude past credit to a firm from the denominator. Specifically, the new exposure measure is constructed as follows:

$$\text{Firm Government Lending Exposure}_{it} = \sum_b w_{ib,t-1} \text{Government Lending Exposure}_{ibt} \quad (10)$$

where

$$\text{Lending to the Government}_{ibt} = \frac{\text{Public Government Lending}_{bt}}{\text{Private Credit}_{bt-1}}$$

Panel B of Table 7 reports the results using this measure. We find that the results are barely distinguishable from those reported in Panel D of Table 4. This suggests that firm size distribution across banks is not driving our results. Finally, in panel C of Table 7 we

show results for equation (5) based on another measure of government lending exposure which uses lagged assets in the denominator without subtracting firm-specific credit in the previous period. Thus, the last measure we use is constructed as

$$\text{Firm Government Lending Exposure}_{it} = \sum_{b} w_{ib,t-1} \text{Government Lending Exposure}_{ibt} \quad (11)$$

where

$$\text{Government Lending Exposure}_{ibt} = \frac{\text{Lending to the Government}_{bt}}{\text{Total Assets}_{bt-1}}$$

Results across the different columns in panel C of Table 7 are similar to those in Panel A. Taken together, the analysis in this section shows that our results are robust to using alternative definitions of government lending exposure.

6 Conclusion

This paper unveils a novel stylized fact regarding the crowding-out effects associated with lending to the government. Specifically, we highlight that, within the framework of bank-based intermediation of loanable funds, the choice of the specific debt contract for intermediation significantly influences the degree to which lending to the government crowds out credit to small and medium-sized firms (SMEs). Leveraging proprietary data encompassing bank holdings of government bonds and commercial loans to the public sector and SMEs, as well as details on bank-firm relationships, our analysis reveals that the crowding-out effects on private credit to SMEs is three times larger for commercial loans than for holdings of government bonds.

This differential crowding out can be, in part, attributed to the differences in liquidity and safety services provided by the two types of debt contracts. Government bonds are more liquid and safer than government loans. Higher liquidity of government bonds allows banks to use them as collateral in the interbank market to borrow more funds to meet the demand for credit from the private sector. Government loans are relatively more illiquid and hence cannot be used as collateral in the interbank market. Thus, financing government spending in the form of bank loans leads to a larger crowding out of private credit.

Our results have important policy implications. Since bond markets in many EMDEs are underdeveloped, a larger of share of lending to the government in those economies is in the form of bank loans compared to advanced economies. Hence the aggregate effects of

crowding out on SME credit might be larger in EMDEs, precisely where those firms face stronger credit access constraints and more difficulties to obtain favorable credit conditions. Thus, in those economies, the development of government bond market could have positive and significant effects on the development of national commercial credit markets indirectly, thus benefiting SMEs access to credit and favorable financing conditions. Moreover, our suggest suggests that the development of the bond market in other EMDEs could be a higher firm investment and employment creation as the development of the bond market frees up resources for the banking sector to hold private debt and could also potentially break the sovereign-bank nexus.

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Table 1: Summary statistics

	Mean	p25	Median	p75	St. Dev.
Panel A: Bank-level data					
Government debt volume (million Mexican pesos)	$27,304	$670.62	$4,157.64	$21,697.29	$50,238.12
Government loans volume (millions Mexican pesos)	$16,848	$0	$50	$9,734	$40,495
Government bonds volume (millions Mexican pesos)	$10,456	$320	$2,050	$11,205	$18,381
Firm loan volume (millions Mexican pesos)	$17,338	$209	$3,085	$13,059	$31,573
Short-term deposits volume (millions Mexican pesos)	$82,768	$1,629	$8,114	$68,683	$166,168
Long-term deposits volume (millions Mexican pesos)	$50,888	$2,410	$10,734	$53,564	$83,564
Return on assets	0.77%	0.30%	0.92%	1.51%	2.18%
Return on equity	9.02%	3.55%	9.84%	15.95%	13.27%
Firm credit delinquency rate	0.03%	0.01%	0.02%	0.03%	0.06%
Capitalization index	18.98%	13.86%	15.43%	17.77%	15.41%
Net interbank loans volume (millions Mexican pesos)	$7,639	$381	$2,248	$10,249	$11,336
Panel B: Loan-level data (firm-bank)					
Exposure to government debt	0.24	0.17	0.21	0.27	0.16
Exposure to government loans	0.16	0.10	0.13	0.16	0.12
Exposure to government bonds	0.08	0.03	0.06	0.11	0.12
Firm loan volume (Mexican pesos)	$845,993	$102,097	$310,650	$1,013,138	$1,248,252
Share of fixed-rate loans	0.43	0.00	0.00	1.00	0.48
Share of dollar-denominated loans	0.00	0.00	0.00	0.00	0.06
Loan Maturity (months)	34.10	18.00	36.00	37.00	47.49
Short term deposits/assets	0.33	0.29	0.34	0.39	0.08
Long term deposits/assets	0.20	0.15	0.17	0.23	0.08
Return on assets	1.53%	1.17%	1.50%	1.98%	0.85%
Return on equity	14.94%	9.90%	15.33%	20.46%	7.49%
Firm credit delinuency rate	2.31%	1.40%	1.76%	2.95%	1.74%
Capitalization index	15.10%	14.11%	15.07%	15.66%	1.63%

