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Bank Ownership, Lending, and Local Economic Performance During the 2008-2010 Financial Crisis*

Nicholas S. Coleman
Brown University

Leo Feler
Johns Hopkins University

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Abstract
In September 2008, after Lehman Brothers' collapse, private banks sharply reduced their lending. In the U.S., this reduction translated into a recession and higher unemployment. In Brazil, despite a similar supply-side reduction in lending by private and especially foreign-funded banks, recessionary effects were comparatively minimal and short-lived. This paper analyzes the role of Brazil's government-owned banks in mitigating a national recession by providing more credit to offset the decline in lending by private banks. Localities in Brazil with a high share of government banks experienced a relative increase in lending following the onset of the 2008-2010 financial crisis compared to areas with a low share of these banks. Areas with a high share of government banks correspondingly experienced a relative increase of approximately 2.3%-4.1% in GDP and 1.8%-2.6% in labor hours and income. Overall, increased lending by government banks in Brazil propped-up GDP and buttressed workers' labor hours and income.

JEL Classification: E44, E51, E65, G01, G21, H81, J23, R11, R51

Nicholas S. Coleman
Brown University
Department of Economics, Box B
Providence, RI 02912
Tel: 612-247-3331
nicholas_coleman@brown.edu

Leo Feler
Johns Hopkins University SAIS
1717 Massachusetts Ave NW, 7th Floor
Washington, DC 20036
Tel: 202-663-5627
lfeler@jhu.edu

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1 Introduction

In September 2008, the collapse of the Lehman Brothers investment bank precipitated a financial crisis and a sharp decline in international credit. Massive layoffs and an economic recession in the U.S. and many industrialized and developing countries ensued. In some countries, however, the effects of the financial crisis were fairly limited and short-lived. This was true for Brazil and China, both of which continued to experience high rates of economic growth in subsequent years. One of the reasons for these countries' relative success during this period has been attributed to government involvement in the banking sector.[1]

This paper explores the argument that government banks can mitigate economic recessions, using data on Brazil. It assesses whether government ownership of banks resulted in more lending, higher GDP, more employment and higher incomes, effectively mitigating the effects of the global financial crisis and helping Brazil avoid an economic recession.

The intuition for why government ownership of banks may help mitigate a recession in the face of a supply-side shock to credit is straightforward: when governments own banks, they can instruct their banks to make loans. In fact, lending by government-owned banks tends to be less responsive in general to macroeconomic shocks than lending by private banks (Micco and Panizza, 2006; Bertay, Demirguc-Kunt, and Huizinga, 2012; and Cull and Martinez-Peria, 2012). In part, this is due to how government banks are funded, being less reliant on short-term debt and being able to 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 coming under greater political pressure and more susceptible to political influence to lend (Sapienza, 2004; Dinc, 2005; Carvalho, forthcoming). Ultimately, government banks may behave differently and extend

[1] The *Economist* (May 12, 2010) cites the CFO of Bradesco, a large private Brazilian bank, as saying that government banks in the country played a critical role in promoting anti-cyclical policies. Additionally, a former governor of Brazil's Central Bank explained the consensus view in Brazil that government banks were important in propping-up the economy during the financial crisis.

[2] In the U.S., during the 2008-2010 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 (Gozzi and Goetz, 2010).

more loans because of softer financing constraints and because, in the face of shocks, they may be less risk averse.

In Brazil, this combination of government funding and political pressure resulted in government banks increasing their lending to offset the decline in private bank lending following the onset of the financial crisis. As Figure 1 shows, the sum of all lending by private-sector banks declined sharply after September 2008, while the sum of all lending by government-owned banks increased. Whereas prior to the onset of the financial crisis, private-sector banks accounted for the majority of all lending, after September 2008, government banks were the major lenders in Brazil.

Since government banks are not spread uniformly throughout Brazil, being concentrated in certain regions, and since lending is highly localized, areas with a high share of government banks were disproportionately stimulated, experiencing relative increases in employment and incomes, as shown in Figures 2 and 3, as government banks in these areas increased their lending to offset the decline in lending elsewhere by private-sector banks. Our empirical strategy is to use a differences-in-differences approach, comparing what happens to lending, GDP, and employment before and after the crisis in areas with a high share of government-owned banks versus areas with a low-share of these banks.

Our results suggest that locations with a high share of government-owned banks experienced better than expected changes in lending, GDP, formal sector employment, and incomes. These localities continued to grow during the 2008-2010 financial crisis and did so faster than otherwise comparable localities with low shares of government banks.

The paper proceeds as follows. Section 2 provides background on Brazil's banking sector and the 2008-2010 financial crisis. Section 3 presents a simple conceptual framework for why government banks might allocate credit differently than private-sector banks and how this might affect employment and GDP. Section 4 describes the data and the empirical strategy. Section 5 presents the main results and offers some robustness checks, and Section 6 concludes.

2 Brazil's Banking Sector and the 2008-2010 Financial Crisis

Approximately one-third of Brazil's nearly twenty thousand bank branches belong to federal government banks. These include *Banco do Brasil*, *Caixa Economica 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. Almost all of these state-owned 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, Caprio, and Levine, 2004).

State-owned and federally-owned banks in Brazil functioned largely as substitutes. State banks existed in the wealthier states, whereas federally-owned banks had the greatest presence in historically underdeveloped states lacking resources to establish their own banks. 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 were never privatized. By 2008, prior to the onset of the financial crisis, 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.

We exploit the variation in bank ownership across localities to estimate how bank ownership during the 2008-2010 financial crisis affected local lending, production, and employment. Figure 4 shows the extent of variation in the share of bank branches that are government-owned across localities in Brazil. Some localities have a high share of government-owned bank branches and some have a low share despite having similar economic characteristics. While we believe that locations of government and private bank branches do not correspond entirely to local economic conditions, we use locality fixed-effects, propensity-score matching, and an instrumental variables procedure in the estimations to mitigate potential endogeneity between a location's bank ownership and its underlying attributes.

With the onset of the financial crisis in September 2008, localities with a high share of government banks experienced increases in lending whereas those with a low share did not. In the next section, we examine conceptually why this might be the case, and analyze the possible theoretical repercussions of greater lending on economic outcomes such as output, employment, and income.

3 Conceptual Framework

This section presents a conceptual framework to explain why private banks might lend differently than government banks when faced with a financial crisis, and how this differential lending might affect economic outcomes such as production, employment, and incomes. The intuition is that private banks may lend less because of funding constraints or because of a combination of greater risk aversion, loan losses, or a more pessimistic outlook on the world. If lending is used for capital investment and if capital complements labor in production, then declines in lending can lead to declines in GDP, employment, and income, with the magnitude of declines depending on the wage elasticity and the capital intensity of production.

3.1 Banks

There are three agents in this framework: banks, firms, and workers. Banks pay a deposit rate, r_d, on deposits, D. They lend out a fraction, γ, of deposits at interest rate r_l. There are two states of the world. A good state occurs with probability p. In this state, loans are repaid with interest. A bad state occurs with probability $(1-p)$. In this state, banks do not receive interest on their loans; they lose a fraction, δ, of what was lent; and they must recapitalize, contributing $\delta\gamma D$ from their own capital. Banks profits in the good, g, and bad, b, states can be written as:

$$\begin{aligned} \pi_g &= r_l\gamma D - r_d D, && \text{(a)} \\ \pi_b &= 0 - r_d D - \delta\gamma D. && \text{(b)} \end{aligned} \tag{1}$$

Banks have an original valuation, V. Their objective is to maximize a welfare function of their expected valuation by choosing what fraction, γ, of deposits to lend. This welfare function, capturing risk aversion, can expressed as:

$$W = p\frac{(V + r_l\gamma D - r_d D)^{1-\sigma}}{1-\sigma} + (1-p)\frac{(V + 0 - r_d D - \delta\gamma D)^{1-\sigma}}{1-\sigma}. \tag{2}$$

Maximizing this welfare function with respect to γ and simplifying yields:

$$\gamma^* = \frac{(V - r_d D)(\phi^{\frac{1}{\sigma}} - 1)}{D(r_l + \delta\phi^{\frac{1}{\sigma}})}, \tag{3}$$

where $\phi = \frac{pr_d}{(1-p)\delta}$ and σ is a measure of risk aversion. The expression in (3) provides the optimal fraction of deposits banks are willing to lend. Assuming banks are risk averse ($\sigma > 1$) and their original valuation is always greater than the dividends paid to depositors ($V - r_d D > 0$), then in order for banks to lend, it must be the case that $\phi = \frac{pr_d}{(1-p)\delta} > 1$.

We can now analyze what happens to the optimal fraction of deposits lent. As the probability of the good state of the world increases, banks are willing to lend more (i.e., $\partial\gamma^* / \partial p > 0$); as risk aversion increases, banks are willing to lend less (i.e., $\partial\gamma^* / \partial\sigma < 0$); and as potential loan losses in the bad state of the world increase, banks are willing to lend less (i.e., $\partial\gamma^* / \partial\delta < 0$).[3] Since lending is equal to a fraction of deposits, $C = \gamma D$, lending can decline if either γ or D declines. In the empirical section, we examine whether the reason for decreased lending by private banks is due to declines in γ or D.

