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Bank ownership, lending, and local economic performance during the 2008–2009 financial crisis

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Abstract

Although government banks are frequently associated with political capture and resource misallocation, they may be well-positioned during times of crisis to provide countercyclical support. Following the collapse of Lehman Brothers in September 2008, Brazil's government banks substantially increased lending. Localities in Brazil with a high share of government banks received more loans and experienced better employment outcomes relative to localities with a low share of government banks. While increased government bank lending mitigated an economic downturn, we find that this lending was politically targeted, inefficiently allocated, and reduced productivity growth.

Keywords

Credit; Financial crises; State-owned banks; Local economic activity

1. Introduction

Government ownership of banks is widespread around the world and increased in many countries during the recent financial crisis. In 2007, government banks accounted for 9.3% of total bank assets across a sample of 71 developed and developing countries with available data; by 2012, this share had increased to 10.0%, with enormous disparities across countries. Among the BRICs, government banks accounted for 44% of bank assets in Brazil, 41% in Russia, 74% in India, and 69% in China.¹ The recent finance literature has focused on the potential drawbacks of direct government intervention in finance through government banks. This literature finds that government ownership of banks is correlated with poor financial development and is most prevalent in developing countries with inefficient governments and weak institutions (Barth et al., 2001; La Porta et al., 2002). There is further evidence that

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¹These numbers come from World Bank Surveys, compiled by Barth et al. (2013). Government ownership is defined as governments controlling a majority stake in banks. As such, these data understate the extent of government involvement in banking during the recent financial crisis as they do not account for cases where governments acquired equity but not a controlling share in banks.

these banks come under pressure to lend to favored sectors or politically connected areas (Sapienza, 2004; Dinc, 2005; Claessens et al., 2008; Carvalho, 2014).

Government banks, however, may be well-positioned in times of crisis to provide counter-cyclical support. When governments own banks, they can instruct their banks to lend. Lending by government banks tends to be less responsive in general to macroeconomic shocks than lending by private-sector banks (Micco and Panizza, 2006; Bertay et al., 2014; Cull and Martinez-Peria, 2013). In part, this difference in lending behavior is due to how government banks are funded; they are less reliant on short-term obligations and can take advantage of government funds to make loans (Ivashina and Scharfstein, 2010).² And in part, this can be explained by politics, with government banks being more susceptible to political influence to lend.

Based on data from the recent financial crisis, there is a strong relationship between government ownership of banks and economic growth coming out of the crisis. Countries with a higher share of government banks experienced smaller economic declines and faster recoveries than countries with lower shares of these banks.³ This paper explores the argument that government banks can provide counter-cyclical support and help alleviate recessions. Using data on Brazil following the collapse of Lehman Brothers in September 2008, we assess whether government ownership of banks resulted in more lending, more production, more employment, and higher incomes, effectively mitigating the effects of the global financial crisis and helping Brazil avoid a recession. In fact, one cited reason for Brazil's relative success during the recent financial crisis was direct government involvement in the banking sector.⁴

Following the onset of the crisis, government banks in Brazil increased their lending to offset the decline in private bank lending. As Fig. 1 shows, aggregate lending by private-sector banks, both foreign and domestic, declined after September 2008, while aggregate lending by government banks increased and has remained substantially higher even five years after the crisis. Whereas private-sector banks accounted for the majority of all lending prior to the financial crisis, after September 2008, government banks were the majority lenders in Brazil.

Government bank branches are not spread uniformly throughout Brazil, and because lending is localized, areas where government bank branches are more prevalent were disproportionately stimulated. These areas correspondingly experienced relative increases in production, employment, and incomes, as shown in Fig. 2. Our empirical strategy is to use a differences-in-differences approach, comparing what happens to lending, production, and

²In the United States, during the 2008–2009 financial crisis, banks cut their lending less if they had better access to deposit financing (Ivashina and Scharfstein, 2010) and if they relied more heavily on retail deposits rather than wholesale liabilities for funding (Goetz and Gozzi Valdez, 2010).

³For a sample of 59 countries for which ownership and real GDP data are available, the correlation between government ownership and real GDP growth in the year following the Lehman Brothers collapse is 0.36 (with p -value 0.005). We use government ownership shares from Barth et al. (2013) and real GDP from national accounts data.

⁴*The Economist* (May 12, 2010) cites the CFO of a large private Brazilian bank as saying that government banks in the country played a critical role in promoting counter-cyclical policies, and a former governor of Brazil's Central Bank explained the importance of government banks in propping-up the economy during the crisis.

employment before and after the crisis in localities with a high share of government bank branches versus localities with a low share of these branches.

Our results suggest that localities with higher shares of government bank branches received more lending and experienced larger relative increases in gross locality product, number of firms in operation, number of formal sector workers, and total wage bills. These localities continued to grow during the 2008–2009 financial crisis and did so faster than otherwise comparable localities with lower shares of government bank branches. These findings are largely consistent with the existing banking and finance literature. Having more efficient financial markets promotes economic growth, both at the national level (King and Levine, 1993) and at the local level (Guiso et al., 2004; Burgess and Pande, 2005; Gilbert and Kochin, 1989). Given this literature, it is not unexpected that relieving local financial frictions during a crisis would improve short-run economic outcomes.

The literature also suggests that economic sectors that rely on bank financing grow faster when this financing is efficiently provided (Rajan and Zingales, 1998) and suffer larger declines when it is not (Braun and Larrain, 2005; Chava and Purnanandam, 2011; Kroszner et al., 2007; Dell’Ariccia et al., 2008). We examine reliance on bank financing and find that while government banks increased lending to localities with higher bank dependence, they did not fully offset the shock to lending in these areas during the crisis. A corollary to this statement is that government banks provided more than the necessary credit to offset declines in lending in areas with lower bank dependence. These findings are consistent with lending not being targeted to specific sectors, but rather, being allocated broadly across localities irrespective of economic necessity.

There is also evidence that government bank lending was politically targeted in the years following the crisis. Localities that were strongly aligned with the winning Workers’ Party during the presidential elections received more than enough credit to compensate for any declines in lending during the crisis. The divergence in lending between government and private-sector banks following the collapse of Lehman Brothers changed the market shares and power of these banks. Even after the crisis, this change in market shares has left the Brazilian banking system more vulnerable to political interference.

Along with evidence of credit misallocation, the results suggest that localities with a greater share of government banks had lower rates of firm turnover and slower productivity growth following the crisis. Moreover, while the rapid expansion of government bank lending led to improved credit quality indicators, which are typically measured in relation to assets, government banks’ delinquent loans and write-offs have increased in absolute values, and profitability has declined. While government banks may be well-positioned to lend counter-cyclically and stimulate the economy during crises, their actions create distortions that may ultimately jeopardize their own financial health and hinder future economic growth.

The paper proceeds as follows. Section 2 provides background on Brazil’s banking sector and the 2008–2009 financial crisis. Section 3 describes the data and empirical strategy. Section 4 presents the results and robustness checks, and Section 5 concludes.

2. Brazil's banking sector and the 2008–2009 financial crisis

Approximately one-third of Brazil's nearly 20,000 bank branches belong to federal government banks. These government banks include *Banco do Brasil*, *Caixa Econômica Federal*, or one of several federally owned regional banks created in the mid-1900s to stimulate regional economic development. Prior to 1997, Brazil also had an expansive system of bank branches owned by individual state governments (Beck et al., 2005). Almost all of these state banks were privatized during a consolidation of Brazil's financial sector between 1997 and 2006. Even after this consolidation, government banks continued to account for approximately 45% of total bank assets in Brazil (Barth et al., 2004).

Prior to the privatization program, Brazil's state and federally owned banks functioned largely as substitutes. State banks existed in the wealthier states, whereas federally owned banks were prevalent in historically underdeveloped states lacking resources to establish their own bank networks. With the privatization of state banks beginning in 1997, bank branches that used to be state-owned in wealthier states were transferred to private ownership. Federally owned banks, however, were never privatized. By 2008, this wave of state-bank privatizations and the absence of any privatization of federal banks left Brazil with bank branches either privately owned or federally owned, with many localities having a bank branch of a particular type (private or government) for reasons unrelated to their underlying economic characteristics.

The location decisions of government bank branches do not appear to react to changes in localities' economic or social characteristics over time. While the initial entry of government bank branches into a locality likely corresponds to the locality's contemporaneous economic and social circumstances, government bank branches almost never exit a locality. This suggests that while a locality's economic and social characteristics evolve, it is not the case that its bank branch composition evolves with it. At the onset of the financial crisis, the mean age of the branches of the two major government banks, *Banco do Brasil* and *Caixa Econômica Federal*, was 24 years and the median age was 20. Of all the bank branches ever opened by these two government banks, 86% are still in existence. There is little evidence to suggest that these government banks were strategically opening or closing branches in the years preceding the financial crisis.