Table 1: Summary statistics (Continued)

	Mean	p25	Median	p75	St. Dev.
Panel C: Firm-level data					
Exposure to government debt	0.24	0.17	0.21	0.27	0.12
Exposure to government loans	0.16	0.10	0.13	0.16	0.11
Exposure to government bonds	0.08	0.03	0.06	0.11	0.08
Firm loan volume (Mexican pesos)	$1,045,225	$105,417	$328,860	$1,151,050	$1,754,997
Share of fix-rate loans	0.43	0.00	0.06	1.00	0.47
Share of dollar-denominated loans	0.00	0.00	0.00	0.00	0.05
Loan Maturity (months)	34.35	19.67	36.00	37.00	42.25
Short term deposits/assets	0.34	0.29	0.34	0.40	0.07
Long term deposits/assets	0.20	0.15	0.17	0.23	0.08
Return on assets	1.54%	1.18%	1.53%	1.98%	0.80%
Return on equity	15.09%	10.29%	15.32%	20.48%	7.34%
Firm credit delinuency rate	2.29%	1.40%	1.74%	2.94%	1.72%
Capitalization index	15.05%	14.17%	15.02%	15.62%	1.47%

Notes: Panels A, B, and C of this table show the summary statistics for the main variables used in the bank-, bank-firm-, and firm-level analysis. The sample period is 2011:Q2-2019:Q2. The bank-level sample has 1000 observations for 34 banks, the bank-firm level panel has 7,661,133 observations for 607,169 firm-bank pairs, and the firm-level sample has 5,560,425 observations for 411,519 firms. See Table A1 for variable definitions.

Table 2: Effect of lending to the government on SMEs: bank-level estimation

	(1)	(2)	(3)	(4)
Panel A: Total lending to the government				
Bank loans and bonds to the government	-0.186**	-0.186**	-0.187**	-0.197**
	(0.077)	(0.077)	(0.077)	(0.089)
Panel B: Only bank loans to the government				
Bank loans to the government	-0.514***	-0.514***	-0.516***	-0.541***
	(0.111)	(0.111)	(0.112)	(0.117)
Panel C: Only bonds				
Banks' holdings of government bonds	-0.012	-0.011	-0.012	-0.007
	(0.071)	(0.071)	(0.072)	(0.069)
Panel D: Loans and bonds in same regression				
Bank loans to the government	-0.516***	-0.516***	-0.518***	-0.547***
	(0.108)	(0.108)	(0.109)	(0.111)
Banks' holdings of government bonds	-0.031	-0.030	-0.030	-0.045
	(0.058)	(0.058)	(0.058)	(0.057)
Bank FE	x	x	x	x
Time FE	x	x	x	x
Deposits	x	x	x	x
Capitalization index		x	x	x
ROA, ROE and firm credit delinquency rate			x	x
Assets				x
Observations	1028	1028	1028	1028