3.2 Firms, Employment, and Output

Lending is assumed to be transformed one-for-one into capital, $K = C = \gamma D$, which firms rent and use in production. Firms produce a globally traded good priced at 1, using capital and labor, according to a Cobb-Douglas production function. Firms maximize the following profit function:

$$\pi = K^{\alpha} L^{1-\alpha} - r_l K - wL, \tag{4}$$

[3] Assuming $V - r_d D > 0$ and $\phi > 1$, so that banks are willing to lend,

$\frac{\partial\gamma^*}{\partial p} = \frac{(r_l + \delta)(V - r_d D)\phi^{\frac{1}{\sigma}}}{p(1-p)\sigma D(r_l + \delta\phi^{\frac{1}{\sigma}})^2} > 0$, $\frac{\partial\gamma^*}{\partial\sigma} = -\frac{\phi^{\frac{1}{\sigma}} \ln\phi (r_l + \delta)(V - r_d D)}{\sigma^2 D(r_l + \delta\phi^{\frac{1}{\sigma}})^2} < 0$, and

$\frac{\partial\gamma^*}{\partial\delta} = -\frac{\phi^{\frac{1}{\sigma}}(r_l + \delta + \delta\sigma\phi^{\frac{1}{\sigma}} - \delta\sigma)(V - r_d D)}{\sigma\delta D(r_l + \delta\phi^{\frac{1}{\sigma}})^2} < 0$.

where K is capital, L is labor, r_l is the rental rate of capital, and w is wages. Since production is constant returns to scale, there are an indeterminate number of firms of indeterminate size, and factor markets are competitive, with capital and labor paid their marginal products:

$$\begin{aligned} r_l &= \alpha K^{\alpha-1} L^{1-\alpha}, && \text{(a)} \\ w &= (1-\alpha) K^{\alpha} L^{-\alpha}. && \text{(b)} \end{aligned} \tag{5}$$

In the short-run, local labor supply is inelastic, and for simplicity, normalized to 1. With full employment, initial period wages are $w_1 = (1-\alpha)(\gamma_1 D_1)^{\alpha}$ and initial period output is $y_1 = (\gamma_1 D_1)^{\alpha}$.

We are interested in a shock to lending, either through a reduction in γ or D. In the second period, there is a decline in lending, with $\gamma_2 D_2 < \gamma_1 D_1$. Given labor is inelastically supplied, if wages can freely adjust downward, then $w_2 = (1-\alpha)(\gamma_2 D_2)^{\alpha}$ and labor demand in the second period is 1, with full employment. Unemployment will only arise if wages are downwardly rigid. Letting $\eta \in [0,1]$ be a measure of wage elasticity, with $\eta = 1$ implying that wages are completely elastic, then wages in the second period can be expressed as $w_2 = (1-\alpha)[\eta(\gamma_2 D_2)^{\alpha} + (1-\eta)(\gamma_1 D_1)^{\alpha}]$. We can now write an expression for labor demand in the second period as a function of lending, the wage elasticity, and the technology parameter, α:

$$L_2 = \left(\frac{1}{\eta + (1-\eta)(\frac{\gamma_1 D_1}{\gamma_2 D_2})^{\alpha}} \right)^{\frac{1}{\alpha}}. \tag{6}$$

Given $0 < \eta < 1$ and $\gamma_2 D_2 < \gamma_1 D_1$, then there will be unemployment, with $L_2 < 1$. Assuming $D_1 = D_2$, with the reason for the decline in lending due to a reduction in γ, we can simplify equation (6) and take the natural logarithm to obtain:

$$\ln L_2 = -\tfrac{1}{\alpha} \ln(\eta + (1-\eta)(\tfrac{\gamma_1}{\gamma_2})^{\alpha}). \tag{7}$$

Similarly, we can write the following expression for output in the second period:

$$\ln y_2 = \alpha \ln(\gamma_2 D_2) - \tfrac{1-\alpha}{\alpha} \ln(\eta + (1-\eta)(\tfrac{\gamma_1}{\gamma_2})^{\alpha}). \tag{8}$$

3.3 Comparative Statics

We can now perform comparative statics on equations (7) and (8) and analyze how employment and output respond to a change in γ_2 depending on the wage elasticity, η, and technology parameter, α.

As γ_2 declines, in other words, as lending declines, both employment and output decline. A higher wage elasticity (a higher value of η) mitigates the decline in both employment and output due to a decline in lending. Finally, as production becomes more capital intensive (with higher values of α), a given decline in lending results in larger declines in output and smaller declines in employment.[4]

The comparative statics are fairly intuitive. With greater wage elasticity, shocks to lending are transmitted to wages rather than to employment and output. Since wages can adjust, employment and output can remain high despite a decline in lending. Moreover, for industries that are more capital intensive, a decline in lending has less of an effect on employment and a greater effect on output. Since in more capital-intensive industries, labor comprises a smaller share of productive inputs, a decline in lending leads to more of a decline in output and less of a decline in employment, as compared to a similar lending shock to less capital-intensive industries.

This conceptual framework yields several testable implications. First, we can test whether a decline in lending is due to a decline in a bank's loanable funds or to a decline in the share of funds a bank is willing to lend. Second, we can test whether declines in lending lead to declines in employment and output, and whether these declines are greater depending on the capital intensity of industries and the labor market rigidities in an area.

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[4] We can differentiate equations (7) and (8) to obtain the following: $\frac{\partial \ln L_2}{\partial \gamma_2} = \frac{(1-\eta)(\frac{\gamma_1}{\gamma_2})^{\alpha}}{\gamma_2\left(\eta+(1-\eta)(\frac{\gamma_1}{\gamma_2})^{\alpha}\right)} > 0$, $\frac{\partial \ln y_2}{\partial \gamma_2} = \frac{\alpha\eta+(1-\eta)(\frac{\gamma_1}{\gamma_2})^{\alpha}}{\eta+(1-\eta)(\frac{\gamma_1}{\gamma_2})^{\alpha}} > 0$, $\frac{(\partial \ln L_2)^2}{\partial \gamma_2 \partial \eta} = \frac{-(\frac{\gamma_1}{\gamma_2})^{\alpha}}{\gamma_2\left(\eta+(1-\eta)(\frac{\gamma_1}{\gamma_2})^{\alpha}\right)^2} < 0$, $\frac{(\partial \ln y_2)^2}{\partial \gamma_2 \partial \eta} = \frac{-(1-\alpha)(\frac{\gamma_1}{\gamma_2})^{\alpha}}{\gamma_2\left(\eta+(1-\eta)(\frac{\gamma_1}{\gamma_2})^{\alpha}\right)^2} < 0$, $\frac{(\partial \ln L_2)^2}{\partial \gamma_2 \partial \alpha} = \frac{-\eta(1-\eta)(\frac{\gamma_1}{\gamma_2})^{\alpha}\ln(\frac{\gamma_1}{\gamma_2})}{\gamma_2\left(\eta+(1-\eta)(\frac{\gamma_1}{\gamma_2})^{\alpha}\right)^2} < 0$ for $\gamma_2 < \gamma_1$, and $\frac{(\partial \ln y_2)^2}{\partial \gamma_2 \partial \eta} = \frac{\eta\left(\eta+(1-\eta)(\frac{\gamma_1}{\gamma_2})^{\alpha}+(1-\eta-\alpha+\alpha\eta)(\frac{\gamma_1}{\gamma_2})^{\alpha}\ln(\frac{\gamma_1}{\gamma_2})\right)}{\gamma_2\left(\eta+(1-\eta)(\frac{\gamma_1}{\gamma_2})^{\alpha}\right)^2} > 0$ for $\gamma_2 < \gamma_1$ and $\alpha, \eta \in (0,1)$.

We now turn to the data and empirical strategy we use to test the implications of the conceptual framework.

4 Data and Empirical Strategy

4.1 Sample

Brazil has 5,565 municipalities as of 2010, which can be combined into 3,659 spatially constant units. These 3,659 units reflect the 1970 municipal borders, which are roughly equivalent in size to a U.S. county. Collapsing the municipalities into 3,659 spatially constant units since the 1970 serves several purposes: first, it allows us to use controls dating back to 1970; second, it more closely reflects spatial areas corresponding to a common area labor market; and third, it mitigates potential issues of firms obtaining loans from outside their municipal borders.

Our analysis focuses on five federally-owned banks and 123 privately-owned ones, which are together responsible for over 18,000 bank branches in Brazil. We do not include banks owned by individual state governments in our analysis since almost all of these had been privatized by the time of the financial crisis and since they did not enjoy the same soft-budget constraints as federally-owned banks.

We exclude from our analysis localities that do not have any bank branches. These tend to be sparsely populated and remote localities. We also experiment with alternative samples, occasionally excluding localities that function as major financial centers, localities that have few formal sector workers, and localities that are outliers on certain dimensions. Our base sample is comprised of 2,601 localities. Summary statistics for this base sample are provided in Table 1. On average, localities have over 60,000 residents in 2000 and are almost 70% urbanized. Immediately prior to the crisis, they had approximately 15,000 formally employed workers, 1,100 formal-sector firms, contributed R$1.05 billion to Brazil's GDP, and had over 7 bank branches, of which, on average, 53% were government-owned. Between 2005 and 2007, the average annual locality GDP growth was nearly 5%, employment growth was over 7%, and credit growth was over 22%.

4.2 Data

This paper combines data on bank branch locations, municipality-level lending, bank balance sheets, and employment censuses. The bank data was provided by the Central Bank of Brazil, and the employment censuses are from Brazil's Ministry of Labor. Data from the Central Bank document the locations of all bank branches – those currently operating and those that have ceased operation – for every year since 1900 to the present. This allows us to capture a snapshot of the spatial distribution of bank branches at the onset 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. This data, combined with bank branch locations, allow us to determine the number of bank branches in a locality, the fraction of these branches that is government-owned, and the aggregate monthly lending in a locality. We create three controls to reflect the degree to which government banks operate in a locality. The primary one is simply the fraction of bank branches in a locality that is government-owned, although we also experiment with a dummy variable that is equal to 1 if the locality has above the median fraction of government-owned bank branches.

