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Why Did Public Banks Lend More During the Global Financial Crisis?

by Joshua Bosshardt and Eugenio Cerutti

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Why Did Public Banks Lend More During the Global Financial Crisis?[1]

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Abstract

During the Global Financial Crisis (GFC), state-owned or public banks lent relatively more than domestic private banks in many countries. However, data limitations have hindered a thorough assessment of what led public banks to better maintain lending during the GFC. Using a novel bank-level dataset covering 25 emerging market economies, we show that public banks lent relatively more during the GFC because they pursued an objective of helping to stabilize the economy, rather than because they had superior fundamentals or access to public or depositors' funding. Nonetheless, their countercyclical behavior seems unique to the GFC rather than a regular characteristic of public banks before and after the GFC.

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I. INTRODUCTION

There are numerous perspectives on the value of state-owned or public banks. Public banks can help resolve credit market inefficiencies (Eslava and Freixas (2016)), reduce the procyclicality of credit (Micco and Panizza (2006), Brei and Schclarek (2013), Cull and Martínez Pería (2013), and Bertay, Demirgüç-Kunt and Huizinga (2015)), support projects with positive externalities (e.g., lending to small and medium-sized enterprises as highlighted by Behr, Foos and Norden (2017) and Ogura (2018)), and extend financial networks to a greater fraction of the population (Anson et al. (2013)). However, they can also be sensitive to political influences (Dinç (2005), Carvalho (2014)), inefficient (Micco and Panizza (2006), Coleman and Feler (2015)), and associated with slower growth and financial development (La Porta, Lopez-de Silanes and Shleifer (2002)).

During the Global Financial Crisis (GFC), public banks experienced little contraction in lending compared to domestic private banks in some countries (see Figure 1 as well as Brei and Schclarek (2013), Cull and Martínez Pería (2013), and Bertay, Demirgüç-Kunt and Huizinga (2015)), which suggests that they can also help stabilize the economy by avoiding a credit crunch.[1] However, data limitations have hindered a thorough assessment of what led public banks to maintain lending during the GFC. In particular, all cross-country studies use annual data, which is unsuitable for detecting short-lived depositor behavior as well as the fast-changing features of the GFC. Previously used datasets also lack sufficiently detailed balance-sheet breakdowns, such as measures of the funding from the public sector.

This paper studies how public banks in emerging markets (EMs) maintained lending during the GFC. We consider three hypotheses:

1. Public banks lent more because they exhibited sounder fundamentals that enabled them to take greater risks.

2. Public banks lent more because they benefitted from funding advantages, such as safe haven

[1] Some country specific studies have also highlighted similar results. For example, Coleman and Feler (2015) shows that localities in Brazil with a high share of public banks received more loans and experienced better employment outcomes relative to localities with a low share of government banks. Similarly, in the case of Turkey, Önder and Özyıldırım (2013) show that credit provided by public banks during the crisis has a significant and positive effect on local growth.

perceptions of depositors or special access to government funding.

3. Public banks lent more because they pursued an objective of helping stabilize the economy during the crisis.

We address these questions using a novel dataset consisting of quarterly balance sheet information provided by the central banks from a diverse sample of 25 EM countries during the period 2006Q1-2010Q4. We focus on EMs during the financial crisis in order to avoid reverse causality bias arising from channels in which public banks have been associated with financial instability (Caprio and Martinez Peria (2000)). In particular, reverse causality bias is unlikely in this context because the financial crisis originated in advanced economies and spread to EMs as an external shock.[2]

We find evidence suggesting that public banks lent more because they pursued an objective of helping to stabilize the economy during the GFC rather than because they possessed different characteristics that were better suited to support loans. In particular, we find that public bank lending during the crisis cannot be explained by sounder fundamentals or advantages in obtaining funding from the public sector. Public banks attracted more deposits at the peak of the crisis in 2008Q4, but not enough to explain the difference in lending compared to domestic private banks. The additional lending growth that exceeds growth in funding corresponds to public banks' willingness to shift the composition of assets, particularly from liquid assets to a higher concentration of loans. Moreover, our analysis using both standard linear regressions and semiparametric distribution regressions (Chernozhukov, Fernández-Val and Melly (2013)) suggests that this countercyclical behavior was only prevalent during the GFC, not before and after the GFC.

Our contribution to the literature is threefold. First, this paper contributes to a literature on the behavior of public banks over the business cycle and during crises. Several papers have documented that lending by public banks is less procyclical compared to that of private banks, and many have considered potential explanations for this behavior of public banks using annual data. The results in Micco and Panizza (2006) do not support the view that this is attributable to misaligned incentives or lazy management. Brei and Schclarek (2013) do not find evidence that public banks acquire more deposits or equity during crises. Bertay, Demirgüç-Kunt and Huizinga (2015) find that public

[2]Moreover, based on Laeven and Valencia (2018), none of the 25 countries included in our sample experienced a systemic banking crisis during this period.

banks have more stable funding and rates of non-performing loans, which could contribute to the relative countercyclicality of public bank lending independently of the occurrence of a financial crisis. Duprey (2015) additionally shows that public banks in medium to- high income countries rely less on vulnerable funding like short-term and wholesale liabilities. We show that public banks lent relatively more during the GFC because they pursued an objective of helping to stabilize the economy, rather than because they had superior fundamentals or access to public or depositors' funding. Moreover, we highlight that the documented relative countercyclicality of public bank lending was not present in EMs before the GFC, as we show that this conclusion reflects mean estimates that do not characterize the behavior of typical banks.

Second, we also contribute to the wider discussion concerning the merits of public banks. On the one hand, public banks can help support projects that private banks might find unprofitable (Eslava and Freixas (2016), Brei and Schclarek (2015)). On the other hand, they also have been associated with inefficiencies (Dinç (2005), Micco and Panizza (2006), La Porta, Lopez-de Silanes and Shleifer (2002)). Our results offer some positive evidence on the long-term effects of using public banks as an instrument to support lending during crises. We do not find evidence that public banks experienced higher non-performing loans ratios after the GFC, suggesting that public bank lending during the GFC was not inefficient or unduly risky. More generally, our analysis of the behavior of public banks during the GFC is in line with one of the three theoretical hypotheses of the model in Brei and Schclarek (2015): in the event of a crisis, public banks might be more willing than private banks to tolerate risky lending with the objective of counteracting the negative spillovers of the financial shock to the real economy.[3] We find that many public banks achieved this objective by shifting their asset composition from liquid instruments to more loans.