While the locations of federal bank branches have remained fairly stable over the past half-century, Brazil has undergone a significant structural transformation. Between 1960 and 2000, Brazil has urbanized and industrialized, and Brazil experienced a shift in population from the Northeast to the Southeast of the country, as discussed in Da Mata et al. (2007) and Feler and Henderson (2011). The determinants of locality growth in Brazil have fundamentally changed. These structural changes in the economy imply that even if a government bank branch were opened for endogenous reasons several decades before, its continued operation is at least partially orthogonal to a locality's current economic and social conditions.

We exploit the variation in bank ownership across localities to estimate how bank ownership during the 2008–2009 financial crisis affected local lending, production, and employment.⁵

Some localities have a high share of government bank branches while others have a low share, despite having similar economic characteristics. Although the locations of government and private bank branches do not correspond entirely to local economic circumstances, we experiment with several different estimation techniques to reduce the possibility of bias due to endogeneity between a locality's banking structure and its underlying characteristics.

3. Data and empirical strategy

This section discusses sample selection, data, and the empirical strategy used to identify the effects of bank ownership on lending and economic outcomes.

3.1. Sample

Brazil has 5565 municipalities as of 2012, which can be combined into 3659 spatially constant units that we call "localities." These 3659 localities reflect the 1970 municipal borders and are roughly equivalent in size to U.S. counties. Collapsing municipalities into 3659 spatially constant units serves two main purposes: first, the 1970 borders more closely reflect geographic units corresponding to common area labor markets, and second, considering larger geographic units reduces the possibility that firms obtain loans from outside their own locality.

The locality-level analysis focuses on four federally owned banks and 115 privately owned banks, which together operate nearly 20,000 branches in Brazil. Because the data do not separately identify lending from individual branches (the data report only aggregated lending by all branches in each locality), we cannot examine lending by branches of individual banks. However, national-level balance sheet data from the Central Bank provide lending at the bank level, aggregated across all of a bank's branches. For these data, we restrict the analysis to the four federally owned banks and the largest 24 privately owned banks, which comprise over 95% of banking system assets one year prior to the financial crisis. This sample excludes the smallest banks, which account for less than 0.05% of banking system assets, to reduce noise and limit the possibility that our bank-level results are driven by the large number of small banks with little actual influence over the financial system. Finally, Brazil's National Development Bank (BNDES) is omitted from the sample of government banks because it is not a retail bank and its operations are not captured in locality-level balance sheets.⁶

⁵An underlying assumption is that lending, especially to small firms, is highly localized. Our lending data only capture loan origination and not the location of borrowers. However, even in developed capital markets, bank lending tends to be localized because of transportation and information costs, which give rise to spatial price discrimination (Degryse and Ongena, 2005). For Brazil, based on unofficial data provided by the Central Bank in 2004, we were able to calculate both the stock of loans held by each locality's bank branches and the outstanding bank debts owed by each locality's firms; the values were highly correlated.

⁶BNDES does not have bank branches nor does it engage in retail lending. Its operations are therefore not captured in locality-level branch data even though they are reported in national-level bank data. Over 85% of BNDES lending prior to and during the financial crisis is to large, national firms (Lazzarini et al., 2011; World Bank, 2012). These firms operate outside the scope of local credit markets, and it would therefore be difficult to attribute local economic fluctuations to BNDES lending. Moreover, BNDES does not account for a large fraction of overall lending in Brazil. While it is an important source of long-term credit, it accounts for 11.6% of total direct lending in Brazil immediately prior to the financial crisis.

Localities that do not have any bank branches, which tend to be sparsely populated and remote, are excluded from the analysis. The base sample therefore contains 2601 localities with at least one bank branch. On average, localities had over 60,000 residents in 2000 and were almost 70% urbanized. Immediately prior to the crisis, they had approximately 15,000 formally employed workers, 1100 formal-sector firms, contributed BRL\$1.05 billion to Brazil's GDP, and had over seven bank branches, of which, on average, 53% were government-owned.⁷ Between 2005 and 2007, average annual locality GDP growth was nearly 5%, employment growth was over 7%, and credit growth was over 22%.

3.2. Data

This paper combines data on bank branch locations, locality-level lending, national-level bank balance sheets, and locality-level employment. The bank data, both at the locality-level and national bank-level, were provided by the Central Bank of Brazil, and the employment data are from Brazil's Ministry of Labor and Employment (MTE). Data from the Central Bank indicate the locations of all bank branches — those currently in operation and those that have ceased operation — for every year since 1861 to the present. This allows us to capture a snapshot of the spatial distribution of bank branches at the beginning of the financial crisis and to see historical trends in branch openings and closures prior to the crisis.

Monthly locality-level lending is available from 1989–2012, although the analysis is limited to the years 2005–2012 to focus on the particular episode of the recent financial crisis. These data, combined with bank branch locations, allow us to determine the number of bank branches in a locality, the fraction of branches that is government-owned, and aggregate monthly lending in a locality. The primary measure of government bank intensity is the fraction of bank branches in a locality that is government-owned in 2007, although we also experiment with a dummy variable that is equal to 1 if the locality has above the median fraction (0.50) of government bank branches.

National-level bank balance sheets, aggregated for all of a bank's branches, allow us to examine total lending of government and private-sector banks. This information shows that private banks reduced lending at the onset of the crisis, but government banks did not. Additionally, these balance sheets are used to determine whether the reduction in lending is due to a reduction in deposits or to a reduction in the fraction of deposits that is lent.

To measure the local economic impact of the financial crisis, we use the *Relação Anual de Informações Sociais* (RAIS), an annual dataset with information on all formal-sector employees and firms, as well as on the self-employed who pay into the social security system. The data cover approximately 2.5 million establishments and 36 million workers. It is well known that the informal sector in Brazil is non-trivial, with the average locality having 34% of its workforce in the informal sector, based on 2000 census data. The results of this paper should therefore be interpreted as a reflection of how lending affects formal-sector economic outcomes.

⁷In 2000, BRL\$1.00 was approximately equivalent to USD\$0.55.

Finally, information on locality-level production and control variables, including measures of urbanization, education, income, population, and exports, all come from Brazil's Institute of Applied Economic Research (IPEA).

3.3. Empirical strategy

This paper aims to understand the aggregate lending behavior of government versus private banks and the impact of any differential lending on the economic performance of Brazilian localities during the recent crisis. To attribute a causal impact to bank ownership, we experiment with several different methodologies to minimize potential concerns about identification. The main specification looks at aggregate lending, output, and employment outcomes in localities as a function of the fraction of government bank branches in these localities. The main specification controls for locality and time fixed-effects and includes locality characteristics interacted with time fixed-effects, but a valid concern is that these may still not fully capture unobserved characteristics that are correlated with both bank branch locations and subsequent economic performance during the crisis and post-crisis periods. Therefore, even if we observe that areas with more government bank branches experience better economic outcomes, this may be because certain unobserved locality attributes, which are correlated with having more government bank branches, make these localities inherently more immune to financial shocks.

To address these concerns, we compare the performance of neighboring localities and of individual economic sectors within localities. Localities that share a border may have more similar unobservable characteristics than geographically distant localities. For example, neighboring localities may enjoy similar physical and human capital endowments, infrastructure, and political institutions compared with faraway localities. The analysis omits cross-state borders to ensure neighboring localities are within the same state. In this specification, we examine pairs of neighboring localities, one locality with a higher share of government bank branches and the other with a lower share, to see how lending, output, and employment are affected by differences in the shares of government bank branches between locality pairs. We also consider performance by economic sector to address the concern that government banks differentially lend to specific sectors of the economy and are concentrated in areas with different sectoral composition. The sectoral specification compares outcomes within the same economic sector across localities with different shares of government bank branches. Our conclusion that government banks had a significant counter-cyclical impact during the financial crisis is based on the combined results from these various empirical approaches.