Notes: This table estimates

$$Firm\ Credit_{bt} = \alpha + \gamma_t + \theta_b + \beta Lending\ to\ the\ Government_{bt} + \varphi X_{bt-1} + \epsilon_{bt}$$

using quarterly bank-level data for the period 2011:Q2-2019Q2. $Firm\ Credit_{bt}$ is the total amount of credit to private firms by bank b at time t. $Lending\ to\ the\ Government_{bt}$ is the total amount of financing provided by bank b to the government at time t. X_{bt-1} is the set of bank-level controls in the previous period that are progressively included in the regression: deposits, capitalization index, return on assets, return on equity, and firm credit delinquency rate. In Panel A, lending to the government is measured as the total amount of lending to the government by banks, including direct credit to the government as well as banks' holdings of government bonds. In Panel B, we include lending to the government only in the form of direct credit to the government; in Panel C, we include lending to the government only through banks' holdings of public bonds; and in Panel D, we distinguish between bank loans to the government and banks' holdings of government bonds in the same regression. All columns include bank and time fixed effects. Standard errors are clustered at the bank level. *** indicates significance at the 1% level, ** indicates significance at the 5% level and * indicates significance at the 10% level.

Table 3: Effect of lending to the government on firm credit: bank-firm level estimation

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Panel A: Total government lending exposure							
Loans plus bonds	-0.179**	-0.200**	-0.168**	-0.161**	-0.257***	-0.386***	-0.366***
to the government	(0.071)	(0.086)	(0.072)	(0.075)	(0.037)	(0.044)	(0.040)
Panel B: government lending exposure to bank loans							
Bank loans to	-0.605***	-0.598***	-0.467***	-0.476***	-0.401***	-0.576***	-0.542***
the government	(0.106)	(0.122)	(0.101)	(0.107)	(0.064)	(0.076)	(0.069)
Panel C: government lending exposure to bonds							
Banks' holdings of	-0.147**	-0.176**	-0.150**	-0.142**	-0.234***	-0.366***	-0.347***
government bonds	(0.063)	(0.082)	(0.069)	(0.071)	(0.046)	(0.057)	(0.051)
Panel D: Exposure to bank loans and bonds in same regression							
Bank loans to	-0.577***	-0.561***	-0.439***	-0.447***	-0.370***	-0.518***	-0.489***
the government	(0.104)	(0.118)	(0.100)	(0.107)	(0.064)	(0.075)	(0.068)
Banks' holdings of	-0.137**	-0.166**	-0.143**	-0.136**	-0.216***	-0.333***	-0.317***
government bonds	(0.057)	(0.077)	(0.065)	(0.066)	(0.046)	(0.055)	(0.050)
Fixed effects							
Firm	x	-	-	-	-	-	-
Bank	x	-	-	-	-	-	-
Time	x	x	-	-	-	-	-
Firm-bank	-	x	x	x	x	x	x
Firm-quarter	-	-	-	x	x	x	x
Firm-year	-	-	-	-	x	-	x
State-sector-time	-	-	x	x	x	-	x
Firm-time	-	-	-	-	-	x	-
Observations	7,661,133	7,661,133	7,661,133	7,661,133	7,392,853	2,327,878	2,327,815

Notes: This table estimates

$$ln(firm\ credit)_{ibt} = \beta Government\ Lending\ Exposure_{ibt} + \varphi X_{ibt-1} + \gamma Z_{ibt-1} + \epsilon_{ibt}$$

using quarterly bank-firm level data for the period 2011:Q2-2019-Q2. $ln(firm\ credit)_{ibt}$ is the log of credit received by firm i from bank b at time t. $Government\ Lending\ Exposure_{ibt}$ is the government lending exposure of bank b that lends to firm i as defined in Equation (3). X_{bt-1} is the set of bank-level controls: deposits, capitalization index, return on assets, return on equity, and firm credit delinquency rate. Z_{ibt-1} is the set of controls for loan characteristics including weighted loan maturity, share of fixed-rate loans, and share of dollar-denominated loans. Panel A, B, and C shows results for total government lending exposure, government lending exposure through loans, and government lending exposure through public bond holdings, respectively. Panel D shows results for each type of lending to the government, holding the other fixed. All columns include bank- and loan-level controls. Standard errors are clustered at bank-two digit NAICS sector-time level. *** indicates significance at the 1% level, ** indicates significance at the 5% level and * indicates significance at the 10% level.