Finally, our paper also offers new evidence on the behavior of depositors during periods of financial instability. In particular, if depositors believe that public banks are more likely to be bailed out, then they may transfer their funds to public banks in a flight to safety. Brei and Schclarek (2013) do not find that public banks attract more deposits during crises, but their annual data is unsuitable for detecting short-lived movements in deposits. Other studies with higher frequency data have reported that public banks sometimes attract more deposits during crises (McCandless, Gabrielli

[3]This behavior of public banks could be explained by different factors related to their state-owned enterprise (SOE) condition. As highlighted in IMF (2020), SOEs may benefit from preferential debt and equity financing, special tax and regulatory provisions, privileged market position and access to information, and rescues from bankruptcy.

and Rouillet (2003), D'Amato, Grubisic and Powell (1997), Adler and Cerutti (2015)), but these papers only consider Argentina and Uruguay. We find that public banks on average were indeed able to attract more deposits during the GFC across our sample of EM countries, but not enough to explain the difference in lending compared to private banks.

We approach the question of why public banks lent more during the GFC using quarterly data for a diverse set of countries. The paper continues as follows. Section 2 describes the data. Section 3 introduces the empirical methodology. Section 4 presents the results. Section 5 concludes.

II. DATA

This paper introduces a novel bank-level dataset consisting of quarterly balance sheet information obtained from the central banks of 25 emerging market (EM) countries during the period 2006Q1-2010Q4. During the data compilation of the IMF Bank contagion module, which is based on BIS and annual bank level data (see Cerutti, Claessens and McGuire (2014) for a description), we noted that several EM countries published quarterly balance sheet data either online or in print form. Our sample of 25 countries is based on those countries for which we were able to obtain the data from the central banks or supervisory agencies. Table 1 describes the variables, and Table 2 provides summary statistics. All non-categorical variables are winsorized at 5% in each quarter.

This dataset possesses several advantages relative to the datasets used in the literature. First, the quarterly frequency of the dataset facilitates a more precise analysis of potentially short-lived phenomena during the different phases of the crisis. Second, several countries in the sample report detailed balance sheet items that are not included in other studies, such as deposits from the central bank and other funds from the state. Third, the dataset includes every bank operating in the countries included in the sample, whereas commonly used databases such as Bureau van Dijk's Banscope have incomplete coverage.[4]

A potential caveat is that countries use different conventions to report some of the accounting items. We exercised care in ensuring that the definitions of accounting items are comparable across countries, and the use of country fixed effects in our regression analysis likely mitigates any residual discrepancies. Another caveat is that the data on state funds primarily reflects regular balance sheet

[4]Bankscope covers an average of approximately 86.43% of total banking system assets relative to our dataset.

items, such as deposits from the central bank, whereas state support during the crisis might have also occurred through unusual transactions that may not be reflected in this data.

We determine the ownership type of a bank as follows. A bank is classified as foreign if it is a branch office of a foreign-owned bank or majority-owned by foreign shareholders, otherwise it is domestic. To determine whether a bank is foreign-owned, we first consulted information included with the account filings data, which was supplemented using the database associated with Claessens and Van Horen (2015), the database associated with the IMF Bank Contagion Module, ownership history information provided by Bankscope, and online searches. To determine whether a domestic bank is publicly owned, we first consulted indications included with the account filings data, which was supplemented using ownership information provided by Bankscope and online searches.

The initial dataset consists of 1062 firms, which includes commercial banks as well as investment banks, savings banks, development banks, specialty banks such as real estate banks, and other financial entities. This paper focuses on commercial banks, whose operations primarily consist of taking customer deposits and issuing loans to individuals and non-financial firms. To obtain the subsample of commercial banks, we apply a "de facto" rule that excludes banks whose average loans to assets ratio or deposits to non-equity liabilities ratio is less than 10% over the sample period.[5] The final sample includes 877 banks, of which 96 are public banks.

Table 3 describes the asset share of public banks as of 2008Q4. There is notable variation ranging from 0% in Honduras, Jamaica, and Nicaragua to 73.56% in Belarus. The average across all countries is equal to 18.40%. Latin American and Caribbean countries exhibit the lowest share of public banks at 11.61%, Eastern European and Central Asian countries exhibit an average share of 28.24%, and East Asian countries exhibit the highest share of public banks at 37.41%.

[5]We use a "de facto" rule because a bank's official designation may not be sufficiently descriptive of its operational model. For example, some development banks primarily lend to other banks as second tier institutions while others primarily lend to individuals and non-financial corporations, and some primarily obtain funding through international agencies or directly from the state while others take deposits (Eslava and Freixas (2016)). The de facto rule is intended to retain the development banks that operate like commercial banks. A caveat is that banks that operate like commercial banks according to this de facto rule but that are not formally commercial banks may still differ in other respects, such as regulatory requirements. The results are qualitatively robust to also excluding banks that are explicitly designated as second tier institutions, development banks, or otherwise distinct from typical commercial banks.

III. EMPIRICAL METHODOLOGY

This paper focuses on the behavior of public banks before, during, and after the global financial crisis, which is associated with the period 2008Q4-2009Q1. We estimate an OLS regression model of the form

$$\begin{aligned}\Delta log(loans)_{ijt} = \beta Public_{ijt} + \eta Public_{ijt} \times GFC_t \\ + \mu Foreign_{ijt} + \phi Foreign_{ijt} \times GFC_t \\ + \gamma X_{ijt-1} + \alpha_{jt} + \epsilon_{ijt}\end{aligned} \tag{1}$$

where $\Delta log(loans)_{ijt}$ is loans growth for bank i in country j at quarter t, $Public_{ijt}$ is an indicator for whether a bank is publicly owned,[6], $Foreign_{ijt}$ is an indicator for whether a bank is foreign-owned, GFC_t is an indicator for whether a quarter occurs during the crisis period 2008Q4-2009Q1, α_{jt} is an indicator for each country-quarter to control for demand for credit, and $X_{ij,t-1}$ is a set of control variables representing bank fundamentals, which includes the share of total banking system assets, the ratio of equity to assets, the ratio of liquid assets, and the ratio of non-deposit liabilities to total liabilities. It also includes the ratio of non-performing loans (NPL) to total loans in some specifications. Bank fundamentals are lagged by one quarter to mitigate reverse causality bias. Standard errors are clustered by country-quarter.

The coefficient β on the public ownership indicator captures the average difference, conditional on the covariates, in loans growth between public and domestic private banks during non-crisis quarters, and the coefficient η on the interaction with the crisis dummy indicates the difference in lending between the two types of banks during the crisis relative to non-crisis quarters. We include corresponding indicators for foreign banks so that the coefficients associated with the public ownership indicator capture the difference between domestic public banks and domestic private banks.

The following fundamentals are included as controls in the regressions. The asset share of a bank relative to the total banking assets of a country captures multiple determinants of loans growth. A high asset share could be associated with lower loans growth since large banks are often more

[6]Note that $Public_{ijt}$ is subscripted by quarter since a small number of banks transition into or out of public ownership.

mature in the firm life cycle and less focused on growth. However, larger banks are also more likely to be bailed-out, which could allow them to take greater risks.