The main estimating equation is:

$$y_{it} = \sum_m Gov_i \cdot Period_m + \alpha_i + \lambda_t + X_i \lambda_t + \varepsilon_{it}, \quad (1)$$

where λ_t are month-by-year fixed-effects when the data are monthly (i.e., for estimations using the bank balance sheet data as outcome variables) and year fixed-effects when the data are annual (i.e., for estimations using production, firm, and employment data as outcome

variables). Bank or locality fixed-effects are captured by α_i , and X_i are bank or locality baseline characteristics interacted with month-by-year or year indicator variables. $Period=\{During, Post\}$ is a set containing two (m) indicator variables: *During* equals 1 during the crisis period, i.e., for the twelve months from September 2008 through August 2009, when the data are monthly, and for the years 2008 and 2009, when the data are annual, and *Post* equals 1 for all months after August 2009, when the data are monthly, and for the years 2010 through the end of the data series, when the data are annual. *Gov* is an indicator variable for whether a bank is government-owned in the national bank-level estimations, and it is the fraction of government-owned bank branches in the locality in 2007 for the locality-level estimations. The error term is captured by ε_{it} . Errors are clustered at the bank or locality-level, with adjustments for small cluster sample size when appropriate. In the robustness section, alternative forms of clustering are also presented.

The inclusion of time fixed-effects absorbs any common trends or shocks. This specification is therefore estimating differences in the dependent variables between either government and private banks or between localities with higher versus lower shares of government bank branches. Coefficient estimates for the month-by-year or year indicators are not reported; these trends and common shocks are evident in Figs. 1 and 2.

Because banks and localities are of different sizes, we scale the outcome variables so the inclusion of time fixed-effects appropriately assumes banks and localities should be experiencing the same relative changes rather than the same absolute changes over time. When applicable, y_{it} is normalized to be 1 in either September 2008, for monthly data, or year 2008, for annual data. With this normalization, the assumption underlying the inclusion of time fixed-effects is that every bank or locality should experience the same relative changes over time. Interacting baseline controls with time indicators further allows relative changes over time to differ depending on baseline bank or locality characteristics.⁸

When examining differences in lending and economic outcomes between neighboring localities as a function of differences in their shares of government bank branches, the following equation is estimated:

$$\Delta y_{it} = \sum_m \Delta Gov_i \cdot Period_m + \alpha_i + \lambda_t + \Delta X_i \lambda_t + \varepsilon_{it}. \quad (2)$$

The dependent variable, y_{it} , is the difference in normalized lending or economic outcomes between two neighboring localities. The subscript i therefore represents a locality-pair instead of an individual locality. Gov_i is the difference in the share of government bank branches between neighboring localities, α_i are the locality-pair fixed-effects, and X_i are the differences in standardized locality baseline characteristics between neighboring localities. Errors, ε_{it} , are clustered at the locality-pair level. Locality pairs that cross state

⁸The benefit of normalizing versus using a growth rate is that one can assess whether differences in outcome variables between government and private banks or between localities with higher versus lower shares of government bank branches return to their pre-crisis levels. While differences in growth rates may eventually return to pre-crisis levels, they do not inform about whether, for example, government banks continue to lend more relative to private-sector banks, or whether employment remains disproportionately higher in localities with a higher share of government bank branches.

boundaries and locality pairs where one locality does not have any bank branches are omitted from the analysis.

To conduct the locality-by-sector estimations, Eq. (1) is modified to obtain

$$y_{ist} = \sum_m Gov_i \cdot Period_m + \alpha_{is} + \lambda_t + X_i \lambda_t + \varepsilon_{ist}. \quad (3)$$

In Eq. (3), y_{ist} is the outcome variable (e.g., output, number of establishments, or employment) for each sector, s , within a locality, i , at time, t . Locality-by-sector fixed-effects are captured by α_{ist} and the errors, ε_{ist} , are clustered at the locality-by-sector level. Locality lending data are only available at the aggregated locality level and not by sector. For output, or specifically, gross locality value-added, the data are broken into four broad categories: agriculture, industry, commerce/services, and government. For establishment and employment variables from RAIS, the data are separated into 15 sectoral categories based on Brazil's CNAE classification codes.⁹

Finally, we examine whether government banks allocated credit differentially based on particular locality characteristics during the crisis and post-crisis periods. Of specific interest, we explore whether areas with a greater share of government bank branches received more lending if: (a) a larger share of their workforce was employed in sectors that were more dependent on bank financing; (b) they had a higher credit-per-worker ratio prior to the crisis; (c) they had a higher share of small firms; (d) they were more strongly aligned with the winning Workers' Party during the 2006 and 2010 presidential elections; and (e) they had a mayor that was a member of the Workers' Party. These particular locality characteristics are meant to reflect credit dependence and political alignments. The following equation assesses whether these characteristics influence the allocation of lending:

$$y_{it} = \sum_m (Gov_i \cdot Int_i \cdot Period_m + Int_i \cdot Period_m + Gov_i \cdot Period_m) + \alpha_i + \lambda_t + X_i \lambda_t + \varepsilon_{it}, \quad (4)$$

where Int_i is the fixed locality characteristic. The estimated coefficient on $Gov_i \cdot Int_i \cdot Period_m$ informs whether localities with equivalent shares of government bank branches but with different values of Int_i receive disproportionate amounts of credit in period m . The extent to which localities with different levels of Int_i are affected during and following the financial crisis is captured by the term $Int_i \cdot Period_m$. Note that if the coefficient estimate on $Gov_i \cdot Int_i \cdot Period_m$ and $Int_i \cdot Period_m$ sum to zero — or, in other words, if they perfectly offset one another — it suggests that government bank branches completely smooth the shock to credit associated with a particular locality characteristic during period m . To analyze whether government bank branches under- or over-compensate for shocks, we therefore estimate:

⁹The two-digit CNAE 95 classification system separates sectors into 17 categories. We exclude two of these, “international organizations and other extraterritorial institutions” and “other collective, social, and personal services,” since fewer than 1% of localities report non-zero employment in these sectors.

$$y_{it} = \sum_m ([Gov_i + 1] \cdot Int_i \cdot Period_m + Gov_i \cdot Period_m) + \alpha_i + \lambda_t + X_i \lambda_t + \varepsilon_{it}. \quad (5)$$

The variables of interest are $[Gov_i + 1] \cdot Int_i \cdot Period_m$ for each period m . Since the data do not attribute locality-level lending to individual bank branches within a locality, we also experiment with restricting the sample to only localities where either all or none of the bank branches are government-owned.

4. Results

We first present results at the consolidated bank-level to show differences in government and private-sector bank behavior prior to, during, and following the financial crisis. We then proceed to examine locality-level lending and real economic outcomes. Finally, we present results exploring changes in bank loan quality and profitability.

4.1. Bank-level results

Table 1 shows results from estimating equation (1) for total monthly credit operations, deposits, and lending as a share of deposits based on national-level balance sheet data between January 2005 and October 2013 for the 28 largest banks — four federally owned banks and 24 privately owned banks — that together comprise 95% of banking system assets one year prior to the financial crisis. In column (1), the coefficient estimates suggest that government banks increased lending by 28.5% relative to private-sector banks in the twelve months following the collapse of Lehman Brothers, and that government bank lending grew faster and remained higher even 60 months after the crisis. The normalized trends in government and private-sector bank lending are plotted in Fig. 1. Prior to the financial crisis, trends in lending were nearly identical for government and private-sector banks. During the crisis, there was a small absolute decline in private-sector bank lending, whereas government bank lending continued to grow.¹⁰ As evident in Fig. 1, government banks continued to lend at substantially higher rates in the post-crisis period. We consider domestic and foreign-owned banks separately to examine whether shocks to foreign-owned banks can account for the differential lending behavior of private banks as a whole. There is little difference between the lending trends of domestic and foreign-owned private-sector banks.

Government banks may lend relatively more during the crisis because they experience an increase in their deposit base relative to private-sector banks. Since the federal government has historically guaranteed the solvency and liquidity of its banks, depositors might view these as safer institutions to maintain deposits. The federal government might also treat its banks more favorably by injecting more capital and providing cheaper funding in times of crisis. To the extent that depositors shift toward government banks or the federal government differentially provides funds to its banks during crises, government banks may experience a relative increase in their deposit base. In this scenario, government banks lend comparatively

¹⁰It is worth noting that our lending variable, total monthly credit operations, represents the stock of loans outstanding rather than a flow of credit. For the stock of loans outstanding to decline in absolute terms, as it does in Fig. 1 for private-sector banks during the crisis, suggests that net lending was negative: more loans were repaid or written-off than were extended during the crisis period.

more than private banks because they are better funded during the crisis. Table 1, column (2), examines this possibility. The increase in deposits was positive but insignificant for government relative to private banks during the crisis and post-crisis periods.

Another reason why government banks may lend comparatively more during crises involves a change in behavior. They may be less risk-averse since they can rely on federal government support to maintain solvency and liquidity, or they may be compelled, for political reasons, to increase lending. With either less risk aversion or increased pressure to lend, one would expect to see government banks lending a greater share of their liabilities; this is examined in column (3). During the crisis and post-crisis periods, lending as a share of deposits increased by nearly 10% for government relative to private banks.