Monthly bank-level balance sheets, aggregated for all of a bank's branches for all of Brazil, allow us to look at aggregate lending of government versus private banks. Using this information, we see that private banks reduced lending and government banks did not at the onset of the financial crisis. Additionally, we can look at banks' liabilities to determine whether the reason for the reduction in lending is due to a reduction in deposits or to a change in the fraction of deposits lent.

To measure the local economic impact of the 2008-2010 financial crisis, we utilize the Brazilian yearly employment census, *Relaçao Anual de Informaçoes Sociais* (RAIS). The RAIS identifies all employees on the payroll of formal sector firms as well as 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 30% of the overall workforce being informal and the average locality having 34% of its workers in the informal sector, based on 2000 census data. We therefore view our results as a

reflection of how lending affects formal-sector employment outcomes in Brazil, although, based on a limited dataset, gains in formal and informal-sector employment are highly correlated.[5]

As an additional exercise, we classify localities based on their economies' dependence on external sources of financing, as done by Rajan and Zingales (1998) and Gozzi and Goetz (2010).[6] We use a measure of external financial dependence for U.S. economic sectors, match U.S. and Brazilian sectors, and then compute the share of pre-crisis employment in Brazilian localities corresponding to these sectors. Our measure of external financial dependence is a dummy variable equal to 1 if the locality has an employment share above the median in sectors dependent on external finance. We also experiment with the share of small firms (those with 1 to 19 employees) in a locality. The intuition, based on Braun and Larrain (2005) and Kroszner, Laeven, and Klingebiel (2007), is that localities whose economies' are heavily dependent on external finance or have a high share of small firms should experience greater changes in employment and GDP as a result of the financial crisis, and in these areas, government banks may play a greater role in mitigating recessions.[7]

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[5] Using the *Pesquisa Nacional por Amostra de Domicilios* (PNAD), an annual panel of 817 representative municipalities from 2001-2009, we estimate the elasticity between formal and informal sector employment controlling for year and municipality fixed effects. The estimate (standard error) of the elasticity is 0.024 (0.010).

[6] As in Rajan and Zingales (1998) and Gozzi and Goetz (2010), external financial dependence is defined as investment that cannot be financed through internal cash flows generated by the firm. It is capital expenditures minus cash flows from operations divided by capital expenditures. Cash flow from operations is broadly defined as the sum of cash flows from operations plus decreases in inventories, decreases in receivables, and increases in payables. We use data compiled by Gozzi and Goetz (2010) on external financial dependence for U.S. firms based on Compustat data from the 1990s. Using their measure of an industry's dependence on external finance, aggregated from firm-level data up to the 3-digit NAICS sector, we match to Brazilian data based on CNAE codes. We then use the share of a locality's employment in these CNAE sectors to compute measures of external financial dependence for each locality in our sample.

[7] Research on financial crises has shown that externally dependent industries are hit harder by recessions (Braun and Larrain, 2005), and that during banking crises, externally dependent industries experience larger contractions in their value-added (Kroszner, Laeven, and Klingebiel, 2007). This differential effect for externally dependent industries is larger in countries where the banking crises were larger (Dell'Ariccia, Detragiache, and Rajan, 2008). Additionally, firms that relied primarily on banks suffered larger declines in valuation, capital expenditures, and profitability following a supply-side shock to credit (Chava and Purnanandam, 2011).

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

4.3 Quasi-Random Distribution of Bank Branches and Matching

A key assumption of this paper is that whether localities have government or private-sector bank branches is random conditional on fixed locality characteristics. Once we control for observable locality characteristics, whether localities have government bank branches should be uncorrelated with potential economic outcomes. If a locality characteristic, for which we had not controlled, were correlated with both the presence of government bank branches and greater economic resilience to fluctuations in lending, then the observed results might be overly attributed to the presence of these government banks branches.

To minimize this potential for omitted variable bias, we employ several corrections. One is to include locality fixed effects in our estimations. This controls for any fixed locality characteristic that might influence both a locality's bank branch composition and economic outcomes during a financial crisis. The drawback of including locality fixed effects is that we cannot obtain estimates from time-invariant characteristics in the estimations. Another approach is to match localities based on the propensity to have more than the median share of government bank branches immediately prior to the crisis. We can then obtain a single measure—the propensity score—and match localities with similar characteristics based on this measure. Using this approach, localities have similar characteristics, but some have a high share of government-owned bank branches while others do not. In some specifications, we control directly for the propensity score in addition to fixed locality characteristics.

We calculate the propensity score as a function of the following locality characteristics taken from 2000 census data: 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. Details of the estimation are provided in an appendix. Within each propensity score block, we cannot reject at the 5%

significance level that at least 95% of the covariates are statistically indistinguishable across localities.

We estimate whether we can predict a locality's share of government-owned bank branches based on locality characteristics. Table 2 shows results from regressing the share of a locality's bank branches that are government owned on the locality's urbanization rate, years of education, shares of industry, services, and agriculture in GDP, average annual GDP and employment growth, and the natural logarithms of total employment, population, GDP, and exports. From column (1), we see that localities that are more urbanized, more educated, less populous, and have higher GDP—essentially, localities that are more developed—have a lower fraction of government-owned bank branches. In column (2), we control for the propensity score. While the propensity score is significant—higher propensity scores are correlated with higher shares of government-owned bank branches—none of the locality characteristics are significant. Once we control for the propensity score, locality characteristics no longer have explanatory power in predicting a locality's fraction of government-owned bank branches. In column (3) we control for 18 propensity score block dummies. Again, locality characteristics are insignificant. We take these results to imply that once we control for the propensity score, or once we match localities based on the propensity score, the distribution of bank branches is essentially random and therefore uncorrelated with other locality characteristics that may determine economic outcomes during a financial crisis.

4.4 Empirical Strategy

Our goal is to assess, first, whether government banks behave differently than private-sector banks and why this may be the case, and second, whether localities with a greater share of government bank branches experience different outcomes in lending, GDP, employment, and income during the 2008-2010 financial crisis.

Using aggregate bank data for all of Brazil, we estimate the following equation:

$$y_{it} = post_t + post_t \times govbank_i + post_t \times X_i + \lambda_i + \tau_t + \varepsilon_{it}, \qquad (9)$$

where y_{it} is alternately the natural logarithm of lending or deposits or the share of deposits lent by bank i in month and year t, $post_t$ is a dummy variable equal to 1

for the crisis and post-crisis period, $govbank_i$ is a dummy variable equal to 1 if the bank is one of the five government-owned banks operating in Brazil, X_i are fixed bank characteristics, λ_i are bank fixed-effects, τ_t is time (in this case, months) relative to the onset of the financial crisis, and ε_{it} is the error term. Controlling for $post_t \times X_i$ allows banks with different fixed characteristics to experience differential changes in the post period regardless of whether they are government or privately owned. We are interested in coefficient estimates on $post_t$ and $post_t \times govbank_i$, which respectively tell us how lending, deposits, or the share of deposits lent changes during the crisis, and how this change differs for government-owned banks relative to private-sector banks.

In addition, we estimate the following equation using random-effects:

$$y_{it} = govbank_i + post_t + post_t \times govbank_i + X_i + post_t \times X_i + \tau_t + \varepsilon_{it}. \qquad (10)$$

This equation allows us to estimate a coefficient on $govbank_i$, which gets subsumed in the fixed-effects when estimating equation (9). The assumption for random-effects estimates to be valid in this case is that the error term is uncorrelated with $govbank_i$ conditional on the other regressors. We postpone a discussion of the validity of this assumption to the next section. For these estimations, standard errors are clustered at the bank level, although we experiment with clustering at the month-year level.

We use a similar empirical strategy—differences-in-differences—to estimate the effects of government bank ownership at the locality level. When estimating effects at the locality level, most of our data are now annual, and instead of just a binary treatment dummy, we allow for the intensity of treatment to vary depending on the fraction of bank branches in a locality that is government-owned immediately prior to the crisis. When examining locality-level banking, y_{it} is alternately the natural logarithm of lending or deposits or the share of deposits lent in locality i at time t. For locality-level banking, our measure of time is either monthly or yearly, to be comparable with other data sources. When we are examining locality-level economic outcomes, y_{it} is alternately the natural logarithm of locality GDP,

employment (both gross employment and hours), wages, or number of establishments; these are all based on annual data. As measures of government bank involvement in localities, $govbank_i$ is either the fraction of bank branches in a locality that is government-owned or a dummy variable equal to 1 if the locality has above the median share of government-owned bank branches.[8] We also control for the propensity score and fixed locality characteristics, X_i, and interact these X_i with $post_t$; this allows localities with certain characteristics to experience differential level changes in the post period. When estimating using annual data, τ_t is the number of years relative to the onset of the financial crisis. Including τ_t in the estimation detrends the data and allows us to capture effects relative to an overall trend. Of interest in equations (9) and (10) are the coefficient estimates on $govbank_i$, $post_t$, and $post_t \times govbank_i$, which respectively tell us how having government bank branches affects the outcome variable, what happens to the outcome variable in the post period, and how this change from the pre to post-period is different for localities with higher shares of government-owned bank branches. For these estimations, standard errors are clustered at the locality level, although we experiment with clustering at the state-year level.

Based on the conceptual framework, we estimate versions of equations (9) and (10) where we alternately include interactions or split the sample to capture a locality's degree of external financial dependence, capital intensity, and labor market flexibility, as well as political alignment with the federal government. This allows us to discern whether the effects of having a higher share of government bank branches is greater for certain types of localities.