The ratio of equity to assets captures bankruptcy risk. A high capital ratio provides a buffer that allows a bank to avoid bankruptcy in the face of unexpected asset write-downs, which could provide flexibility for expanding credit. Additionally, many countries require banks to maintain a capital ratio above a regulatory lower limit. To the extent that issuing new equity is relatively costly, banks operating near the limit may be constrained from issuing new loans.

The ratio of liquid assets, particularly cash and securities, to total assets captures risks arising from banks' maturity transformation role. A higher liquidity ratio ensures that a bank can pay withdrawals of short-term liabilities without having to liquidate its long-term assets, which may in turn increase the capacity for issuing new loans.

The ratio of non-deposit or wholesale liabilities to total liabilities captures risks associated with the composition of a bank's funding. To the extent that wholesale funds can be relatively unstable during a crisis, we predict a negative association between wholesale ratio and loans growth during the crisis.

The NPL ratio measures the quality of a bank's loan portfolio. Delinquent loans can worsen liquidity risks because they do not yield interest payments, and they can worsen bankruptcy risks because they are more likely to be written-off from total assets. Both of these effects are likely to be negatively associated with loans growth.[7]

IV. RESULTS

This section reports the results from testing the hypotheses introduced in Section 1 to explain why public banks lent more during the crisis relative to private banks.

[7] Since the ratio of non-performing loans is relatively slow-moving, we supplement our primary quarterly dataset with annual data from Bankscope in order to increase the number of observations. We interpolate by matching annual observations to quarters in the same year.

IV.1. HYPOTHESIS 1: SOUNDER FUNDAMENTALS

Hypothesis 1 states that public banks lent more during the crisis because they exhibited sounder fundamentals that enabled them to take greater risks. To investigate this hypothesis, Table 4 compares the mean of bank-level averages of fundamentals during the periods before, during, and after the crisis for domestic private and domestic public banks. Before and during the crisis, public banks were significantly larger and exhibited a greater asset share of liquid assets, both of which could have increased their capacity to issue loans during the crisis.[8] If the difference in lending between public and private banks during the crisis was solely attributable to such differences in fundamentals, then the estimate for the interaction $Public_{ijt}\ x\ GFC_t$ would yield an estimate that is equal to zero when bank fundamentals are included as controls.

Table 5 presents the results from estimating equation (1). As a benchmark, column (1) includes only country-quarter fixed effects. The coefficient on $Public_{ijt}\ x\ GFC_t$ is positive and significant at 1%, indicating that public banks increased lending by approximately 5% more than private banks during the crisis conditional on only country-quarter effects. Column (2) includes the control variables. The conditional effect of public ownership remains positive, significant, and of similar magnitude compared to column (1), which suggests that the difference in loans growth between public and private banks cannot be solely attributed to differences in fundamentals. The coefficients on the fundamentals are generally consistent with the predictions in section III. Column (3) estimates a similar regression on an alternative set of bank control variables that includes the NPL ratio, which is only available for a subset of countries. The coefficient on $Public_{ijt}\ x\ GFC_t$ remains positive and significant.

Finally, we investigate to what extent the relative increase in public bank lending during the crisis was a result of exhibiting different sensitivities to fundamentals. In particular, we estimate a model where all of the control variables in the baseline regression are interacted with indicators for the crisis, public ownership, and their interaction. The effect of public ownership in this model depends on the values of the fundamentals, which generates a distribution of effects over the sample. The average public ownership effect during the crisis is equal to 4.2% and significant at 5%. The coefficients are displayed in Table 6. The coefficient on $Public_{ijt}\ x\ GFC_t$ is positive and signfi-

[8] Private and public banks exhibit similar ratios of cash to assets, but public banks have a higher asset share of securities.

cant at 5%, whereas most of the interactions with the fundamentals are insignificant. This further supports the interpretation that the relative increase in public bank lending during the crisis cannot be attributed to differences in fundamentals, even after allowing for the possibility that public ownership or the crisis changed the way that banks responded to fundamentals.

IV.2. HYPOTHESIS 2: FUNDING ADVANTAGES

Hypothesis 2 states that public banks lent more because they benefitted from funding advantages specifically related to their ownership status, such as safe haven perceptions of depositors or special access to government funds. In this section, we first show that public banks attracted more deposits during the peak of the crisis, which is consistent with a flight to safety in which depositors migrated to banks that they perceived as safer. If depositors migrated to public banks because they had stronger fundamentals, then regressing deposits growth on $Public_{ijt}\ x\ GFC_t$ would yield an estimate that is equal to zero when including fundamentals as controls. By contrast, a positive estimate would suggest that depositors believed that public banks were more likely to be bailed out.

Column (1) of Table 7 presents the estimation results after running the regression specified in equation (1) except with deposits growth as the dependent variable. Public banks acquired about 2.4% more deposits than domestic private banks during the crisis conditional on fundamentals and country-quarter effects. The effect is most prevalent at the peak of the crisis in 2008Q4: the coefficient in a regression that replaces the indicator for the GFC by an indicator for 2008Q4 is 4.9% and significant at 10% (column 2), whereas the coefficient for a similar exercise except using an indicator for 2009Q1 is only 1.3% and insignificant (column 3).

To capture the pass-through effect of deposits on loan growth, we estimate the regression with loans growth as the dependent variable except also including deposits growth and its interaction with the crisis as regressors. The results in column (4) indicate that deposits growth strongly predicts lending in general (e.g. a 1% increase in deposits increases lending by about 0.25%), but it does not explain the increased lending of public banks during the crisis since the coefficient on $Public_{ijt}\ x\ GFC_t$ remains significant and large. So, even though public banks attracted more deposits during the peak of the GFC, this is not enough to explain their increased lending.

Another possibility is that public banks might have lent more due to receiving greater funding sup-

port from the state. To test this hypothesis, Table 8 column (1) show the results from estimating the regression with state funds growth as the dependent variable.[9] The coefficient on $Public_{ijt}\ x\ GFC_t$ is insignificant and does not suggest that public banks obtained more state funds during the crisis. Note that the number of observations is reduced in a regression involving the growth rate of state funds since it is restricted to the subsample of observations where the level of state funds is greater than zero. To incorporate cases where state funds increased from zero, column (2) estimates a similar regression except using the quarterly difference in state funds as the dependent variable.[10] In this specification, the coefficient on the public ownership dummy is positive and significant, indicating that public banks exhibited greater growth in public liabilities during the non-crisis years. However, the coefficient on the interaction is insignificant, which suggests that public banks did not obtain significantly more state funds during the crisis.

Finally, since public banks did not acquire significantly more funding from deposits or state support during the crisis compared to private banks, another possibility is that they were more willing to invest in loans rather than safer liquid assets. To test this hypothesis, Table 8 column (3) runs the regression with the growth in the share of liquid assets as the dependent variable. The negative and significant coefficient on $Public_{ijt}\ x\ GFC_t$ indicates that private banks stocked up on liquid assets during the crisis to a greater extent than public banks. This suggests that public banks might have possessed a unique business model that led them to prioritize lending over mitigating liquidity risk.