These results suggest that government banks increased lending during the crisis and post-crisis periods not because they were necessarily better capitalized or funded, but because behavioral factors led them to increase the rate at which they extended credit.¹¹

4.2. Locality-level results

Table 2 shows results from estimating equation (1) for credit operations and real economic variables at the locality level. The estimations include locality fixed-effects, time fixed-effects (either monthly for total credit operations or annual for the real economic variables), and baseline locality characteristics interacted with time indicator variables. In column (1), the results suggest that localities with a greater share of government bank branches received more credit during and following the financial crisis: for equivalent localities, having all bank branches government-owned is associated with approximately 15% more credit compared to areas with no government branches. For the real economic variables, the results suggest that having a greater share of government bank branches is associated with relatively more production as measured by gross locality product (column 2), more firms (column 3), and a higher total wage bill (column 6). The results for employment (column 4) and total labor hours (column 5) are positive but insignificant.

In Fig. 2, the trends in credit, employment, total wage bill, and gross locality product are plotted for each year, with values for 2008 normalized to 1, for localities with high versus low shares of government bank branches. Localities with a high share of government bank branches are those where at least 50% of branches are government-owned. As shown in the figure, localities with a high share of government bank branches received relatively more credit and experienced comparatively better economic outcomes during the crisis and post-crisis periods. It is worth noting that, on average, credit, employment measures, and production did not decline across localities; rather, their rate of growth slowed during the financial crisis. In Eq. (1), common trends are captured by time fixed-effects, and only the

¹¹We experimented with using all 115 private-sector banks; as long as the estimations are weighted to account for the four government banks being considerably larger in terms of total assets, on average, than the 115 private-sector banks, we obtain substantially similar results. Without weighting, the bank-level results are larger in magnitude, but we are concerned that the unweighted results reflect problems in treating the 115 private-sector banks as a suitable comparison group for the four government banks. The results in Table 1 are based on estimations that include bank fixed-effects, month-by-year fixed-effects, and baseline bank characteristics interacted with month-by-year indicators. These baseline characteristics are the natural logarithm of a bank's assets, a bank's total credit operations as a share of liabilities, a bank's capital ratio, and a measure of the quality rating of a bank's lending portfolio, all for September 2007.

average difference between areas, depending on their shares of government bank branches, is captured by the coefficient estimates on $Gov_i \cdot Period_m$ for each period.

We explore these results further by examining differences in outcomes as a function of differences in the shares of bank branches that are government-owned across neighboring localities and by examining sector-specific effects within localities. Table 3 shows these results. Panel A, based on estimating equation (2), suggests that localities with a higher share of government bank branches relative to their neighbors received more credit, had slightly higher gross locality product, more firms, more employment, higher total labor hours, and higher total wage bills, with varying levels of significance.¹² Panel B, based on estimating equation (3), shows results when keeping locality sectors constant. Within the same sector, the results suggest that there were larger positive effects, again with varying levels of significance, on production, number of firms, employment, labor hours, and total wage bills during and following the crisis in localities with a higher share of government bank branches.

4.3. Bank dependence, political economy, productivity, and loan quality

In this subsection, we explore whether increased government bank lending was allocated efficiently during and following the financial crisis, and how any increase in lending associated with having a higher share of government bank branches impacted local measures of productivity. We also examine various indicators of bank financial health to assess whether government banks saw deteriorating portfolio quality or lower profitability as a result of their increased lending following the onset of the crisis.

4.3.1. Bank dependence—To examine the allocative efficiency of bank lending during and following the crisis, we estimate Eq. (5) using three different measures of bank dependence. Following the Rajan and Zingales (1998) methodology, we use an employment-weighted measure of the external financing requirements of individual sectors across Brazilian localities.¹³ While the Rajan and Zingales (1998) methodology of examining bank dependence has become standard in the literature, applying it to Brazilian localities may be problematic.¹⁴ We therefore consider two alternative measures. Credit per worker in the baseline year (2005) provides some indication of whether a locality is more credit dependent. However, since credit per worker in the baseline year is an equilibrium outcome reflecting local supply and demand conditions, it may not represent an efficient allocation. Finally, we use the share of locality employment in small firms (i.e., those with 1–19

¹²We interpret the lack of differential effects in the post-crisis period for many of the real economic variables as suggesting spatial spillovers across neighboring localities over time, but we cannot directly test for spillovers with the available data.

¹³External financing requirements by sector are calculated as follows. We obtained data from Goetz and Gozzi Valdez (2010) indicating the extent to which firms in three-digit NAICS sectors in the United States have higher initial scale and longer gestation periods before any cash flow is harvested, implying greater reliance on external financing. We concord the three-digit NAICS information on external financing to either the two-digit or three-digit sector classifications used in Brazil and compute external financing requirements for locality i as $ExtFin_i = \sum_j (Emp_{ij}/Emp_i) * ExtFin_j$, where j indexes sectors, Emp is employment using 2005 as a baseline, and $ExtFin$ captures external financing needs.

¹⁴First, the Rajan and Zingales (1998) measures are based on publicly listed U.S. firms in the 1990s. Rajan and Zingales (1998) applied these measures to countries, whereas our analysis applies these measures to small localities with considerably less diversity in sectoral composition. Second, the concordance between NAICS and Brazil's CNAE industry classifications is imperfect; with the three-digit CNAE, many localities have zero employment in individual sectors, whereas using the two-digit CNAE produces noisy measures of external financing.

employees). As discussed in Beck et al. (2008), small firms tend to be more reliant on external financing, and in Brazil, they are especially likely to rely on government banks for start-up capital.¹⁵

Table 4, columns (1) through (3), shows results using employment-weighted locality external financing requirements, baseline credit per worker, and share of locality employment in small firms as the interaction variables. The coefficient estimates on $[Gov_i + 1] \cdot Int_i \cdot During_t$ and $[Gov_i + 1] \cdot Int_i \cdot Post_t$ are essentially zero in Panel A, column (1), which uses external financing requirements as the bank dependence measure. Panels B and C consider only localities with either all or no government bank branches. In Panel B, for localities with only government bank branches, the coefficient estimates are positive and insignificant, and in Panel C, for localities with only private-sector bank branches, the coefficient estimates are negative and marginally significant. On their own, these estimates suggest that government banks allocated more credit to areas with higher external financing requirements in a way that fully smoothed shocks to lending during the crisis and post-crisis periods. However, with classical measurement error in the locality external financing variable, our estimates likely suffer from attenuation bias (Ashenfelter and Krueger, 1994). The coefficient estimates in columns (2) and (3), using baseline credit per worker and employment in small firms as alternative measures of bank dependence, suggest that government banks did not provide sufficient credit to bank dependent localities to fully offset credit shocks during the crisis and post-crisis periods. Given that localities with higher shares of government bank branches on average received more credit during the crisis and post-crisis periods, the implication of these latter results is that increased credit also flowed to localities that were not bank dependent.

4.3.2. Political economy—The finance literature describes several instances in which government ownership of banks is associated with politically targeted lending or where political contributions lead to preferential access to financing through government banks (Sapienza, 2004; Dinc, 2005; Claessens et al., 2008; Carvalho, 2014). This misallocation of lending based on political associations is costly, both because it leads to bad loans and higher rates of loan forgiveness (Khwaja and Mian, 2005) and because it raises the cost of capital to firms without similar political connections (Claessens et al., 2008). In examining the potential misallocation of credit during the financial crisis, we follow the literature and assess whether localities that were more closely aligned with the ruling Workers' Party received more credit if they had a greater share of government bank branches.

We use three variables to measure a locality's alignment with the Workers' Party. The first is an indicator variable if a locality had a mayor from the Workers' Party in any year between 2005 and 2012.¹⁶ The second is an indicator variable if the majority of a locality's electorate voted for the Workers' Party candidate in the final round of voting in either the 2006 or 2010

¹⁵Based on World Bank Enterprise Survey data for 2009, of the 1802 Brazilian firms in the survey, 1176 reported obtaining a loan and 379 received their most recent loan from a government bank. Among small firms with loans (those with 1–19 workers), 41% had received their most recent loan from a government bank, whereas for medium-sized firms (those with 20–100 workers) and large firms (those with more than 100 workers), the corresponding figures are 32% and 19%, suggesting that smaller firms in Brazil are comparatively more dependent on government banks for financing.

¹⁶For localities composed of multiple municipalities, this indicator variable takes the value 1 if more than 50% of votes cast in the locality were for a mayor belonging to the Workers' Party.

presidential elections. The third is a continuous variable reflecting the maximum (minimum) margin by which the Workers' Party candidate won (lost) in the final round of voting in either the 2006 or 2010 presidential elections. These variables reflecting political affiliation with the ruling party are used in place of Int_i when estimating Eq. (5). Results are shown in Table 4, columns (4) through (6).