5 Results

In this section, we present results based on the empirical strategy and informed by the conceptual framework. We first discuss bank-level monthly lending results based on data from Brazil's retail banks with operations during the two

[8] We also experimented with $govbank_i$ being a dummy equal to 1 if the locality had at least one government-owned bank branch. The issue in doing this is that there are few large and developed localities that do not have at least one government-owned bank branch, which makes it difficult to argue that our treatment and control localities are otherwise similar.

years prior through one year following the onset of the crisis. We next discuss locality-level lending, GDP, and employment results. Finally, we discuss variations of the locality-level results based on localities' political alignments, external financial dependence, and labor market characteristics; assess the quality of government bank lending during the crisis; and provide some robustness checks.

5.1 Bank-Level Results

To assess how banks in Brazil operated during the financial crisis, Table 3 shows results from estimating equations (9) and (10). Total credit operations – which include traditional lending as well as lease financings and lines of credit – decline in the post period by approximately 15% relative to previous trends for private-sector banks. For government-owned banks, total credit operations actually increase by about 9% to 13%. This translates into a difference in the post-crisis period of 24% to 28% between the total credit operations of private-sector and government-owned banks. These results are shown in columns (1) -(3) of Table 3 and mirror the trends in Figure 1. The specifications of columns (1) and (2) control for bank fixed-effects, and in addition, column (2) interacts the $post_t$ dummy with fixed bank-level characteristics to control for the possibility that banks with different characteristics would have experienced different changes in credit operations independent of the financial crisis.[9] Column (3) shows results using bank random-effects, which allows us to estimate the coefficient on the $govbank_i$ variable. In general, government-owned banks provide more credit than private-sector banks, and this is especially true during the financial crisis.

The differential changes in credit operations between government and private-sector banks during the financial crisis could be the outcome of changes in behavior or of changes in the amount of loanable funds. Columns (3)-(6) of Table 3 show what happens to a bank's total asset base, which includes retail deposits as well as interbank borrowing and commercial paper issuances. Total assets declined

[9] The fixed bank-level characteristics, calculated as of August 2006, are the natural logarithms of total credit and total assets, a measure of portfolio quality calculated as a weighted average of credit ratings on loans, and banks' capitalization ratios, all standardized to have mean 0 and standard deviation 1.

by 6.5% to 7.4% in the post period, relative to previous trends, and this decline is not statistically different between private and government-owned banks.

The relative increase in government banks' credit operations, shown in columns (1)-(3) is not due to a relative increase in the availability of loanable funds. As columns (7)-(9) show, whereas private-sector banks reduced their share of assets lent by slightly more than 2% relative to previous trends, government banks increased their share of assets lent by 4.5% to 5.7%. This is a significant difference of 6.7% to 7.9% in the share of assets lent.

Government banks behaved differently than private-sector banks following the financial crisis. While we cannot separate whether this difference in behavior is due to differences in risk aversion, outlook, or potential loan losses, we can argue that it leads government banks to increase credit operations during the crisis. We turn now to how these differences in national-level bank behavior translate into local-level outcomes.

5.2 Locality-Level Results

The credit results discussed in the previous subsection are based on national aggregates. In this subsection, we first examine whether these credit results also hold when we look at locality-level credit operations. An issue here is that for localities with more than one bank branch, we cannot ascribe credit operations to a particular type of bank, i.e., government or private. Instead, we assess whether localities with a higher share of government bank branches experience different credit outcomes following the crisis. We do this using monthly data on credit and assets aggregated across bank branches in a locality, and we repeat this exercise collapsing the monthly data into annual averages, to make them comparable to our annual data on GDP, employment, and establishments. We then show and discuss results on employment and GDP at the locality-level before proceeding to variations of these locality-level results.

5.2.1 Credit Operations and Assets

Table 4 shows results from estimating equations (9) and (10) using monthly locality-level data for total credit operations, total assets, and the share of assets lent. As shown in columns (1) and (2), the average locality without any government

bank branches experienced declines in lending of 44.5% to 51.8%, relative to previous trends, following the onset of the financial crisis. Every ten percentage point increase in the share of a locality's bank branches that is government owned mitigates these declines by 7.3% to 8.6%, and localities with all of their bank branches government-owned actually experience increases in total credit operations following the crisis. In columns (3) and (4), we weight the estimations by a locality's total population in 2000. This more closely reflects the outcomes for where the average person lives; without weighting, each locality carries the same importance in the estimation regardless of whether they are minimally populated or major population centers. Based on results from these weighted regressions, shown in columns (3) and (4), we obtain that total credit operations declined between 7.2% to 29.5% following the onset of the crisis, but having a ten percentage point higher share of government-owned bank branches in the locality mitigates these declines by 1.9% to 3.9%. When estimating equations (1)-(4) with $govbank_i$ being a dummy variable equal to 1 if the locality has above the median share of government-owned bank branches, the results are similar. For the average locality, having a high share of government-owned bank branches increases total credit operations during the financial crisis by 44.3% to 54.9% relative to previous trends; and for the population-weighted average, these increases are 6.4% to 12.4%. The impact of the crisis on total credit operations and the mitigating effects of government-owned bank branches were smaller in more populous areas, but the effects are nonetheless present and highly significant.

We repeat this exercise using annual data on total credit operations at the locality level. Averaging the monthly information on total credit operations reduces the overall variance, and accordingly, we obtain slightly smaller but still significant estimates. For the average locality without government bank branches, declines in lending relative to previous trends are on the order of 45.7% to 57.9% (14.2% to 31.4% for the population-weighted regressions) following the onset of the financial crisis, and every ten percentage point increase in the share of bank branches that is government-owned mitigates this decline by 6.3% to 6.6% (1.8% to 2.5% for the

population-weighted regressions), as reported in columns (5)-(8). The results are comparable when $govbank_i$ is a dummy variable if the locality has above the median share of government-owned bank branches.

While we do not report locality-level results for total assets and share of assets lent, we obtain results that correspond to the bank-level ones discussed previously. Localities with a higher share of government-owned bank branches experience increases in total credit operations because they experience increases in the share of assets lent during the financial crisis. This increase in the share of assets lent varies from 0.5% to 1.0% (0.3% to 1.0% for the population-weighted regressions) for every ten percentage-point increase in the share of bank branches that are government-owned in the locality.[10]

Localities with a high share of government-owned bank branches effectively experience no declines in total credit operations relative to previous trends following the onset of the financial crisis.

5.2.2 Employment and GDP

Localities with a high share of government-owned bank branches likewise experience less severe declines in employment and GDP following the onset of the financial crisis. Table 5 shows results for the effects of having a high share of government-owned bank branches on GDP, industrial value-added, and services value-added at the locality level. Depending on the specification, declines in GDP vary from almost zero to 1.6% (zero to 2.6% in the population-weighted regressions) in localities with no government-owned bank branches, and declines are mitigated by 0.33% to 0.56% (0.33% to 0.65% in the population-weighted regressions) for every ten percentage point increase in the share of bank branches in a locality that is government-owned. These results are shown in columns (1)-

[10] The coefficient estimates on $post_t \times govbank_i$ are 0.051 and 0.055 when $post_t \times X_i$ is included in the estimation (0.030 and 0.044, respectively, for the population-weighted regressions), based on monthly-level data, and 0.094 and 0.108 (0.076 and 0.102, respectively, for the population-weighted regressions), based on annual data. All of these estimates are significantly different from zero at least at the 1% level.

(4).[11] The inclusion of $post_t \times X_i$ in the estimations potentially absorbs some of the post effects and some of the effects of government bank ownership on the outcome variable during the post-period, leading us to underestimate the true coefficients on both $post_t$ and $post_t \times govbank_i$. However, to the extent that localities with different characteristics may experience different post effects for reasons correlated with the presence of government bank branches, excluding $post_t \times X_i$ would cause us to overestimate the true coefficients on $post_t$ and $post_t \times govbank_i$. The estimates we obtain provide plausible lower and upper bounds of the true effects, and even the most conservative of these suggests that government bank branches mitigated contractions in local GDP.

GDP is calculated as the sum of value added in industry, services, agriculture, and government. Industry and services together account for 74.9% (80.5% when population-weighted) of localities' economies. The relative increase in GDP for areas with a high share of government bank branches was driven primarily by increases in industry and services. Although the estimates are more noisily estimated when we disaggregate GDP, industrial value-added would have declined by 1.3% to 2.5% and services value-added would have declined by 1.5% to 2.7% following the onset of the financial crisis, but these declines were reversed for areas with a high share of government bank branches. For every ten percentage point increase in the share of government-owned bank branches in a locality, industrial value-added is 0.23% (insignificant) to 0.45% higher and services value-added is 0.17% to 0.39% higher.