IV.3. HYPOTHESIS 3: STABILIZATION MOTIVES

Hypothesis 3 states that public banks lent more during the crisis because they pursued an objective to help stabilize the economy.[11] This section considers two ways in which this might have occurred. First, public banks may follow a different business model that causes them to generally operate in a

[9] As described in section II, state funds includes deposits from the central bank and other liabilities associated with the public sector.

[10] Note that even when using this specification there are still fewer observations compared to the regressions involving other dependent variables. This is because only a subset of countries reports state funds.

[11] Another interpretation is that public banks pursued a unique business model that effectively led them to play a stabilizing role. For example, public banks may have had higher tolerance for risk due to relatively strong expectations of government guarantees, although the results from Table 8 suggests that public banks did not benefit from greater realized state support. Additionally, if expectations of government guarantees drove public bank lending during the crisis, then it should have also motivated higher lending by private banks with relatively strong expectations of bailouts, such as large banks that might be considered "too big to fail." Table 6 shows that the interaction of asset share with the GFC is positive but insignificant.

relatively countercyclical manner during normal times, which could give them greater capacity to also operate in a countercyclical manner during crises. Second, public banks may have expanded lending during the crisis as an ad hoc measure to avoid a credit crunch.

To assess the procyclicality of public banks around the time of the crisis, Table 9 presents the estimates from a similar regression as equation (1) that is estimated separately on the subsamples before, during, and after the crisis. Column (1) indicates that public banks were on average less procyclical compared to private banks before the crisis. Column (2) indicates that public banks were also less procyclical during the crisis, but the magnitude of the estimate on the public ownership dummy is notably larger compared to before the crisis. This comparison suggests that the degree of countercyclicality that public banks exhibited during the crisis was unique and may have been intentionally motivated to avoid a credit crunch.

The insignificant estimate in column (3) suggests that public banks failed to wind-down lending after expanding during the crisis. This finding is consistent with case studies of individual countries. For example, World Bank (2013) finds that after Brazil used its public banks to stabilize credit supply during the crisis, the share of loans by public banks continued to expand for several subsequent years, suggesting a failure to behave relative countercyclically compared to private banks during the recovery.[12]

The above considerations about the relative countercyclicality of public banks before and during the GFC are based on regression results that estimate mean difference between public and private banks, which might not adequately compare the behavior of a typical banks from the two groups due to the influence of outliers. To better assess the procyclicality of public bank lending, we also employ the semiparametric distribution regression methodology introduced in Chernozhukov, Fernández-Val and Melly (2013) to estimate cross-sectional models of loans growth for periods before, during, and after the GFC (2007Q1-2007Q4, 2008Q4-2009Q1, and 2010Q1-2010Q4, respectively). In each period, we estimate the distribution of loans growth over the period for public banks, the distribution of loans growth for private banks, and a counterfactual distribution of loans growth for public banks as if lending for public banks were determined from their characteristics, such as fundamentals and country-quarter effects, in the same way as lending is determined for

[12]Note that our results are qualitatively similar if Brazil is excluded.

private banks.[13]

Figure 2 presents the results of this exercise for the three periods. During the crisis, the distribution of loans growth for public banks is uniformly greater across all quantiles compared to the counterfactual distribution, which reinforces the interpretation that public bank lending cannot be attributed to differences in characteristics. By contrast, before the crisis the distributions are similar except for the fast-growing banks with loans growth above the 80th percentile. Similarly, in 2010 public banks lent as much or more compared to private banks except among the fastest-growing banks. Thus, although fewer public banks expanded very rapidly during non-crisis times, the typical public bank was not less procyclical than the typical private bank. This result suggests that the countercyclical behavior of public banks was unique to the crisis rather than a regular characteristic of public banks.

Consistent with these findings from the distribution regression analysis, column (1) of Table 10 shows that the negative effect of public ownership in the linear regression estimated on the period before the GFC diminishes dramatically and becomes insignificant in the period before the GFC if we omit the top 20% of the observations by country, quarter, and ownership type. The remaining columns show that the effect of public ownership during other periods is not significantly affected by omitting these observations.

IV.4. LONG-TERM IMPLICATIONS

This sections considers the long-term consequences of public banks' relatively countercyclical lending during the crisis. The unique degree of countercyclicality exhibited by public banks during the crisis suggests that they may have maintained lending as an emergency financial stabilization policy. Since such a motivation could prioritize lending more over lending well, it could have increased public banks' willingness to write risky loans that would more likely become non-performing loans (NPLs).

We investigate this hypothesis using a difference-in-difference specification. We use annual data from Bankscope in order to study the change in the non-performing loans ratio after 2010, the last

[13] This exercise can be interpreted as a distributional version of a Oaxaca-Blinder decomposition, where the difference between the observed distributions of the two groups is split between the difference in characteristics and the difference in the way that characteristics determine the dependent variable (Oaxaca (1973), Blinder (1973)).

year in our primary dataset.[14] The dataset for this exercise consists of two bank-level cross-sections: the pre-crisis period corresponds to 2008Q3, which is the last year quarter before the crisis, and the post-crisis period corresponds to the mean during 2012-2015. We estimate a difference-in-differences specification

$$NPL_{ijt} = Post_t + Public_{ijt} + Post_t \times Public_{ijt} + \alpha_j + \epsilon_{ijt} \tag{2}$$

where NPL_{ijt} is the non-performing loans ratio for bank i in country j at period t, $Public_{ijt}$ is an indicator for whether a bank is publicly owned, $Post_t$ denotes the post-crisis period averaging over 2012-2015, α_j is an indicator for each country. Robust standard errors are reported in parentheses. Foreign banks are excluded.

Table 11 presents the results. The estimate indicates that NPLs of public banks did not significantly change relative to private banks. We take care to note that this result is based on *reported* NPLs. However, we do not have reason to believe in our setting that there were discrepancies between reported and actual NPLs that would be correlated with bank ownership status. IMF (2020) also finds no significant performance differences between public and private banks in emerging and developing economies for the decade after the GFC. Nonetheless, the fact that NPL or other performance indicators did not significantly differ does not rule out inefficiencies and low productivity in public banks' lending. Coleman and Feler (2015) highlights that the GFC changed the market shares and power of public banks in Brazil, with public bank lending being politically targeted in the years following the GFC.

V. CONCLUSION

This paper examines several hypotheses to explain what led public banks to lend relatively more compared to private banks during the Global Financial Crisis in a diverse set of countries. Public bank lending during the crisis cannot be explained by sounder fundamentals or advantages in obtaining deposits or funds from the state. Instead, it is more likely that public banks lent more because of different objectives that led them to pursue a stabilizing role during the GFC. Moreover, we also find evidence that their relatively high degree of lending during the crisis did not appear to compromise their stability, as measured by the ratio of non-performing loans.

[14] We interpolate by matching annual observations to quarters in the same year.