In column (4), the coefficient estimates suggest that localities with mayors belonging to the Workers' Party received slightly more lending if they had a higher share of government bank branches. In columns (5) and (6), areas for which a majority of the electorate voted for the Workers' Party presidential candidate received more lending if they had a higher share of government bank branches. For a given share of government bank branches, the extent to which lending exceeded any shocks to credit increased the more the locality supported the Workers' Party in the presidential elections (column 6). In Panels B and C, we examine only localities that had all or no government bank branches. While the results are not always significant, we see that localities that were affiliated with the Workers' Party received more lending if they had government bank branches (Panel B) than if they did not (Panel C).

4.3.3. Firm turnover and productivity—Table 5 investigates firm turnover and changes in various proxy measures for productivity. Conceptually, counter-cyclical lending by government banks can increase productivity if it prevents productive firms from failing due to temporary liquidity constraints. Moreover, since firms that rely on external financing for R&D typically cut both R&D and product innovation when they are credit-constrained, any alleviation of constraints during the financial crisis may be beneficial to productivity (Benfratello et al., 2008; Campbello et al., 2010). However, if government banks prop-up unproductive firms (as in Caballero et al., 2008), allocate credit indiscriminately, or misallocate credit on the basis of political affiliations, then we should expect productivity to suffer. Based on the previous results and the existing literature, our prior is that government banks misallocate credit more than they use credit to enhance productivity.

In columns (1) and (2), we re-examine our previous result that a higher share of government bank branches is associated with having more firms in operation during and following the crisis. The relatively greater number of firms in localities with a higher share of government bank branches is due to fewer firm deaths as opposed to more firm births. In fact, consistent with Caballero et al. (2008), firm births and firm deaths are both lower during the crisis in areas with a higher share of government bank branches. The far greater reduction in firm deaths, however, translates into a relative increase in the overall number of firms. These results suggest that localities with a higher share of government bank branches experience less firm turnover during the crisis.

As proxies for productivity, columns (3), (4), and (5) show results using output per firm, wage bill per firm, and exports per firm as the dependent variables.¹⁷ With these three

¹⁷Since only the most productive firms tend to be exporters (Melitz, 2003), we use exports per firm as a measure of whether surviving firms during the crisis and post-crisis periods tend to be more productive. Output per firm is gross locality product divided by total number of firms in the locality; wage bill per firm is total locality wage bill divided by total number of firms; and exports per firm (only available from 2005 through 2010) is total locality exports (in US\$ FOB) divided by total number of firms for localities with non-zero exports. Output per firm, wage bill per firm, and exports per firm are all normalized to have value 1 in year 2008.

measures, the signs of coefficient estimates suggest a relative decline in productivity, although we do not obtain statistical significance at conventional levels.

4.3.4. Quality of loans—Given the evidence that Brazil's government banks misallocated credit during the crisis and post-crisis periods, a valid question is how this misallocation affected government banks' balance sheets and financial health. Table 6 shows results for the capital ratio, credit earnings, loss provisions, share of credit delinquent, charge-offs, and net profits for government relative to private-sector banks, based on estimating equation (1) using national-level bank balance sheets. As evident in column (1), government banks decapitalized relative to private-sector banks. This is consistent with government banks using their capital buffers to lend counter-cyclically (Jimenez et al., 2013). With the increase in lending, government banks' credit earnings increased (column 2). Traditional measures of credit portfolio quality also improved relative to private-sector banks, with loan loss provisions (column 3), share of credit more than 90 days delinquent (column 4), and charge-offs (column 5) all declining.¹⁸ Trends for these measures of lending quality for government and private-sector banks are plotted in Fig. 3. These results for lending quality are not entirely surprising. As private-sector banks reduce lending even to high-quality borrowers, government banks can expand lending to these borrowers. Moreover, the overall expansion of credit by government banks can reduce losses as a share of total lending even while absolute losses increase. Finally, column (6) reports results for net profits. There is little change in government banks' net profits during the crisis; however, between 2010 and 2013, their profits are lower than those for private-sector banks.

Overall, the results suggest that government banks lend counter-cyclically, increasing their lending relative to private-sector banks during the crisis. This increased lending is channeled to localities where government banks are more prevalent. These localities experience better employment and production outcomes compared to localities where government bank branches are less prevalent. There is evidence that increased government bank lending is politically targeted and broadly allocated rather than directed toward areas where production is more dependent on external financing. While this misallocation of credit does not immediately erode the quality of government banks' lending portfolios, we find that it negatively affects firm turnover and various measures of productivity.

4.4. Robustness

This section examines the robustness of the main findings to alternative specifications, explanations, clustering, and sample selection. Table 7 shows base case results from Table 2 in row (A) and robustness checks in subsequent rows. In row (B), instead of a continuous share of government bank branches, we use an indicator variable for whether a locality's share of government bank branches is greater than or equal to the median (0.50). For row (C), Eq. (1) is modified by removing the interactions of locality baseline controls with time

¹⁸The Central Bank of Brazil establishes minimum amounts that banks must provision for potential loan losses based on repayment delinquencies. Although banks can provision more than this amount, they cannot provision less. While the result on loss provisions could be due to private banks being more conservative and provisioning more than the required minimum, the result for credit delinquencies suggests that government banks experience a relative decline in bad credit; we interpret this as suggesting that government banks provision relatively less not only because they behave less conservatively following the crisis, but also because they experience a relative improvement in their lending portfolios.

indicators; coefficient estimates and significance levels all increase. In lieu of controls interacted with time indicators, row (D) shows results using propensity-score matching.¹⁹ Row (E) uses the regression-based Oaxaca-Blinder estimates of counterfactual outcomes to construct a “control group” for localities with high shares of government bank branches.²⁰ In the base case, the dependent variables are normalized to be 1 in either September 2008 for monthly data or for year 2008 for annual data. Row (F) uses the natural logarithm of the dependent variables instead of their normalized values.

While the base case reports standard errors clustered at the locality level, alternatives are to cluster by time, by state-by-time, or to double-cluster by locality and time, following Thompson (2011). Given concerns about insufficient time periods and small cluster sample bias, we experiment with clustering by state-by-time and double clustering by both locality and state-by-time. When clustering at the state-by-time level (not shown) and when double-clustering by locality and state-by-time (Row (G)), the significance of the base case results remains largely unchanged.

Row (H) presents results that aggregate spatial units into metropolitan statistical areas. These are areas defined as commuting zones and common labor markets by Brazil’s geography and statistics agency (IBGE). The majority of our localities are already unique commuting zones and labor markets, although 441 belong to larger metropolitan areas. Collapsing to metropolitan areas is meant to address concerns of bank branches lending to individuals and firms outside their own localities. Results at the metropolitan area level are similar to those in the base case.

Row (I) includes the interaction of government employment with period indicators to assess whether the base case results are being driven by other government actions that may be correlated with the presence of government bank branches. While it is true that localities with a higher share of government bank branches also tend to have a higher share of employment in government, including interactions with the share of government employment does not alter the base case results. To explore alternative channels, we estimate Eq. (1) using, as the dependent variables, the number of workers employed in construction and federal government transfers to each locality. We do not obtain any significant coefficient estimates (results not shown), suggesting that it is not through changes in fiscal transfers or through stimulus spending associated with public works programs that localities with a greater share of government bank branches are experiencing relative increases in employment and production in the crisis and post-crisis periods.

¹⁹We estimate the propensity of localities to have a high share of government bank branches (i.e., greater than or equal to 0.50) as a function of baseline locality characteristics. These characteristics, from 2000 census data, are average years of education, urbanization rate, illiteracy rate, average per capita income, and the natural logarithms of population, total locality income, total locality employment, a measure of total locality human capital, and several interactions of these variables. We use Epanechnikov kernel matching with bandwidth 0.05. With matching using the estimated propensity score to calculate average treatment effect weights, a Kolmogorov-Smirnov test fails to reject the equality of kernel density distributions for localities with high versus low shares of government bank branches. See Dehejia and Wahba (1999) and Heckman et al. (1997) for a discussion of propensity-score matching.

²⁰Following Oaxaca (1973), Blinder (1973), and Kline (2011), we first regress our dependent variables on baseline locality controls only for localities with low shares of government bank branches, predict the dependent variables for all localities, and then estimate equation (1) only for localities with high shares of government bank branches, where we now have actual and counterfactual outcomes for these localities.