The mitigating effects of government bank branches on economic outcomes are only weakly reflected in employment numbers, as shown in Table 6. While

[11] We also estimate the random-effects specification of equation (10), which includes $post_t \times X_i$ as controls, with the natural logarithm of locality GDP as the dependent variable (not shown in Table 5). The coefficient estimates (standard errors) on $govbank_i$, $post_t$, and $post_t \times govbank_i$ are respectively 0.025 (0.015), -0.003 (0.005), and 0.033 (0.008). Prior to the crisis, areas with a higher fraction of government-owned bank branches have slightly higher GDP, but this is not significantly different from zero. The fact that the coefficient estimate on $post_t \times govbank_i$ remains stable across both the random and fixed-effects specifications provides some suggestive evidence that assuming $E(\varepsilon_{it} \cdot govbank_i \mid X_i) \approx 0$ is not unreasonable.

employment declines by 2.5% to 3.7% in the post period relative to previous trends for areas with no or only a low share of government bank branches, the mitigating effects of having all or a high share of government-owned bank branches in a locality are on the order of 1.4% to 3.4%, as shown in columns (1)-(4).[12] Depending on the specification, these mitigating effects are not significantly different from zero at conventional levels. However, when we examine total hours rather than employment levels, we obtain much more significant results. Declines in total hours range from 2.6% to 4.8% in the post-period, but having all government bank branches or a high share of government bank branches mitigates these declines by 1.8% to 5.5%, with these results being more significant than those for total employment. Similarly, when analyzing the total wage bill of a locality, the positive effects of having a high share of government bank branches during the post-crisis period are large and significant, especially for more populous localities.

Finally, as shown in Table 7, the number of establishments, which declines from zero to 3.2% relative to previous trends for areas with no or only a low share of government bank branches, is 1.2% to 10% higher in the post-period for localities with all government-owned bank branches or with a high share of these bank branches. These effects of government-owned bank branches on the number of establishments are highly significant and are larger for more populous localities.[13]

These reduced-form results collectively suggest that the increased lending provided by government-owned banks during the financial crisis not only propped-

[12] When estimating the random-effects specification of equation (10) with the natural logarithm of total employment as the dependent variable, we obtain the following coefficient estimates (standard errors) on $govbank_i$, $post_t$, and $post_t \times govbank_i$: 0.028 (0.027), -0.036 (0.012), and 0.017 (0.019) (not shown in Table 6). As before, while localities with a higher fraction of government bank branches have slightly higher employment prior to the crisis, this is not statistically different from zero. The coefficient estimate on $post_t \times govbank_i$ likewise remains unchanged across the random-effects and equivalent fixed-effects specifications.

[13] The random-effects estimations based on equation (10) using the natural logarithm of total hours, the natural logarithm of the wage bill, and the natural logarithm of the total number of establishments as the dependent variables yield coefficient estimates on $govbank_i$ that are not significantly different from zero and coefficient estimates on $post_t \times govbank_i$ that are statistically identical to the equivalent fixed-effects estimates (not shown in Tables 6 and 7).

up production and prevented a greater number of firms from failing, but also buttressed workers' labor hours and income.

5.3 Variations of the Locality-Level Results, Quality of Loans, and Robustness

In this section, we explore variations of the locality-level results, assess loan quality, and provide some robustness checks. Specifically, we are interested in whether the increased credit provided by government-owned banks flows to where it might be needed most and where it might be most productive, or whether these flows are determined by political considerations. Accordingly, we examine banks' balance sheets to assess whether government-owned banks experience a deterioration in their loan portfolio as a result of extending credit during the crisis. We also perform some robustness checks by trimming our sample to ensure that our results are not driven purely by outliers. Finally, and more speculatively, we conduct an exercise to assess what happens to local productivity, as measured by the Solow residual, as a result of government bank lending. While the presence of government banks may attenuate the recessionary effects of the financial crisis, it may also prevent Schumpeterian creative destruction and the reallocation of resources to more productive firms.

We begin by estimating a variant of equation (9) that includes interactions with a measure of the fraction of firms in a locality that are dependent on banking or external finance. As discussed previously, we follow Rajan and Zingales (1998) and Gozzi and Goetz (2010), and adapt their measures of external financial dependence to Brazil. This is admittedly an imperfect measure: sectors that cannot fund themselves from retained earnings and are dependent on external financing in the U.S. are unlikely to fully approximate dependent sectors in Brazil, where financial markets are much less developed. We additionally use the fraction of a locality's firms that are small (we restrict these to firms with 1 to 19 employees) since, in Brazil, these types of firms are typically more credit-constrained and therefore more reliant on external financing for start-up funding (Kumar and Francisco, 2005). Results are shown in Table 8. The coefficient estimates on $post_t \times govbank_i$ are

generally positive and significant, and, as before, they suggest that areas with a higher fraction of government-owned bank branches experience relative increases in lending, GDP, hours, wages, and number of firms following the financial crisis. However, the coefficient estimates on $post_t \times govbank_i \times high\ external\ dependence_i$ or on $post_t \times govbank_i \times high\ frac.small\ firms_i$ are generally mixed, even when we do not control for $post_t \times X_i$ and when we weight the estimations by locality population. If government banks targeted lending to localities whose firms were most reliant on external sources of financing, then we should obtain positive estimates, and we do not. Our measures of external financial dependence are imperfect, and we experimented with several alternatives, including a continuous variable to capture the fraction of firms that are small or externally dependent rather than using a dummy variable for whether the locality is above the median in these measures. While we cannot rule out that government banks targeted lending to where it might have had the greatest impact, we have no convincing evidence that they followed such a strategy.

When we estimate a variant of equation (9) to include interactions with mayors' political affiliations around the time of the crisis, we find no conclusive evidence that credit was targeted based on political connections. We are interested in whether mayors are politically affiliated with the executive branch of the federal government because it is the executive branch that appoints the directors of federally-owned banks. We code a locality as being politically affiliated around the time of the financial crisis if its mayor is from the Worker's Party, which controlled the executive branch, or if its mayor is from a party that is a member of the coalition government.[14] For localities that are comprised of multiple municipalities, we use the electorate-weighted share of mayors that belong to either the Worker's Party or a coalition party. Results are shown in Table 9. We report results for whether the locality had elected a politically-affiliated mayor in either the 2004 or the 2008 elections, and we experiment with separating political affiliations in these periods

[14] We consider coalition parties to be those that have a ministerial appointment in the executive branch. A list of coalition parties based on ministerial appointments is provided in the appendix.

(not shown) rather than considering them together. In general, we do not obtain any significant coefficient estimates on $post_t \times govbank_i \times affiliated_i$, except in one specification where results are positive but only weakly significant. Regardless of whether we control for $post_t \times X_i$, weight the estimations by locality population, or separately consider political affiliations during different election cycles, we fail to obtain robustly significant coefficients to suggest that lending is allocated based on political affiliations. Instead, we find that the coefficient estimates on $post_t \times govbank_i$ remain positive and significant, suggesting that more credit is allocated during the financial crisis to localities with a higher fraction of government-owned banks irrespective of these localities' political affiliations with the federal government.

Even though government-owned banks provide credit during a time when private banks are reducing their lending, they do not appear to be sacrificing their lending standards. As shown in Table 10, while government-owned banks may reduce their capitalization ratios slightly, between zero and 4.0% relative to private-sector banks during the post-crisis period, the quality of their loans actually appears to improve, with borrowers' credit ratings being between 1.6% (insignificant) to 4.1% higher.[15] This is consistent with even high-quality borrowers being unable to obtain credit from private-sector banks and instead shifting to government-owned banks. A caveat is that these credit ratings are self-reported, and so it is unclear whether government-owned banks are simply becoming relatively more lax in their ratings, although we have no reason to believe this is the case. There appears to be no significant difference in the post-period between the loan loss provisions and credit earnings of government relative to private-sector banks, again suggesting that

[15] Banks provide a breakdown of the credit ratings of their loans. We apply a numerical value to these letter ratings and then use these numerical values to derive a weighted average of the overall credit quality of the loan portfolio. If the portfolio is comprised entirely of the highest-rated credits, the "Borrowers' Credit Rating" variable takes the value 1, if it is comprised entirely of the lowest-rated credits, this variable takes the value 0. Banks' capitalization ratio is calculated as total equity capital as a share of total liabilities. Loan loss provisions is capital as a share of total credit operations set aside to cover potential loan losses. Credit earnings is earnings from credit as a share of total credit operations.

government banks have not significantly relaxed their lending standards in an effort to provide more credit during the crisis.

To test an implication of the conceptual framework, we estimate a variant of equation (9) that includes interactions with measures of local capital intensity and labor market flexibility. In localities with more capital-intensive industries, the impact of a decline in lending should be reflected more in GDP than in labor since labor is a less important input in production. In areas with more flexible labor markets, a decline in lending should be reflected less in GDP and possibly more in employment and wages. As measures of capital intensity, we alternately consider the fraction of a locality's workforce initially employed in heavy industries or manufacturing and a dummy variable if the locality has above the median share of employment in these sectors. As a measure of labor market flexibility, we alternately consider the pre-crisis share of workers in the informal sector and the pre-crisis share of the working-age population that is not employed. Results are shown in Table 11. In more capital-intensive localities, post-crisis declines in GDP are zero to 1.9% larger while declines in employment are similar to those in less capital-intensive areas, as shown in columns (1)-(4). While having a higher share of government-owned bank branches buttresses GDP in these areas, their effect on GDP is smaller than in less capital-intensive localities. This coincides with the previous finding that government-owned banks were not necessarily targeting more credit to localities where this credit might have had greater effects. In localities with more flexible labor markets, the declines in GDP and employment following the onset of the crisis are smaller in magnitude, as shown in columns (5)-(8). As predicted by the empirical framework, in areas where there is more slack in the labor market, there appears to be smaller declines in both GDP and employment since firms can presumably substitute more easily between labor and capital.