The role played by public banks during the GFC is not minor from a policy perspective. Helping to avoid a credit crunch can help stabilize the economy during recessions, which is important since hysteresis effects could make GDP losses during a recession partly permanent (Blanchard, Cerutti and Summers (2015)). However, the challenges highlighted in the literature regarding the inefficiencies and political influences in the credit allocation of public banks during normal times could outweigh — if not properly continuously addressed — the potential benefits during crisis times.

APPENDIX I. FIGURES

Figure 1: This figure shows the mean quarterly loans growth of domestic private and domestic public banks within a window of the GFC for our sample of banks from 25 emerging market countries, which is described in section II.

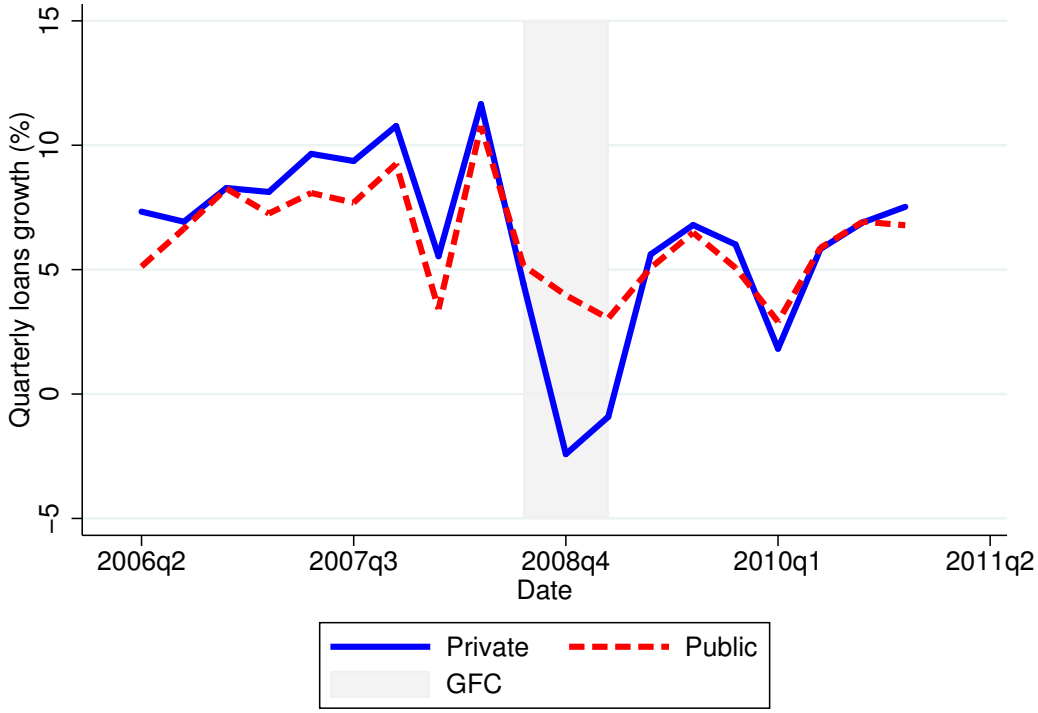


Figure 2: Loans growth distribution. These figures show the empirical distribution of loans growth for domestic private banks, the empirical distribution of loans growth for domestic public banks, and a counterfactual distribution estimated using the methodology is Chernozhukov, Fernández-Val and Melly (2013) of loans growth for public banks as if lending for public banks were determined from their characteristics, including fundamentals and country-quarter effects, in the same way as lending is determined for private banks. Panel (a) shows the distributions of loans growth over a period before the crisis (2007Q1-2007Q4), panel (b) corresponds to loans growth over the crisis period (2008Q4-2009Q1), and panel (c) corresponds to loans growth after the crisis period (2010Q1-2010Q4).

(a) Before GFC (2007Q1-2007Q4)

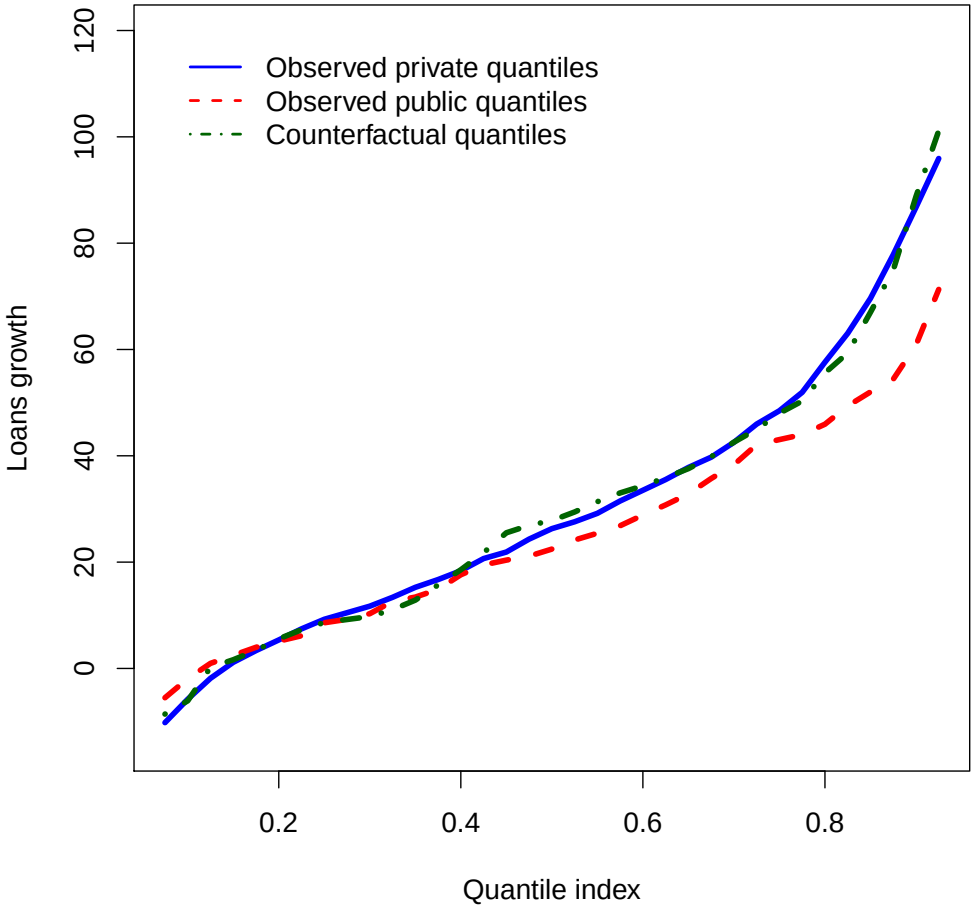


Figure 2: Loans growth distribution (cont.)