Finally, row (J) shows the results of a placebo exercise. Instead of using localities' actual baseline shares of government bank branches, we use the estimated propensity scores calculated from the specification in row (D) and interact it with period indicators. If results are truly driven by the prevalence of government bank branches and not by locality characteristics that are correlated with the presence of government bank branches, then we should not obtain any significant coefficient estimates. Indeed, only one coefficient estimate (for lending during the crisis) is significant, but it is much smaller in magnitude than in the base case; none of the other coefficient estimates are significant.

Our main results are robust to alternative specifications, explanations, clustering, and sample selection. Similar robustness exercises for the results in Tables 4–6 did not lead to any major changes in our findings.

5. Conclusion

While the financial crisis led to a sharp decline in lending, production, and employment in many countries around the world, this decline was fairly minimal in Brazil. In part, the reason for only a mild economic downturn in Brazil can be attributed to the country's government banks. The onset of the financial crisis caused private-sector banks to alter their behavior and operate more conservatively, while government banks increased their lending. Although this counter-cyclical lending by government banks appears to have mitigated the effects of an economic downturn, we find evidence that increased government bank lending was politically targeted and inefficiently allocated, and that areas with a greater prevalence of government bank branches experienced less firm turnover and relative declines in productivity after the crisis.

In areas with a higher share of government bank branches, the local economy was disproportionately stimulated. Total credit operations, production, employment, income, and number of firms in operation were all higher in these localities than in corresponding localities with lower shares of government branches. Our estimates suggest that economic growth, incomes, and the number of firms would have declined in Brazil relative to pre-crisis trends if not for the actions of government banks.

Despite these immediate benefits of government involvement in the banking system during crises, such involvement also creates distortions that may ultimately jeopardize the financial health of government banks and hinder future economic growth. Government bank lending appears to have prevented firm turnover and reduced productivity growth in the medium-term. Additionally, the rapid expansion of government bank lending has led to improved credit quality indicators in relative terms (as a share of assets), but the absolute values of delinquent loans and charge-offs have actually increased. There are also indirect financial costs. Government banks have become less profitable, and they rely more heavily on federally supplied funds, often obtained at below market rates or below the rate of inflation, to provide credit.

Finally, there is ample evidence that government banks and bailouts of banks are subject to political capture and that lending can become politically motivated over time, with

detrimental effects to the allocation of productive inputs and financial development (Duchin and Sosyura, 2012; Dinc, 2005; Khwaja and Mian, 2005; Carvalho, 2014; Barth et al., 2001). Even in Brazil, this was the case when individual state governments had their own commercial banks (Feler, 2014). Brazil has bailed out its federal and state government banks numerous times during the past century, with the most recent attempt to reduce government participation in the banking sector costing the country over 5% of GDP.²¹ Given that government bank lending has not returned to pre-crisis trends even five years after the crisis, the short-term countercyclical benefits of increased government intervention in the banking sector may not outweigh potential long-term costs in terms of reduced productivity, increased risk of political capture, and future bailouts.

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²¹ According to the Central Bank of Brazil, the PROES program incentivizing the privatization of state-owned banks involved over R \$63 billion in capital injections during the late 1990s and early 2000s. Brazil's GDP in 2000 was R\$1179 billion.

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Fig. 1.

Total credit operations at the national bank level, 2005–2013. *Notes:* This figure shows total real credit operations deflated to Brazilian *reais* of January 2000 and normalized to have value 1 for all bank types at month 0 (September 2008). Banks are classified as government or private, with private banks being subdivided into domestic and foreign-owned based on controlling interests as specified by the Central Bank of Brazil.

Fig. 2.

Locality-level effects, 2005–2012. *Notes:* This figure shows total real credit operations, employment, locality wage bill, and gross locality product, normalized to have value 1 in 2008, for localities with high versus low shares of government bank branches. Localities are classified as having a high share of government bank branches if at least 50% of their branches belong to government banks. Monthly credit operations at the locality level are deflated to Brazilian *reais* of January 2000 and then averaged over the year to yield average annual credit operations. The total locality wage bill and gross locality product are deflated to Brazilian *reais* of January 2000.

Fig. 3. Bank-level delinquent credit operations, loss provisions, and charge-offs, 2005–2013. *Notes:* This figure shows delinquent credit operations (with payments more than 90 days overdue) as a share of total credit, provisions for potential credit losses as a share of total credit, and deductions for actual credit losses (charge-offs) as a share of assets in circulation.

Table 1

Bank-level credit operations and liabilities, 2005–2013.

Dependent variable:	(1) Lending	(2) Deposits	(3) Lending/Deposits
<i>Gov · During</i>	0.285 *** (0.102)	0.014 (0.067)	0.095 *** (0.024)
<i>Gov · Post</i>	0.558 ** (0.225)	0.127 (0.164)	0.097 *** (0.025)
R^2	0.42	0.53	0.23
Number of observations	2818	2818	2818
Number of banks	28	28	28

Notes: Jackknife standard errors, clustered at the bank level, are reported in parentheses. Data are from monthly bank-level balance sheets, as reported by the Central Bank of Brazil, from January 2005 to October 2013 for the 28 largest banks — four federally owned banks and 24 privately owned banks — whose combined assets account for 95% of all banking system assets one year prior to the onset of the financial crisis. Lending and deposits are both deflated to Brazilian *reais* of January 2000 and are normalized to have value 1 in September 2008. *Gov* is an indicator variable for whether a bank is government-owned. *During* is an indicator variable for the twelve months from September 2008 to August 2009 following the onset of the crisis, and *Post* is an indicator variable for all months from September 2009 to October 2013. All regressions include bank fixed-effects, month-by-year fixed-effects, and baseline bank characteristics interacted with month-by-year indicators. Baseline characteristics are the natural logarithm of a bank's assets, a bank's total credit operations as a share of liabilities, a bank's capital ratio, and a measure of the quality rating of a bank's lending portfolio, all for September 2007.

* Significance at 10% level.

** Significance at 5% level.

*** Significance at 1% level.

Table 2

Locality-level lending and real economic effects, 2005–2012.

Dependent variable:	(1) Lending	(2) GLP	(3) Firms	(4) Emp.	(5) Tot. Hours	(6) Wage Bill
<i>Gov · During</i>	0.147 *** (0.016)	0.020 *** (0.006)	0.014 *** (0.005)	0.005 (0.008)	0.007 (0.009)	0.021 * (0.011)
<i>Gov · Post</i>	0.158 *** (0.027)	0.008 (0.010)	0.033 *** (0.008)	0.001 (0.012)	0.006 (0.013)	0.033 * (0.017)
R^2	0.65	0.63	0.77	0.55	0.53	0.68
Number of observations	242,066	20,390	20,389	20,390	20,390	20,390
Number of localities	2573	2601	2601	2601	2601	2601

Notes: Standard errors, clustered at the locality level, are reported in parentheses. Lending data are monthly, from January 2005 through December 2012, while the remaining dependent variables are annual, from 2005 through 2012. Lending, gross locality product (GLP), and the locality wage bill are all deflated to Brazilian *reais* of January 2000, and all dependent variables are normalized to have value 1 in either September 2008 (in the case of lending) or in year 2008 (for remaining variables). *Gov* is the fraction of locality branches that are owned by government banks in 2007. *During* is an indicator variable for the twelve months from September 2008 through August 2009, in the case of lending, and for the years 2008 and 2009, in the case of remaining dependent variables. *Post* is an indicator variable for all months from September 2009 through December 2012, in the case of lending, and for the years 2010 through 2012, in the case of remaining dependent variables. All regressions include locality fixed-effects, time fixed-effects (month-by-year in the case of lending and year fixed-effects in the case of remaining dependent variables), and baseline locality characteristics interacted with time indicator variables. Baseline locality characteristics are the standardized natural logarithms of the number of bank branches in a locality in 2005, locality income in 2000, locality population in 2000, value of locality exports in 2005, the standardized mean years of schooling for adults in the locality in 2000, and the share of locality population in urban areas in 2000.

* Significance at 10% level.

** Significance at 5% level.

*** Significance at 1% level.

Table 3

Local-level lending and real economic effects by neighboring locality pairs and sectors, 2005–2012.