Our base results are robust to alternative sample selection and remain significant when we cluster at the state-year as opposed to the locality level, as shown in Table 12. We trim the top and bottom 3% of our sample with respect to total credit, GDP, employment, and population. The results from the base case – that having a higher fraction or above the median fraction of government-owned bank

branches is associated with relatively more lending, higher GDP, more hours, higher wages, and a greater number of establishments – holds both across these different samples and across different specifications, although significance is occasionally weaker. We also experiment with trimming the top and bottom 5%, 10%, and 15% with respect to total credit, GDP, employment, and population, and again, our base results are robust, although significance is lost as we reduce the sample size (not shown). When we cluster at the state-year as opposed to the locality level, some standard errors are larger, although significance levels remain largely unchanged. We are not concerned that our base results are driven by outliers or are only significant due to our method of clustering.

As a final exercise, we attempt to estimate the effect of government-bank involvement on productivity in local economies during the financial crisis. For each locality, for 2000-2009, we estimate the following equation:

$$\ln GDP_{it} = \ln K_{it} + \ln L_{it} + \varepsilon_{it}, \qquad (11)$$

where GDP_{it} is the equivalent of gross domestic product in locality i at time t, K_{it} is total credit operations, L_{it} is alternately employment or total labor hours, and ε_{it} is the error term. We obtain coefficient estimates on $\ln K_{it}$ and $\ln L_{it}$, and use these estimates to compute the residuals for each locality for 2005-2009. Note that each locality is constrained to having the same production technology throughout the period, although localities can have a different optimal mix of credit (capital) and labor from one another. With the Solow residuals as the dependent variable, we estimate equations (9) and (10). Results are shown in Table 13. We find that greater government presence in a locality is associated with a zero to 3.8% increase in productivity, as measured by the Solow residual.[16] It is important to caveat these

[16] Additionally, when estimating using random-effects, we find that localities with a higher share of government-owned bank branches are no more productive and may even be slightly less productive in the pre-crisis period than localities with a lower share of these bank branches. When we consider labor to be the number of workers employed in a locality, we obtain the following coefficient estimates (standard errors) on $govbank_i$, $post_t$, and $post_t \times govbank_i$: -0.0014 (0.0010), 0.0158 (0.0035), and 0.0072 (0.0052) when $govbank_i$ is the share of government-owned bank branches in a locality, and -0.0003 (0.0008), 0.0188 (0.0029), and 0.0014 (0.0038) when $govbank_i$ is a dummy variable equal to 1 if the locality has above the median share of government-owned bank branches.

results by noting that they only reflect short-term outcomes. While the greater presence of government-owned banks may serve to prop-up lending, GDP, and firms, it is unclear whether in the long-term, this prevents structural adjustment in the economy and hampers productivity. In the short-term, however, it does not appear that government-bank intervention led to a relative decline in local productivity; in the most optimistic of estimates, local productivity actually increases in areas with the highest shares of government-owned bank branches.

6 Conclusion

While the onset of the 2008-2010 financial crisis resulted in a sharp decline in lending, production, and employment in many countries around the world, this decline was comparatively mild in Brazil. In part, the reason for only a mild economic decline in Brazil can be attributed to the country's government banks. The onset of the crisis led private banks to change their behavior and operate more conservatively. They reduced their share of assets lent, and coupled with the decline in assets, this resulted in a sharp drop in private-sector lending. Government banks, however, actually increased their lending despite a decline in assets. This higher lending does not appear to have been allocated politically, although there is also no evidence that it was allocated strategically to areas where it might have been most productive. Instead, it appears that government banks simply lent more in the areas where they operated without necessarily targeting specific localities or sectors.

In areas with high government bank presence, the local economy was disproportionately stimulated. Total credit operations, GDP, labor hours, income, and the number of establishments were all higher in these localities than in corresponding ones with only a low share of government-owned bank branches. Our estimates suggest that economic growth, incomes, and the number of firms would have declined in Brazil relative to previous trends if not for the involvement of government-owned banks. These banks buttressed the economy, increasing local

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When we consider labor to be total hours, these estimates are -0.0018 (0.0011), 0.0146 (0.0035), and 0.0089 (0.0053) when $govbank_i$ is the share of government-owned bank branches, and -0.0006 (0.0008), 0.0178 (0.0030), and 0.0028 (0.0038) when $govbank_i$ is a dummy variable.

lending by 26%, GDP by 2.3%, labor hours by 1.8%, incomes by 1.9%, and the number of firms by 1.2%, with larger effects in more populous localities. A counter-argument to these effects is that they may have prevented Schumpeterian creative destruction in the local economy, and therefore have hampered productivity growth in the longer term. At least in the short term, within two years following the onset of the crisis, there appears to be no negative effect on an area's productivity as a result of government bank involvement.

These results should be interpreted with some caution. There is ample evidence that government banks are subject to political capture (Dinc, 2005) and that their lending can become politically motivated (Khwaja and Mian, 2005; Carvalho, forthcoming), with detrimental effects to the allocation of productive inputs and financial development (Barth, Caprio, and Levine, 2001). Even in Brazil, this has previously been the case (Feler, 2012). While government-owned banks propped-up the economy in Brazil and prevented a deeper recession from occurring following the onset of the 2008-2010 financial crisis, it is unclear what the longer-term implications of government bank intervention might be. At least during a crisis, government bank lending had significantly positive and fairly immediate effects on GDP, employment, and incomes, and helped firms, especially smaller firms, remain in business.

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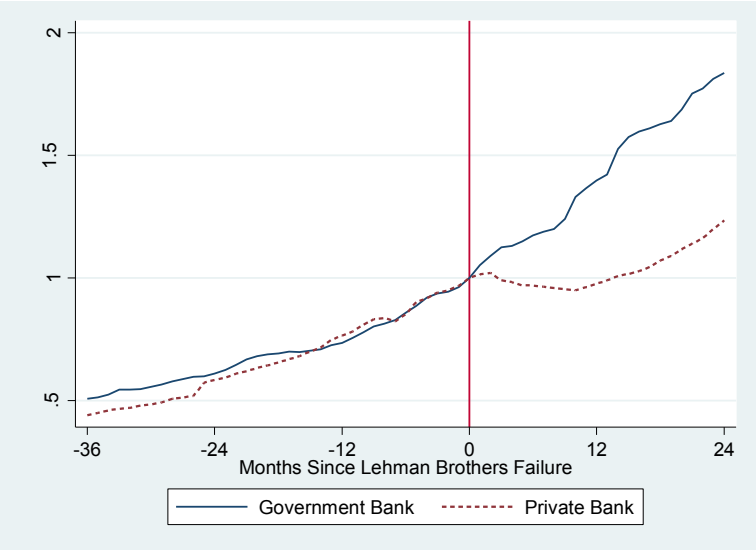
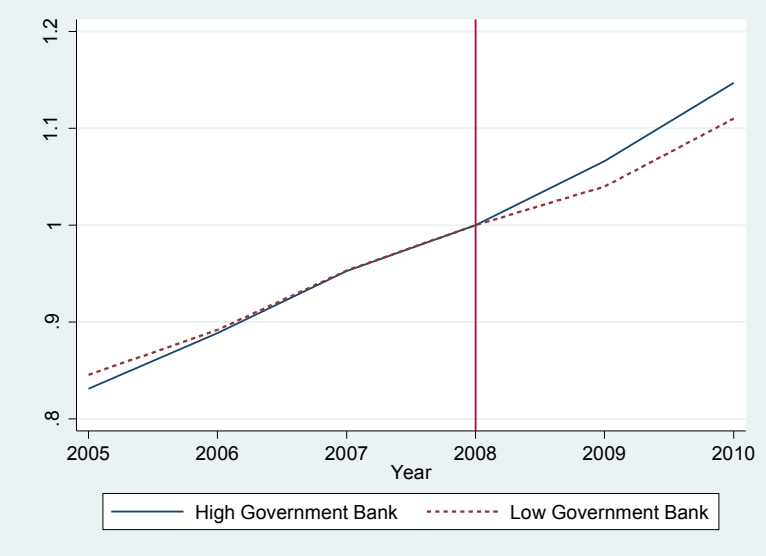
Figures

Figure 1: Total Credit Operations



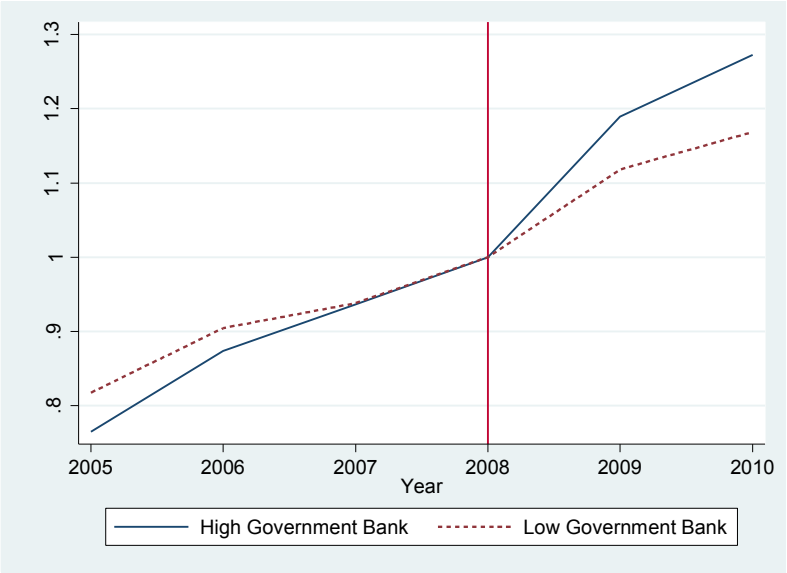
Notes: This figure shows the natural logarithm of total credit operations normalized to be 1 at the onset of the financial crisis in September 2008. Total credit is based on aggregated balance sheets of five federal government banks and 123 private-sector banks.