(b) During GFC (2008Q4-2009Q1)

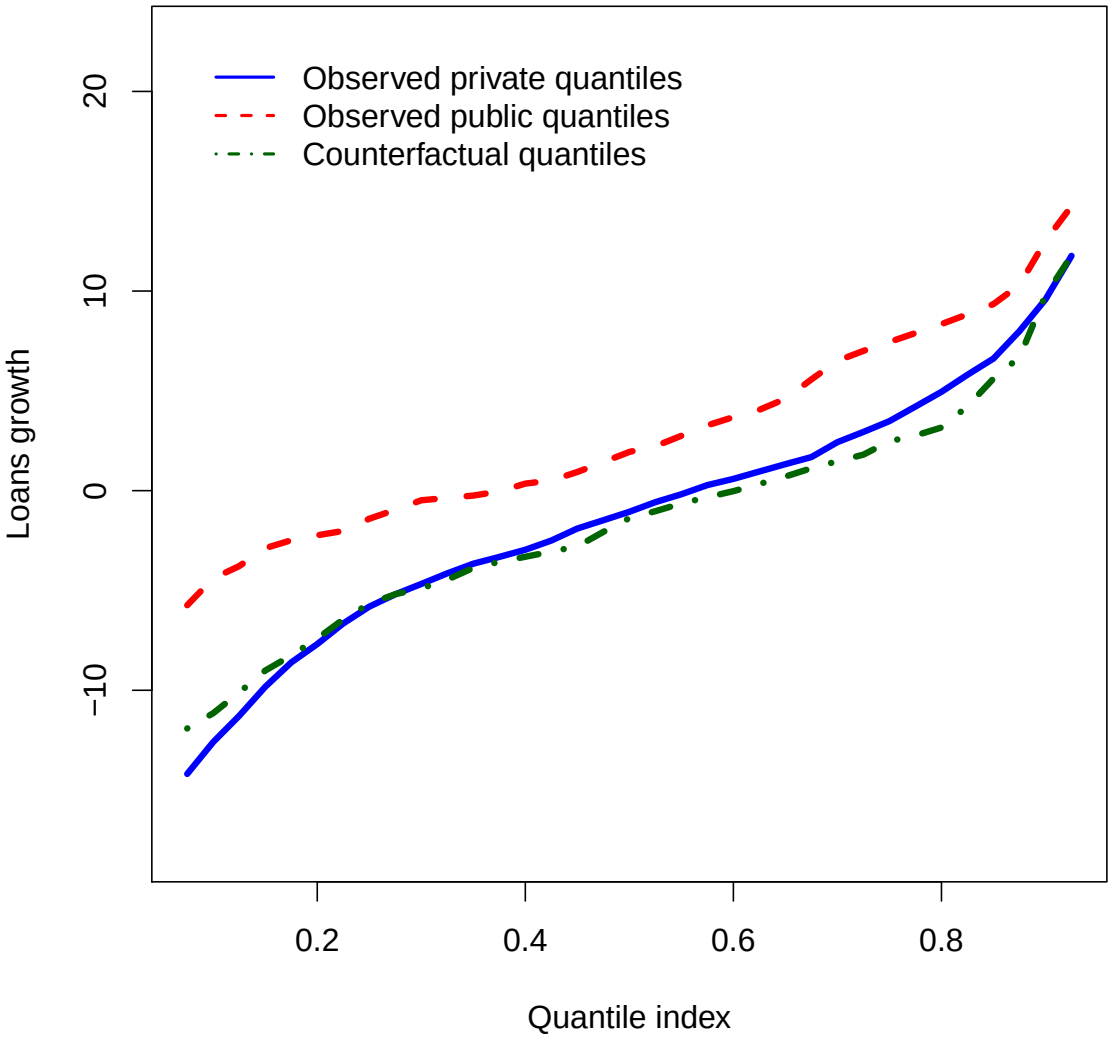
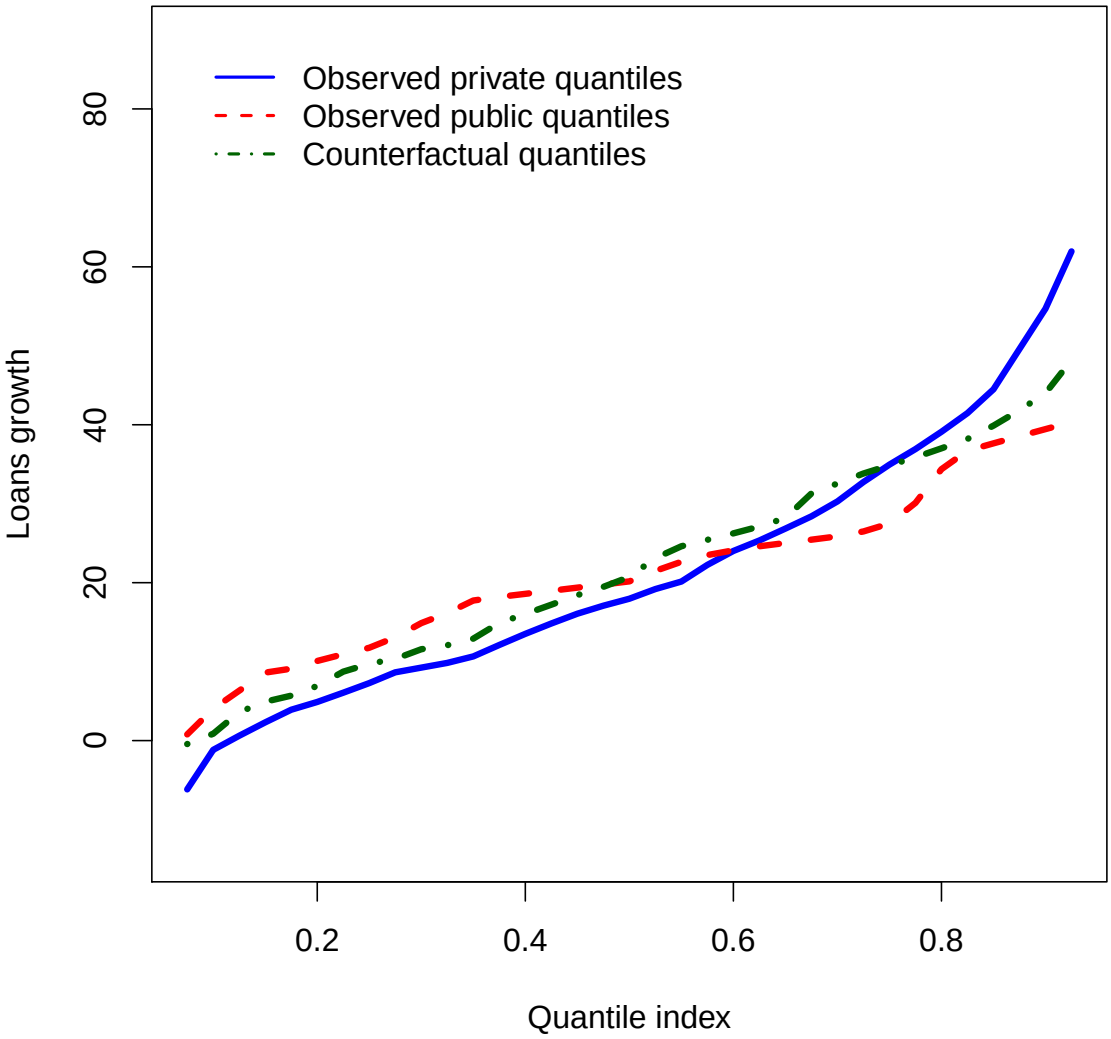


Figure 2: Loans growth distribution (cont.)