Dependent variable:	(1) Lending	(2) GLP	(3) Firms	(4) Emp.	(5) Tot. Hours	(6) Wage Bill
Panel A: Neighboring locality-pair fixed-effects						
<i>Gov · During</i>	0.155 *** (0.011)	0.012 *** (0.005)	0.004 (0.003)	0.020 *** (0.006)	0.018 *** (0.006)	0.021 *** (0.008)
<i>Gov · Post</i>	0.153 *** (0.020)	0.006 (0.007)	0.014 *** (0.005)	0.001 (0.008)	−0.0001 (0.009)	0.001 (0.011)
<i>R</i> ²	0.06	0.04	0.05	0.02	0.01	0.01
Number of observations	530,949	45,123	45,448	45,190	45,237	45,154
Number of localities	1918	1947	1947	1947	1947	1947
Number of locality pairs	5739	5841	5841	5841	5841	5841
Panel B: Locality sector fixed-effects						
<i>Gov · During</i>		0.019 *** (0.005)	0.003 (0.004)	0.016 *** (0.005)	0.015 *** (0.005)	0.017 *** (0.006)
<i>Gov · Post</i>		0.009 (0.007)	0.013 ** (0.005)	0.023 *** (0.008)	0.021 *** (0.008)	0.034 *** (0.009)
<i>R</i> ²		0.45	0.31	0.28	0.27	0.42
Number of observations		79,974	161,742	163,162	163,166	163,116
Number of localities		2601	2601	2601	2601	2601
Number of sectors		4	15	15	15	15

Notes: Standard errors, clustered at the locality-pair level (Panel A) or the locality-sector level (Panel B), are reported in parentheses. Lending data are monthly, from January 2005 through December 2012, while the remaining dependent variables are annual, from 2005 through 2012. Lending, gross locality product (GLP), and the locality wage bill are all deflated to Brazilian reais of January 2000, and all dependent variables are normalized to have value 1 in either September 2008 (in the case of lending), or in year 2008 (for remaining variables). Panel A examines the relationship between the difference in the dependent variables during each period and the difference in the share of government bank branches across neighboring localities. Neighboring locality pairs that cross state boundaries and localities whose neighbors do not have any bank branches are excluded from the estimations. Panel B examines outcomes within local economic sectors. Lending is not available at the locality-sector level; gross locality product at the sector level is decomposed into four categories: industry, commerce/services, agriculture, and government; and information for firms, employment, hours, and wages are decomposed into 15 sectoral categories according to Brazil's CNAE classification codes. Sectors that account for less than 1%, on average, of a locality's employment between 2005 and 2012 are excluded from the estimations. *Gov* is the fraction of locality branches that are owned by government banks in 2007 and *Gov* is the difference in this fraction across neighboring localities. *During* is an indicator variable for the twelve months from September 2008 through August 2009, in the case of lending, and for the years 2008 and 2009, in the case of remaining dependent variables. *Post* is an indicator variable for the months from September 2009 through December 2012, in the case of lending, and for the years 2010 through 2012, in the case of remaining dependent variables. Regressions include neighboring locality-pair fixed-effects (Panel A) or locality-sector fixed-effects (Panel B), time fixed-effects (month-by-year in the case of lending and year fixed-effects in the case of remaining dependent variables), and either baseline locality characteristics (Panel B) or the difference in baseline characteristics between neighboring localities (for Panel A) interacted with time indicator variables. Baseline locality characteristics are the standardized natural logarithms of the number of bank branches in a locality in 2005, locality income in 2000, locality population in 2000, value of locality exports in 2005, the standardized mean years of schooling for adults in the locality in 2000, and the share of locality population in urban areas in 2000.

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* Significance at 10% level.
** Significance at 5% level.
*** Significance at 1% level.

Table 4

Credit allocation by bank dependency and political alignment, 2005–2012.

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable: Normalized Total Credit Operations (Lending)						
Interaction term (Int):	External Dependence	Credit per Worker	Share Emp. Small Firms	Workers' Party Mayor	Workers' Party Pres. Majority	Workers' Party Pres. Vote Margin
Panel A: $Gov > 0$						
$[Gov + 1] \cdot Int \cdot During$	-0.003 (0.038)	-0.086*** (0.010)	-0.196*** (0.039)	0.023 (0.019)	-0.002 (0.014)	0.069** (0.027)
$[Gov + 1] \cdot Int \cdot Post$	-0.009 (0.078)	-0.261*** (0.018)	-0.388*** (0.081)	0.044 (0.043)	0.069** (0.029)	0.334*** (0.055)
R^2	0.73	0.78	0.73	0.73	0.73	0.73
Number of observations	198,532	199,240	202,282	202,282	202,282	202,282
Number of localities	2097	2102	2137	2137	2137	2137
Panel B: $Gov = 1$						
$Int \cdot During$	0.029 (0.020)	-0.074*** (0.006)	-0.100** (0.045)	0.002 (0.019)	0.020 (0.024)	0.015 (0.030)
$Int \cdot Post$	0.075 (0.049)	-0.170*** (0.013)	-0.116 (0.106)	0.032 (0.043)	0.102** (0.049)	0.101 (0.066)
R^2	0.72	0.76	0.71	0.71	0.72	0.71
Number of observations	73,897	74,142	75,572	75,572	75,572	75,572
Number of localities	781	783	799	799	799	799
Panel C: $Gov = 0$						
$Int \cdot During$	-0.098* (0.053)	-0.102** (0.049)	-0.074 (0.109)	-0.001 (0.040)	-0.049 (0.045)	-0.079 (0.079)
$Int \cdot Post$	-0.210** (0.087)	-0.274*** (0.071)	-0.068 (0.159)	-0.043 (0.073)	0.009 (0.061)	-0.081 (0.116)
R^2	0.34	0.35	0.34	0.34	0.34	0.34
Number of observations	38,497	38,207	39,784	39,784	39,784	39,784
Number of localities	422	417	436	436	436	436

Notes: Standard errors, clustered at the locality level, are reported in parentheses. The dependent variable is monthly total locality credit operations (lending), from January 2005 through December 2012, deflated to Brazilian reais of January 2000 and normalized to have value 1 in September 2008. The interaction terms (Int) are a measure of external credit dependence based on Rajan and Zingales (1998) (column 1), average credit per worker in the locality in 2005 (column 2), share of locality employment in firms with 1–19 employees (column 3), an indicator variable for whether the locality elected a Workers' Party mayor in either the 2004 or 2008 municipal elections (column 4), an indicator variable for whether a majority of the locality's electorate voted for the Workers' Party candidate in the 2006 or

2010 presidential elections (column 5), and a continuous variable reflecting the maximum locality vote margin for the Workers' Party candidate in the 2006 and 2010 presidential elections (column 6). In Panel A, only localities with a non-zero fraction of government bank branches are included in the estimations; Panel B considers only localities with all government-owned bank branches; and Panel C considers only localities with no government-owned bank branches. For Panel A, the estimating equation is $Credit_{ijt} = [Gov_j + 1] \cdot Int_j \cdot During_t + Gov_j \cdot Post_t + a_j + \lambda_j + X_j \lambda_j + \varepsilon_{ijt}$. For Panels B and C, the estimating equation is $Credit_{ijt} = Int_j \cdot During_t + Int_j \cdot Post_t + a_j + \lambda_j + X_j \lambda_j + \varepsilon_{ijt}$. For Panels B and C, the indicator variable for the twelve months from September 2008 through August 2009 and *Post* is an indicator variable for all months from September 2009 through December 2012. All estimations include locality fixed-effects, time fixed-effects, and baseline locality characteristics interacted with time indicator variables. Baseline locality characteristics are the standardized natural logarithms of the number of bank branches in a locality in 2005, locality income in 2000, locality population in 2000, value of locality exports in 2005, the standardized mean years of schooling for adults in the locality in 2000, and the share of locality population in urban areas in 2000.

* Significance at 10% level.

** Significance at 5% level.

*** Significance at 1% level.

Table 5

Firm turnover and productivity.

Dependent variable:	(1) Firm Births	(2) Firm Deaths	(3) Output per Firm	(4) Wage Bill per Firm	(5) Exports per Firm
<i>Gov · During</i>	−0.020* (0.011)	−0.036*** (0.014)	0.006 (0.009)	−0.004 (0.012)	−0.136 (0.165)
<i>Gov · Post</i>	0.025 (0.015)	0.017 (0.018)	−0.019 (0.012)	−0.016 (0.016)	−0.368 (0.235)
<i>R</i> ²	0.61	0.55	0.10	0.28	0.03
Number of observations	20,205	19,643	20,390	20,390	6,102
Number of localities	2578	2544	2601	2601	1038

Notes: Standard errors, clustered at the locality level, are reported in parentheses. All dependent variables are normalized to have value 1 in 2008. Firm births and deaths are calculated as the appearance and disappearance between years of unique firm identifiers within each locality in the RAIS data. Output per firm is gross locality product divided by total number of firms in the locality, wage bill per firm is total locality wage bill divided by total number of firms, and exports per firm, only available from 2005 through 2010, is total locality exports (in US\$ FOB) divided by total number of firms for localities with non-zero exports. Gross locality product and wage bill are deflated to Brazilian *reais* of January 2000. *Gov* is the fraction of locality branches that are owned by government banks in 2007. *During* is an indicator variable for the years 2008 and 2009. *Post* is an indicator variable for the years 2010 through 2012 (or only 2010 in the case of exports per firm). All regressions include locality fixed-effects, year fixed-effects, and baseline locality characteristics interacted with year indicator variables. Baseline locality characteristics are the standardized natural logarithms of the number of bank branches in a locality in 2005, locality income in 2000, locality population in 2000, value of locality exports in 2005, the standardized mean years of schooling for adults in the locality in 2000, and the share of locality population in urban areas in 2000.