Figure 2: Total Employment



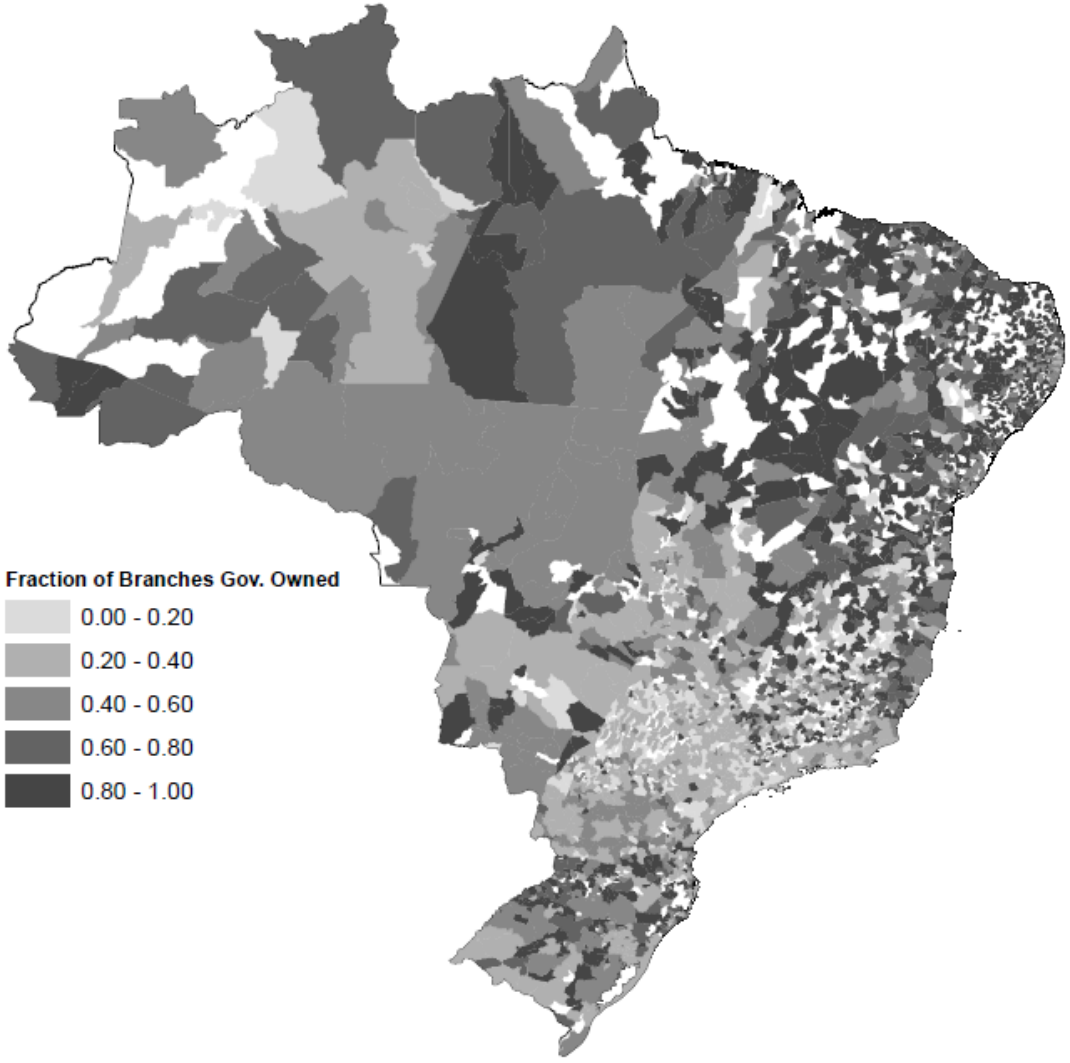
Notes: This figure shows the natural logarithm of locality-level employment normalized to be 1 at the onset of the financial crisis in 2008 for the 2,601 localities with bank branches. High government bank localities are defined as localities that have above the median share of government-owned bank branches.

Figure 3: Total Wages



Notes: This figure shows the natural logarithm of locality-level wages normalized to be 1 at the onset of the financial crisis in 2008 for the 2,601 localities with bank branches. High government bank localities are defined as localities that have above the median share of government-owned bank branches.

Figure 4: Variation in Government Ownership of Bank Branches



Notes: This figure shows the share of bank branches that are government-owned in 2007 for the 2,601 Brazilian localities that have at least one bank branch.

Tables

Table 1: Summary Statistics

	Mean	Median	Std. Dev.
Bank and Credit Variables:			
Fraction Branches Government Owned	0.53	0.50	0.37
Total Bank Branches	7.6	2.0	65.6
Government Bank Branches	2.5	1.0	11.8
Private Bank Branches	5.1	1.0	54.4
Yearly Real Credit Growth	22.1%	16.6%	41.5%
Locality Variables:			
GDP in 2007 (in R$ millions of 2000)	1,050	81	25,600
Yearly GDP Growth	4.9%	4.4%	7.9%
Yearly Industry Value-Added Growth	4.6%	2.9%	17.9%
Yearly Services Value-Added Growth	5.9%	5.4%	6.2%
Total Employment in 2007	14,218	2,247	105,455
Yearly Employment Growth	7.1%	5.6%	14.3%
Total Hours in 2007 (in 10,000s)	2,288	357	16,613
Yearly Hours Growth	7.5%	6.0%	13.7%
Total Monthly Wages in 2007 (in R$10,000s)	1,866	161	18,748
Yearly Wage Growth	11.5%	8.6%	18.4%
Total Firms in 2007	1,108	256	6,049
Yearly Growth in Number of Firms	5.0%	4.3%	5.6%
Control Variables:			
GDP in 2000 (in R$ millions)	447	61	3,783
Population in 2000	62,075	21,231	277,809
Fraction Population Urban	0.68	0.70	0.21
Years of Schooling in 2000	4.47	4.56	1.29
Total Exports in 2007 (in R$10,000s)	6,144	0	34,195

Notes: Summary statistics are based on the sample of 2,601 localities with at least one bank branch in 2007, prior to the onset of the financial crisis. Growth rates are averages for 2005-2007.

Table 2: Determinants of a Locality's Share of Government Bank Branches

	(1)	(2)	(3)
Dep. Variable:	Fraction Branches Gov Owned		
Ln(Total Employment)	0.0039	-0.0098	-0.0069
	(0.0220)	(0.0198)	(0.0200)
Frac. Urban	-0.3862***	-0.0792	-0.0415
	(0.0552)	(0.0554)	(0.0566)
Ln(Population)	0.1157***	0.0326	0.0289
	(0.0215)	(0.0204)	(0.0204)
Ln(GDP)	-0.0610***	0.0079	-0.0024
	(0.0220)	(0.0208)	(0.0209)
Years of Education	-0.0700***	-0.0023	-0.0065
	(0.0104)	(0.0104)	(0.0109)
Ln(Exports)	-0.0005	-0.0006	-0.0005
	(0.0012)	(0.0011)	(0.0011)
Industry VA/Total GDP	0.2095	0.1429	0.1577
	(0.1648)	(0.1501)	(0.1501)
Services VA/Total GDP	0.0225	0.1228	0.1148
	(0.1676)	(0.1559)	(0.1561)
Agric VA/Total GDP	0.0294	0.0222	0.0459
	(0.1574)	(0.1445)	(0.1454)
Yearly GDP Growth (2005-2007)	0.1518	0.0569	0.0537
	(0.1019)	(0.0918)	(0.0919)
Yearly Employment Growth (2005-2007)	-0.0059	0.0435	0.0455
	(0.0444)	(0.0413)	(0.0411)
Propensity Score		0.6390***	
		(0.0335)	
P-Score Block Dummies			x
Number of Localities	2,601	2,601	2,601

Notes: Robust standard errors in parentheses. Results are shown from regressing the fraction of total branches in a locality that are government owned in 2007 on locality characteristics. Column (2) includes a control for the propensity to have above the median share of government-owned bank branches and column (3) includes propensity score block dummies.

* significant at 10%; ** significant at 5%; *** significant at 1%.

Table 3: Total Credit Operations (Bank Balance Sheets)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Dep. Variable:	Total Credit Operations			Total Assets			Total Credit/Total Assets		
Govt			0.5219***			-0.1029			0.0226
			(0.1994)			(0.0650)			(0.0157)
Post	-0.1469***	-0.1453***	-0.1453***	-0.0736***	-0.0654**	-0.0654**	-0.0213**	-0.0182**	-0.0182**
	(0.0385)	(0.0447)	(0.0442)	(0.0267)	(0.0258)	(0.0254)	(0.0084)	(0.0089)	(0.0088)
PostXGovt	0.2339***	0.2750*	0.2750*	-0.0088	-0.0290	-0.0290	0.0786***	0.0708***	0.0708***
	(0.0651)	(0.1458)	(0.1439)	(0.0572)	(0.0843)	(0.0832)	(0.0224)	(0.0254)	(0.0251)
PostXControls		x	x		x	x		x	x
Bank Fixed Effects	x	x		x	x		x	x	
Bank Random Effects			x			x			x
Observations	4,440	4,440	4,440	4,440	4,440	4,440	4,440	4,440	4,440
Number of Banks	120	120	120	120	120	120	120	120	120

Notes: Robust standard errors, clustered at the bank level, in parentheses. Bank characteristics included as controls and interacted with post are total assets, capitalization ratio, a weighted average of borrowers' credit ratings, and credit as a share of assets, all for August 2006, prior to the onset of the financial crisis. We restrict the sample to 120 banks in continuous operation between 2006 and 2009. All estimations control for a linear time trend.