(c) After GFC (2010Q1-2010Q4)



APPENDIX II. TABLES

Table 1: Variable definitions.

Variable	Definition	Source
Public	Indicator of public bank	Bankscope, online sources
Foreign	Indicator of foreign bank	Claessens and van Horen (2015), IMF Bank Contagion Module, Bankscope, online sources
Loans growth	Quartlery growth rate of loans (= net loans when available) (%)	Central banks
Deposits growth	Quarterly growth rate of customer deposits (= demand + time + savings deposits, when available) (%)	Central banks
State funds growth	Quarterly growth rate of state funds (= central bank deposits and other public sector liabilities) (%)	Central banks
Asset share	Share of assets in the banking system (%)	Central banks
Capital ratio	Equity divided by assets (%)	Central banks
Liquidity ratio	Liquid assets (= cash + securities) divided by total assets (%)	Central banks
Wholesale ratio	(Non-equity liabilities - customer deposits)/non-equity liabilities (%)	Central banks
Non-performing loans (NPL)	Non-performing loans divided by gross loans (%)	Central banks and Bankscope

Table 2: Summary statistics.

	N	Mean	SD	SD
Loans growth	14504	6.142	4.370	12.037
Deposits growth	14471	6.091	4.130	14.832
State funds growth	9277	0.054	0.000	0.414
Public	15479	0.111	0.000	0.314
Foreign	15479	0.369	0.000	0.483
Asset share	15479	2.843	0.766	4.270
Capital ratio	15477	15.416	10.963	11.956
Liquidity ratio	15439	28.177	25.358	18.484
Wholesale ratio	15472	32.990	25.889	25.219
Non-performing loans ratio (NPL)	12720	3.016	1.720	3.471

Table 3: Public bank share. This table presents the total number of banks, the number of public banks, and the share of bank assets held by public banks in the sample countries as of 2008Q3.

Country name	Total banks	Public banks	Public share
Argentina	62	11	33.891
Belarus	29	4	73.56
Bolivia	11	1	6.856
Brazil	97	12	34.139
Bulgaria	29	1	.782
Chile	21	1	13.375
Colombia	17	1	3.849
Dominican Republic	21	1	35.209
Ecuador	27	5	20.045
El Salvador	12	2	4.162
Guatemala	16	1	.988
Honduras	17	0	0
Indonesia	117	5	36.644
Jamaica	6	0	0
Korea	17	4	31.926
Mexico	32	5	14.02
Nicaragua	7	0	0
Panama	59	2	9.811
Paraguay	15	1	3.205
Peru	14	3	5.753
Serbia	31	5	13.334
Taiwan Province of China	37	9	59.419
Thailand	18	2	21.653
Turkey	26	3	25.304
Venezuela	49	7	12.091

Table 4: Fundamentals comparison. This table presents the mean of bank-level averages of fundamentals during the periods before, during, and after the crisis (2006Q1-2008Q3, 2008Q4-2009Q1, and 2009Q2-2010Q4, respectively) for domestic private and public banks as well as the p-value from a difference of means test. All non-categorical variables are winsorized at 5% in each quarter.

	Private	Public	P-Value
Before GFC			
Asset share	2.214	4.616	0
Capital ratio	15.17	13.89	0.313
Liquidity ratio	25.86	35.60	0
Wholesale ratio	28.95	32.90	0.131
NPL ratio	3.210	4.256	0.016
During GFC			
Asset share	2.232	4.906	0
Capital ratio	16.03	14.30	0.255
Liquidity ratio	26.17	33.62	0
Wholesale ratio	31.08	35.58	0.129
NPL ratio	3.422	3.535	0.805
After GFC			
Asset share	2.276	5.292	0
Capital ratio	15.00	13.04	0.132
Liquidity ratio	28.15	33.88	0.004
Wholesale ratio	29.28	36.20	0.010
NPL ratio	3.265	3.801	0.187

Table 5: Loans growth regressions. This table presents results from estimating equation (1) as described in section III. T-statistics computed using country-quarter-clustered standard errors are reported in parentheses. * indicates statistical significance at the 10% level, ** indicates significance at the 5% level, and *** indicates significance at the 1% level.

	(1) No controls	(2) Baseline	(3) Additional controls
Public	-0.640**	-0.607*	-0.347
	(-2.01)	(-1.91)	(-1.02)
Public × GFC	5.639***	5.605***	5.788***
	(4.59)	(4.71)	(5.50)
Foreign	-0.937***	-1.066***	-1.226***
	(-3.14)	(-3.66)	(-3.75)
Foreign × GFC	3.056***	3.012***	1.981*
	(2.80)	(2.75)	(1.85)
Lag asset share		-0.095***	-0.127***
		(-4.61)	(-6.29)
Lag capital ratio		0.070***	0.085***
		(5.07)	(5.10)
Lag liquidity ratio		0.064***	0.067***
		(6.28)	(6.38)
Lag wholesale ratio		0.001	0.008
		(0.21)	(1.12)
Lag NPL ratio			-0.432***
			(-8.67)
Observations	14504	14464	11890
R^2	0.248	0.259	0.267
Country-quarter FE	Yes	Yes	Yes

Table 6: Loans growth regressions with rich interactions. This table presents results from estimating equation (1) as described in section III except with the addition of interactions between the fundamentals and the public ownership indicator, the crisis indicator, and the interaction of the public ownership indicator and the crisis indicator. T-statistics computed using country-quarter-clustered standard errors are reported in parentheses. * indicates statistical significance at the 10% level, ** indicates significance at the 5% level, and *** indicates significance at the 1% level.