Table 4: Effect of lending to the government on firm credit: firm-level estimation

	(1)	(2)	(3)
Panel A: Total government lending exposure			
Loans plus bonds to the government	-0.357**	-0.339**	-0.333**
	(0.0169)	(0.0181)	(0.019)
Panel B: Firm government lending exposure to bank loans			
Bank loans to the government	-0.437***	-0.426***	-0.448***
	(0.0266)	(0.0269)	(0.0273)
Panel C: Firm government lending exposure to bonds			
Banks' holdings of government bonds	-0.184***	-0.119***	-0.0715***
	(0.0199)	(0.0221)	(0.0235)
Panel D: Firm exposure to bank loans and bonds			
Bank loans to the government	-0.467***	-0.455***	-0.470***
	(0.0266)	(0.0267)	(0.0274)
Banks' holdings of government bonds	-0.242***	-0.198***	-0.155***
	(0.0197)	(0.0218)	(0.0233)
Fixed effects			
Firm	x	x	-
Time	x	-	-
Firm-quarter	-	-	x
State-sector-time	-	x	x
Observations	5,560,425	5,560,425	5,560,425

Notes: This table estimates

$$Firm\ Credit_{it} = \alpha_i \beta Firm\ Government\ Lending\ Exposure_{it} + \varphi X_{it-1} + \gamma Z_{it-1} + \eta_{it},$$

where $Firm\ credit_{it}$ is the total credit received by firm i from all banks it has borrowing relationships with. $Firm\ Government\ Lending\ Exposure_{it}$ is the average exposure of firm i to changes in government borrowing through its banking relationships. It is constructed as the weighted average of government lending exposure of all banks that have a relationship with firm i at time t. φX_{it-1} is the set of weighted bank-level control variables aggregated at the firm level: deposits, capitalization index, return on assets, return on equity, and firm credit delinquency rate. Z_{it-1} is the set of weighted loan-level controls including weighted loan maturity, share of fixed-rate loans, and share of dollar-denominated loans. Columns include all bank-level control variables. Panel A, B, and C shows results for total government lending exposure, government lending exposure through loans, and government lending exposure through public bond holdings, respectively. Panel D shows results for each type of lending to the government, holding the other fixed. Standard Errors are clustered at firm level. *** indicates significance at the 1% level, ** indicates significance at the 5% level and * indicates significance at the 10% level.

Table 5: Lending to the government and inter-bank loans

	(1)	(2)	(3)	(4)
Panel A: Total lending to the government				
Bank loans and bonds to the government	0.128**	0.128**	0.127**	0.071
	(0.060)	(0.061)	(0.061)	(0.045)
Panel B: Only bank loans to the government				
Bank loans to the government	0.115	0.115	0.115	0.024
	(0.099)	(0.099)	(0.099)	(0.047)
Panel C: Only bonds				
Banks' holdings of government bonds	0.125**	0.125**	0.124**	0.083*
	(0.053)	(0.053)	(0.053)	(0.042)
Panel D: Loans and bonds in same regression				
Bank loans to the government	0.125	0.125	0.125	0.036
	(0.099)	(0.099)	(0.099)	(0.054)
Banks' holdings of government bonds	0.129**	0.129**	0.128**	0.086*
	(0.0528)	(0.0530)	(0.0533)	(0.045)
Controls				
Bank FE	x	x	x	x
Time FE	x	x	x	x
Deposits	x	x	x	x
Capitalization index		x	x	x
ROA, ROE and firm credit delinquency rate			x	x
Bank controls: Assets				x
Observations	1028	1028	1028	1028

Notes: This table estimates

$$Interbank\ loans_{bt} = \alpha + \gamma_t + \theta_b + \beta Lending\ to\ the\ Government_{bt} + \varphi X_{bt-1} + \epsilon_{bt}$$

using quarterly bank-level data for the period 2011:Q2-2019Q2. $Interbank\ loans_{bt}$ is the total amount of interbank loans outstanding for bank b at time t. $Lending\ to\ the\ Government_{bt}$ is the total funding provided by bank b to the government at time t. X_{bt-1} is the set of bank-level controls in the previous period that are progressively included in the regression:: deposits, return on assets, return on equity, and firm credit delinquency rate. In Panel A, lending to the government is measured as the total amount of lending to the government by banks, including direct credit to the government as well as banks' holdings of government bonds. In Panel B, we include lending to the government only in the form of direct loans to the government; in Panel C, we include lending to the government only through banks' holdings of public bonds; and in Panel D, we distinguish between bank loans to the government and banks' holdings of government bonds in the same regression. All columns include bank and time fixed effects. Standard errors are clustered at the bank level. *** indicates significance at the 1% level, ** indicates significance at the 5% level and * indicates significance at the 10% level.