* Significance at 10% level.

** Significance at 5% level.

*** Significance at 1% level.

Table 6

Bank capital, earnings, profits, and credit quality, 2005–2013.

Dependent variable:	(1) Capital Ratio	(2) Credit Earnings	(3) Loss Provisions	(4) Credit > 90 Days Delinq.	(5) Charge-Offs	(6) Net Profits
<i>Gov · During</i>	−0.042* (0.024)	0.004** (0.002)	−0.039*** (0.009)	−0.041*** (0.011)	−0.003*** (0.001)	0.008 (0.023)
<i>Gov · Post</i>	−0.037** (0.016)	0.002* (0.001)	−0.043*** (0.009)	−0.044*** (0.010)	−0.003** (0.001)	−0.034* (0.018)
<i>R</i> ²	0.37	0.38	0.41	0.41	0.63	0.30
Number of observations	2908	2908	2938	2938	2938	2933
Number of banks	28	28	28	28	28	28

Notes: Jackknife standard errors, clustered at the bank level, are reported in parentheses. Capital ratio is capital as a share of total assets, credit earnings are earnings from credit operations as a share of total credit, loss provisions are provisions for potential credit losses as a share of total credit, credit > 90 days delinquent is the share of total credit with payments that are more than 90 days overdue, charge-offs are deductions of credit losses as a share of assets in circulation, and net profits are normalized operating profits minus normalized operating expenditures (normalized to have value 1 in September 2008). Data are from monthly bank-level balance sheets, as reported by the Central Bank of Brazil, from January 2005 to October 2013 for the 28 largest banks whose combined assets account for 95% of all banking system assets one year prior to the onset of the financial crisis. *Gov* is an indicator variable for whether a bank is government-owned. *During* is an indicator variable for the twelve months from September 2008 through August 2009, and *Post* is an indicator variable for all months from September 2009 through October 2013. All regressions include bank fixed-effects, month-by-year fixed-effects, and baseline bank characteristics interacted with month-by-year indicators. Baseline characteristics are the natural logarithm of a bank's assets, a bank's total credit operations as a share of liabilities, a bank's capital ratio, and a measure of the quality rating of a bank's lending portfolio, all for September 2007.

* Significance at 10% level.

** Significance at 5% level.

*** Significance at 1% level.

Table 7

Robustness checks.

Dependent variable:	(1) Lending	(2) GLP	(3) Firms	(4) Emp.	(5) Tot. Hours	(6) Wage Bill
(A) Base case	<i>Gov. During</i> 0.147*** (0.016)	0.020*** (0.006)	0.014*** (0.005)	0.005 (0.008)	0.007 (0.009)	0.021* (0.011)
	<i>Gov. Post</i> 0.158*** (0.027)	0.008 (0.010)	0.033*** (0.008)	0.001 (0.012)	0.006 (0.013)	0.033* (0.017)
(B) Dummy: <i>Gov</i> 0.50	<i>Gov. During</i> 0.084*** (0.011)	0.014*** (0.005)	0.008** (0.003)	0.005 (0.005)	0.006 (0.006)	0.016** (0.007)
	<i>Gov. Post</i> 0.103*** (0.019)	0.007 (0.008)	0.017*** (0.006)	0.003 (0.008)	0.005 (0.009)	0.016 (0.011)
(C) No controls interacted w/time	<i>Gov. During</i> 0.184*** (0.014)	0.051*** (0.005)	0.054*** (0.004)	0.012* (0.006)	0.016** (0.007)	0.048*** (0.009)
	<i>Gov. Post</i> 0.258*** (0.024)	0.055*** (0.008)	0.142*** (0.008)	0.027*** (0.010)	0.042*** (0.010)	0.115*** (0.014)
(D) P-score matching	<i>Gov. During</i> 0.196*** (0.027)	0.031*** (0.010)	0.012 (0.010)	0.019 (0.014)	0.022 (0.017)	0.026 (0.023)
	<i>Gov. Post</i> 0.209*** (0.043)	0.027* (0.014)	0.044*** (0.016)	0.025 (0.017)	0.032* (0.019)	0.069** (0.028)
(E) Oaxaca-Blinder	<i>Gov. During</i> 0.114*** (0.005)	0.019*** (0.003)	0.013*** (0.002)	0.007** (0.003)	0.013*** (0.003)	0.031*** (0.004)
	<i>Gov. Post</i> 0.167*** (0.010)	0.023*** (0.004)	0.030*** (0.004)	-0.003 (0.005)	0.005 (0.005)	0.032*** (0.007)
(F) Ln(dep. var.) instead of normalization	<i>Gov. During</i> 0.159*** (0.022)	0.022** (0.009)	0.016*** (0.006)	0.005 (0.011)	0.011 (0.011)	0.017 (0.014)
	<i>Gov. Post</i> 0.152*** (0.029)	0.010 (0.012)	0.034*** (0.009)	0.008 (0.014)	0.018 (0.015)	0.028 (0.017)
(G) Double cluster	<i>Gov. During</i> 0.147*** (0.018)	0.020* (0.012)	0.014** (0.007)	0.005 (0.010)	0.007 (0.012)	0.021* (0.013)
	<i>Gov. Post</i> 0.158*** (0.029)	0.008 (0.013)	0.033*** (0.012)	0.001 (0.014)	0.006 (0.015)	0.033 (0.020)
(H) Collapse to metro areas	<i>Gov. During</i> 0.152*** (0.016)	0.027*** (0.007)	0.015*** (0.005)	0.006 (0.008)	0.009 (0.009)	0.016 (0.011)
	<i>Gov. Post</i> 0.180*** (0.029)	0.022** (0.010)	0.039*** (0.009)	0.009 (0.012)	0.015 (0.014)	0.034* (0.018)

Dependent variable:	(1)	(2)	(3)	(4)	(5)	(6)
	Lending	GLP	Firms	Emp.	Tot. Hours	Wage Bill
(I) Include <i>GovEmp</i> interactions	<i>Gov · During</i> 0.204 *** (0.017)	0.019 *** (0.006)	0.013 *** (0.005)	0.005 (0.008)	0.006 (0.009)	0.019 * (0.011)
	<i>Gov · Post</i> 0.288 *** (0.028)	0.009 (0.010)	0.031 *** (0.008)	0.001 (0.012)	0.005 (0.013)	0.030 * (0.017)
(J) Placebo: use p-score as “ <i>Gov</i> ”	<i>Gov · During</i> 0.050 ** (0.025)	0.001 (0.010)	0.001 (0.007)	0.004 (0.011)	0.010 (0.012)	0.007 (0.016)
	<i>Gov · Post</i> −0.008 (0.041)	0.013 (0.015)	−0.002 (0.013)	0.004 (0.017)	0.003 (0.019)	0.011 (0.025)

Notes: Standard errors are reported in parentheses. Row (A) presents the base case estimates with errors clustered at the locality level. Row (B) uses an indicator variable equal to 1 for *Gov* if the fraction of locality branches that are government-owned is equal to or greater than the median fraction (0.50). Row (C) excludes locality controls interacted with time indicator variables. Row (D) matches localities based on their propensity to have above the median fraction of government bank branches. Row (E) follows an Oaxaca-Blinder approach to construct a counterfactual “control group” of localities with less than the median share of government bank branches and matches these to localities with above the median fraction; for these estimations, *Gov* is an indicator variable as in row (B). Row (F) uses the natural logarithms of the dependent variables instead of their normalized values. Row (G) shows the base case estimates with double-clustered errors (by locality and state-by-time). Row (H) aggregates localities into “urban agglomerations” in the cases when multiple localities comprise a metropolitan area or common labor market, with errors clustered at the urban agglomeration level. Row (I) includes the fraction of locality employment in government in 2007 (*GovEmp*) interacted with *During* and *Post*. Row (J) uses the propensity score calculated based on locality characteristics in place of *Gov* as a placebo test for whether locality characteristics jointly determine the fraction of locality branches that are government-owned and the relative differences in the dependent variables during the crisis and post-crisis periods.

* Significance at 10% level.

** Significance at 5% level.

*** Significance at 1% level.