	(1)
	Loans growth
Public	-0.722
	(-0.79)
Public × GFC	6.275**
	(2.35)
Foreign	-1.069***
	(-3.67)
Foreign × GFC	2.758***
	(2.64)
Lag asset share	-0.124***
	(-5.43)
Lag capital ratio	0.074***
	(4.76)
Lag liquidity ratio	0.059***
	(5.09)
Lag wholesale ratio	0.001
	(0.13)
Lag asset share × Public	0.079
	(1.56)
Lag capital ratio × Public	-0.003
	(-0.10)
Lag liquidity ratio × Public	0.012
	(0.67)
Lag wholesale ratio × Public	-0.016
	(-1.40)

Lag asset share × GFC	0.164
	(1.64)
Lag capital ratio × GFC	-0.012
	(-0.27)
Lag liquidity ratio × GFC	0.033
	(0.87)
Lag wholesale ratio × GFC	0.024
	(1.35)
Lag asset share × Public × GFC	-0.193
	(-1.07)
Lag capital ratio × Public × GFC	-0.112
	(-1.08)
Lag liquidity ratio × Public × GFC	0.023
	(0.44)
Lag wholesale ratio × Public × GFC	0.014
	(0.34)
Observations	14464
R^2	0.260
Country-quarter FE	Yes

Table 7: Deposits regressions. This table presents results from estimating equation (1) as described in section III with deposits growth as the dependent variable in columns (1) to (3) and loans growth in column (4). T-statistics computed using country-quarter-clustered standard errors are reported in parentheses. * indicates statistical significance at the 10% level, ** indicates significance at the 5% level, and *** indicates significance at the 1% level.

	(1) Y=Deposits growth	(2) GFC=2008Q4	(3) GFC=2009Q1	(4) Y=Loans growth
Public	-0.844**	-0.756*	-0.568	-0.408
	(-2.07)	(-1.91)	(-1.35)	(-1.28)
Public × GFC	3.272*	4.866*	1.295	4.716***
	(1.86)	(1.78)	(0.71)	(4.26)
Foreign	-1.355***	-1.276***	-1.006***	-0.718***
	(-4.22)	(-4.12)	(-2.85)	(-2.69)
Foreign × GFC	3.772**	6.095**	1.024	1.975**
	(2.37)	(2.39)	(0.82)	(2.04)
Lag asset share	-0.075**	-0.075**	-0.074**	-0.077***
	(-2.49)	(-2.49)	(-2.47)	(-4.09)
Lag capital ratio	0.133***	0.132***	0.133***	0.038***
	(7.57)	(7.54)	(7.59)	(3.01)
Lag liquidity ratio	-0.042***	-0.042***	-0.042***	0.076***
	(-3.38)	(-3.39)	(-3.35)	(7.57)
Lag wholesale ratio	0.090***	0.090***	0.090***	-0.021***
	(10.46)	(10.46)	(10.46)	(-3.36)
Deposits growth				0.250***
				(22.85)
Observations	14430	14430	14430	14414
R^2	0.220	0.220	0.218	0.334
Country-quarter FE	Yes	Yes	Yes	Yes

Table 8: Additional explanations. This table presents results from estimating equation (1) as described in section III where the dependent variable is the growth in state funds in column (1), the quarterly difference in state funds in column (2), and liquidity ratio growth in column (3). T-statistics computed using country-quarter-clustered standard errors are reported in parentheses. * indicates statistical significance at the 10% level, ** indicates significance at the 5% level, and *** indicates significance at the 1% level.

	(1)	(2)	(3)
	Y=State funds growth	Y=State funds diff	Y=Liquidity growth
Public	-0.757	0.091***	0.860
	(-0.18)	(4.03)	(1.13)
Public × GFC	-39.192	-0.323	-4.719*
	(-1.48)	(-1.24)	(-1.89)
Foreign	-6.784	-0.019*	-0.347
	(-1.27)	(-1.89)	(-0.38)
Foreign × GFC	58.709	-0.047	-3.122
	(0.70)	(-1.04)	(-1.36)
Lag asset share	0.028	0.003**	-0.154***
	(0.06)	(2.17)	(-3.09)
Lag capital ratio	0.054	-0.002**	0.034
	(0.21)	(-2.40)	(1.38)
Lag liquidity ratio	0.005	0.000	-0.385***
	(0.02)	(0.33)	(-11.87)
Lag wholesale ratio	-0.450**	0.000	0.016
	(-2.25)	(0.59)	(1.35)
Observations	2391	9271	14290
R^2	0.367	0.321	0.176
Country-quarter FE	Yes	Yes	Yes

Table 9: Loans growth (subsamples). This table presents results from estimating equation (1) as described in section III for subsamples corresponding to before, during, and after the global financial crisis. T-statistics computed using country-quarter-clustered standard errors are reported in parentheses. * indicates statistical significance at the 10% level, ** indicates significance at the 5% level, and *** indicates significance at the 1% level.

	(1) 2006Q1-2008Q3	(2) 2008Q4-2009Q1	(3) 2009Q2-2010Q4
Public	-1.236***	4.435***	0.354
	(-2.81)	(3.99)	(0.83)
Foreign	-0.786**	1.757*	-1.295***
	(-2.03)	(1.71)	(-3.04)
Lag asset share	-0.125***	0.023	-0.091***
	(-4.13)	(0.28)	(-3.39)
Lag capital ratio	0.095***	0.050	0.045**
	(4.53)	(1.27)	(2.44)
Lag liquidity ratio	0.095***	0.101***	0.007
	(7.31)	(2.74)	(0.52)
Lag wholesale ratio	0.014	0.023	-0.027***
	(1.47)	(1.61)	(-2.98)
Observations	7611	1545	5308
R^2	0.227	0.319	0.193
Country-quarter FE	Yes	Yes	Yes

Table 10: Loans growth (subsamples, omitting fast-growing banks). This table presents results from estimating equation (1) as described in section III for subsamples corresponding to before, during, and after the global financial crisis and omitting banks with loans growth above the 80th percentile by country, quarter, and ownership type. T-statistics computed using country-quarter-clustered standard errors are reported in parentheses. * indicates statistical significance at the 10% level, ** indicates significance at the 5% level, and *** indicates significance at the 1% level.

	(1) 2006Q1-2008Q3	(2) 2008Q4-2009Q1	(3) 2009Q2-2010Q4
Public	-0.447	4.786***	0.606
	(-1.25)	(3.45)	(1.38)
Foreign	-1.498***	-0.101	-1.853***
	(-5.74)	(-0.13)	(-6.34)
Lag asset share	0.170***	0.228***	0.146***
	(7.44)	(4.63)	(5.94)
Lag capital ratio	-0.104***	-0.091***	-0.093***
	(-8.11)	(-3.64)	(-6.41)
Lag liquidity ratio	-0.020**	-0.005	-0.059***
	(-2.28)	(-0.14)	(-5.77)
Lag wholesale ratio	-0.011*	-0.018	-0.026***
	(-1.90)	(-1.62)	(-3.91)
Observations	5876	1193	4100
R^2	0.349	0.514	0.348
Country-quarter FE	Yes	Yes	Yes

Table 11: Long-term effects. This table presents results from estimating equation (2) as described in section IV.IV. T-statistics computed using heteroscedasticity-robust standard errors are reported in parentheses. * indicates statistical significance at the 10% level, ** indicates significance at the 5% level, and *** indicates significance at the 1% level.

	(1) Y = NPL ratio
Post-GFC	0.119
	(0.22)
Public	0.391
	(0.37)
Post-GFC × Public	0.345
	(0.23)
Observations	588
R^2	0.264
Country-quarter FE	Yes

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