Table 6: Robustness: Bartik-style measure of banks' government lending exposure

	(1)	(2)	(3)	(4)
Panel A: Only bank loans to the government				
Synthetic bank loans to	-0.505***	-0.505***	-0.508***	-0.532***
the government	(0.137)	(0.137)	(0.137)	(0.139)
Panel B: Only Bonds				
Synthetic banks' holdings of	0.020	0.021	0.021	0.008
government bonds	(0.077)	(0.077)	(0.076)	(0.082)
Controls				
Bank FE	x	x	x	x
Time FE	x	x	x	x
Deposits	x	x	x	x
Capitalization index		x	x	x
ROA, ROE and firm delinquency rate			x	x
Lagged assets				x
Observations	897	897	897	897

Notes: This table estimates

$$Firm\ Credit_{bt} = \alpha + \gamma_t + \theta_b + \beta Synthetic\ Lending\ to\ the\ Government_{bt} + \varphi X_{bt-1} + \epsilon_{bt}$$

using quarterly bank-level data for the period 2011:Q2-2019Q2. $Firm\ Credit_{bt}$ is the total amount of credit to private firms by bank b at time t. $Synthetic\ Lending\ to\ the\ Government_{bt}$ is the bartik-style measure of the total amount of financing provided by bank b to the government at time t, as described in Section 5.1. X_{bt-1} is the set of bank-level controls in the previous period that are progressively included in the regression: deposits, capitalization index, return on assets, return on equity, and firm credit delinquency rate. In Panel A, we include the synthetic measure of lending to the government only in the form of direct credit to the government; in Panel B, we include only the synthetic measure of lending to the government only through banks' holdings of public bonds. All columns include bank and time fixed effects. Standard errors are clustered at the bank level. *** indicates significance at the 1% level, ** indicates significance at the 5% level and * indicates significance at the 10% level.

Table 7: Robustness: alternative measures of firm government lending exposure (FGLE)

	(1)	(2)	(3)
Panel A: FGLE normalized by bank assets net of firm credit			
Bank loans to the government	-1.273***	-1.248***	-1.291***
	(0.063)	(0.064)	(0.065)
Banks' holdings of government bonds	-0.485***	-0.402***	-0.322***
	(0.051)	(0.027)	(0.028)
Panel B: FGLE normalized by private credit			
Bank loans to the government	-0.467***	-0.455***	-0.470***
	(0.027)	(0.027)	(0.027)
Banks' holdings of government bonds	-0.243***	-0.198***	-0.155***
	(0.020)	(0.022)	(0.023)
Panel C: FGLE normalized by bank assets			
Bank loans to the government	-1.491***	-1.458***	-1.510***
	(0.079)	(0.080)	(0.082)
Banks' holdings of government bonds	-0.524***	-0.405***	-0.310***
	(0.058)	(0.064)	(0.070)
Controls			
Loan- and bank-level controls	x	x	x
Fixed effects			
Firm	x	x	-
Time	x	-	-
Firm-quarter	-	-	x
State-sector-time	-	x	x
Observations	5,560,425	5,560,425	5,560,425

Notes: This table re-estimates

$$Firm\ Credit_{it} = \alpha_i + \beta Firm\ Government\ Lending\ Exposure_{it} + \varphi X_{it-1} + \gamma Z_{it-1} + \eta_{it}$$

$Firm\ credit_{it}$ is the total credit received by firm i from all banks it has borrowing relationships with. $Firm\ Government\ Lending\ Exposure_{it}$ is the average exposure of firm i to changes in government borrowing through its banking relationships. It is constructed as the weighted average of government lending exposure of all banks that have a relationship with firm i at time t. φX_{it-1} is the set of weighted bank-level control variables aggregated at the firm level: bank assets, deposits, capitalization index, return on assets, return on equity, and firm credit delinquency rate. Z_{it-1} is the set of weighted loan-level controls including weighted loan maturity, share of fixed-rate loans, and share of dollar-denominated loans. In panel A, the government lending exposure measure is constructed as public funding normalized by total assets net of bank credit to the firm whose exposure is being measured. In panel B, government lending exposure is calculated as public funding normalized by private credit. In panel C, government lending exposure is calculated as public funding normalized by bank assets. In all panels, both coefficients are estimated in the same regression. All columns include bank- and loan-level controls. Column (1) includes firm and time fixed effects. Column (2) includes firm and state-sector-time fixed effects. Column (3) includes firm-quarter and state-sector-time fixed effects. Standard errors are clustered at the firm level. *** indicates significance at the 1% level, ** indicates significance at the 5% level and * indicates significance at the 10% level.

Online Appendix: Not For Publication

Table A1: Variables Definitions

Variable	Definition
Panel A: Bank-level data	
Government debt volume, including loans and bonds (millions Mexican pesos)	Volume of government debt in a bank's portfolio. It includes loans extended to the local or federal government by the bank as well as the bank's holdings of bonds issued by the government.
Government loans volume (millions Mexican pesos)	Volume of loans extended to the local or federal government by the bank.
Government bonds volume (millions Mexican pesos)	Value of government bonds held by the bank.
Firm loans volume (millions Mexican pesos)	Total amount of credit extended to private firms by the bank.
Short-term deposits volume (millions Mexican pesos)	Total amount of short-term (on demand) deposits of the bank.
Long-term deposits volume (millions Mexican pesos)	Total amount of long-term deposits of the bank. These deposits include consumer deposits as well as deposits by non-financial firms and other financial institutions.
Return on assets (%)	Return on assets of the bank in the previous quarter. This refers to the net income of the bank calculated at the end of the month divided by the total assets.
Return on equity (%)	Return on equity of the bank in the previous quarter.This refers to the net income of the bank calculated at the end of the month divided by the total equity.
Firm credit delinquency rate (%)	Delinquency rate for firm credit in the previous quarter. The delinquency rate is the amount of past due credit divided by total credit. A credit is said to be past due if it is not paid within the original time frame specified in the loan contract.
Capitalization index	Capitalization index in the previous quarter. The capitalization index is calculated according to the Basel III international regulatory framework. This index measures net capital as a percentage of the total risk-weighted assets of the bank.
Net Inter-bank loans volume (millions Mexican pesos)	Total amount of inter-bank borrowing net of inter-bank lending.
Panel B: Loan-level data (firm-bank)	
Share of fixed-rate loans (%)	Banks loans issued with a fixed interest rate as a share of total bank credit outstanding.
Share of dollar-denominated loans (%)	Dollar-denominated bank loans as a share of total bank credit outstanding.
Loan maturity (months)	Amount of months remaining for the loan to be paid. This variable is constructed at the bank level as the weighted average of all loans extended by a given bank to a given firm in the firm-bank pair, with the share of each loan in total bank credit being the relevant weight.

Table A2: Lending to the government and bank characteristics

	Δ Government Credit		Δ Bonds	
	Coefficient	s.d.	Coefficient	s.d.
	(1)	(2)	(3)	(4)
Panel A: Bank characteristics				
Log of total assets	0.004	(0.003)	-0.044	(0.044)
Short-term deposits/assets	0.025	(0.026)	-0.819*	(0.402)
Long-term deposits/assets	0.041	(0.056)	0.383	(0.491)
Return on assets	0.001	(0.001)	0.008	(0.023)
Return on equity	0.001	(0.001)	-0.001	(0.005)
Capitalization index	0.001	(0.001)	-0.004**	(0.002)
Firm credit delinquency rate	0.071	(0.051)	-0.508	(0.464)

Notes: This table estimates the univariate regression

$$\Delta Lending\ to\ the\ Government_{bt} = \alpha + \beta X_{bt-1} + \epsilon_{bt},$$

where X_{bt-1} could be either bank size (log of total assets), short- or long-term deposit ratio, bank profitability (return on assets, return or equity), capitalization index, or bank health (firm credit delinquency rate). This regression is estimated using quarterly bank-level data for the period 2011:Q2-2019:Q2. The dependent variable is a bank's financing to the government. Columns (1) and (2), show results for public debt financed through bank loans and columns (3) and (4) show results for public debt financed through banks' holdings of public bonds. Columns (1) and (3) show the point estimates of β and columns (2) and (4) show the standard errors. Each row shows results for a separate univariate regression. Standard errors clustered at bank level. *** indicates significance at the 1% level, ** indicates significance at the 5% level and * indicates significance at the 10% level.