* significant at 10%; ** significant at 5%; *** significant at 1%.

Table 4: Total Credit Operations (Municipality Balance Sheets)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dep. Variable:	Total Credit Operations (Monthly)				Total Credit Operations (Yearly)			
Panel A: Govbank=Frac. Branches Govt Owned								
Post	-0.4453***	-0.5178***	-0.0719***	-0.2949***	-0.4570***	-0.5793***	-0.1419***	-0.3143***
	(0.0422)	(0.0479)	(0.0152)	(0.0329)	(0.0536)	(0.0960)	(0.0227)	(0.0501)
PostXGovbank	0.7254***	0.8621***	0.1944***	0.3955***	0.6623***	0.6291***	0.1780***	0.2450***
	(0.0537)	(0.0685)	(0.0262)	(0.0488)	(0.0845)	(0.0943)	(0.0443)	(0.0543)
Panel B: Govbank=High Govt Bank Dummy								
Post	-0.3094***	-0.3687***	-0.0116	-0.1525***	-0.3389***	-0.4334***	-0.0903***	-0.2320***
	(0.0344)	(0.0386)	(0.0109)	(0.0185)	(0.0381)	(0.0820)	(0.0146)	(0.0416)
PostXGovbank	0.4435***	0.5492***	0.0638***	0.1244***	0.4156***	0.4000***	0.0695***	0.0752***
	(0.0336)	(0.0465)	(0.0139)	(0.0209)	(0.0504)	(0.0598)	(0.0186)	(0.0240)
For both panels:								
PostXControls		x		x		x		x
Locality Fixed Effects	x	x	x	x	x	x	x	x
Population Weighted			x	x			x	x
Observations	96,237	96,237	96,237	96,237	13,005	13,005	13,005	13,005
Number of Localities	2,601	2,601	2,601	2,601	2,601	2,601	2,601	2,601

Notes: Robust standard errors, clustered at the locality level, in parentheses. Results are shown from regressing the natural logarithms of total credit operations at the monthly level (in columns (1)-(4)) and at the average annual level (in columns (5)-(8)) on post, postXgovbank, and depending on the specification, on postXcontrols, where controls include urbanization, population, total income, and education all for 2000, and total exports in 2005, the total number of bank branches in 2007, and the propensity score. All estimations include locality fixed effects and a linear time trend, and columns (3), (4), (7), and (8) are population-weighted. In Panel A, govbank is the fraction of total bank branches in a locality that is government-owned, and in Panel B, govbank is a dummy equal to 1 if the fraction of government-owned bank branches is above the median for all localities.

* significant at 10%; ** significant at 5%; *** significant at 1%.

Table 5: GDP and Value-Added

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dep. Variable:	GDP				Industry Value-Added		Services Value-Added	
Panel A: Govbank=Frac. Branches Govt Owned								
Post	-0.0156***	-0.0029	-0.0255***	-0.0127	-0.0246**	-0.0131	-0.0269***	-0.0149***
	(0.0055)	(0.0061)	(0.0075)	(0.0086)	(0.0100)	(0.0116)	(0.0042)	(0.0045)
PostXGovbank	0.0574***	0.0334***	0.0649***	0.0334**	0.0450***	0.0234	0.0394***	0.0169**
	(0.0081)	(0.0096)	(0.0109)	(0.0147)	(0.0152)	(0.0187)	(0.0063)	(0.0073)
Panel B: Govbank=High Govt Bank Dummy								
Post	-0.0084*	0.0022	-0.0096	-0.0045	-0.0193**	-0.0075	-0.0217***	-0.0122***
	(0.0047)	(0.0053)	(0.0061)	(0.0066)	(0.0083)	(0.0101)	(0.0035)	(0.0038)
PostXGovbank	0.0413***	0.0225***	0.0342***	0.0177**	0.0332***	0.0121	0.0280***	0.0111**
	(0.0058)	(0.0073)	(0.0073)	(0.0090)	(0.0109)	(0.0148)	(0.0045)	(0.0055)
For both panels:								
PostXControls		x		x		x		x
Locality Fixed Effects	x	x	x	x	x	x	x	x
Population Weighted			x	x				
Observations	13,005	13,005	13,005	13,005	13,005	13,005	13,005	13,005
Number of Localities	2,601	2,601	2,601	2,601	2,601	2,601	2,601	2,601

Notes: Robust standard errors, clustered at the locality level, in parentheses. Results are shown from regressing the natural logarithms of locality-level GDP (columns (1)-(4)), industry value-added (columns (5) and (6)), and services value-added (columns (7) and (8)) on post, postXgovbank, and depending on the specification, on postXcontrols, where controls include urbanization, population, total income, and education, all for 2000, and total exports in 2005, the total number of bank branches in 2007, and the propensity score. All estimations include locality fixed effects and a linear time trend, and columns (3) and (4) are population-weighted. In Panel A, govbank is the fraction of total bank branches in a locality that is government-owned, and in Panel B, govbank is a dummy equal to 1 if the fraction of government-owned bank branches is above the median for all localities.

* significant at 10%; ** significant at 5%; *** significant at 1%.

Table 6: Total Employment, Hours, and Wages

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Dep. Variable:	Total Employment				Total Hours				Total Wages			
Panel A: Govbank=Frac. Branches Govt Owned												
Post	-0.0370***	-0.0359***	-0.0316***	-0.0360**	-0.0482***	-0.0443***	-0.0391***	-0.0416***	-0.0827***	-0.0666***	-0.0941***	-0.0353*
	(0.0093)	(0.0137)	(0.0083)	(0.0171)	(0.0095)	(0.0132)	(0.0077)	(0.0155)	(0.0114)	(0.0151)	(0.0088)	(0.0185)
PostXGovbank	0.0191	0.0170	0.0343**	0.0196	0.0382***	0.0309	0.0545***	0.0382	0.0542***	0.0239	0.1335***	0.0389
	(0.0131)	(0.0209)	(0.0136)	(0.0271)	(0.0144)	(0.0208)	(0.0139)	(0.0247)	(0.0160)	(0.0228)	(0.0143)	(0.0276)
Panel B: Govbank=High Govt Bank Dummy												
Post	-0.0345***	-0.0353***	-0.0249***	-0.0391***	-0.0411***	-0.0378***	-0.0263***	-0.0353***	-0.0768***	-0.0641***	-0.0630***	-0.0304**
	(0.0073)	(0.0107)	(0.0055)	(0.0108)	(0.0074)	(0.0102)	(0.0050)	(0.0101)	(0.0090)	(0.0120)	(0.0072)	(0.0134)
PostXGovbank	0.0136*	0.0150	0.0233***	0.0249*	0.0235***	0.0175	0.0302***	0.0258**	0.0407***	0.0181	0.0755***	0.0291**
	(0.0080)	(0.0138)	(0.0074)	(0.0140)	(0.0086)	(0.0134)	(0.0073)	(0.0124)	(0.0098)	(0.0149)	(0.0082)	(0.0144)
For both panels:												
PostXControls		x		x		x		x		x		x
Locality Fixed Effects	x	x	x	x	x	x	x	x	x	x	x	x
Population Weighted			x	x			x	x			x	x
Observations	13,005	13,005	13,005	13,005	13,005	13,005	13,005	13,005	13,005	13,005	13,005	13,005
Number of Localities	2,601	2,601	2,601	2,601	2,601	2,601	2,601	2,601	2,601	2,601	2,601	2,601

Notes: Robust standard errors, clustered at the locality level, in parentheses. Results are shown from regressing the natural logarithms of total employment (columns (1)-(4)), total hours (columns (5)-(8)), and total wages (columns (9)-(12)) on post, postXgovbank, and depending on the specification, on postXcontrols, where controls include urbanization, population, total income, and education, all for 2000, and total exports in 2005, the total number of bank branches in 2007, and the propensity score. All estimations include locality fixed effects and a linear time trend, and columns (3), (4), (7), (8), (11), and (12) are population-weighted. In Panel A, govbank is the fraction of total bank branches in a locality that is government-owned, and in Panel B, govbank is a dummy equal to 1 if the fraction of government-owned bank branches is above the median for all localities.

* significant at 10%; ** significant at 5%; *** significant at 1%.

Table 7: Establishments

	(1)	(2)	(3)	(4)
Dep. Variable:		Number of Firms		
Panel A: Govbank=Frac. Branches Govt Owned				
Post	-0.0314***	-0.0069	-0.0322***	-0.0072
	(0.0038)	(0.0042)	(0.0053)	(0.0078)
PostXGovbank	0.0687***	0.0225***	0.0999***	0.0388***
	(0.0061)	(0.0069)	(0.0104)	(0.0122)
Panel B: Govbank=High Govt Bank Dummy				
Post	-0.0207***	-0.0020	-0.0078**	0.0031
	(0.0029)	(0.0033)	(0.0031)	(0.0057)
PostXGovbank	0.0459***	0.0124***	0.0530***	0.0191***
	(0.0038)	(0.0044)	(0.0057)	(0.0062)
For both panels:				
PostXControls		x		x
Locality Fixed Effects	x	x	x	x
Population Weighted			x	x
Observations	13,005	13,005	13,005	13,005
Number of Localities	2,601	2,601	2,601	2,601

Notes: Robust standard errors, clustered at the locality level, in parentheses. Results are shown from regressing the natural logarithm of total establishments on post, postXgovbank, and depending on the specification, on postXcontrols, where controls include urbanization, population, total income, and education, all for 2000, and total exports in 2005, the total number of bank branches in 2007, and the propensity score. All estimations include locality fixed effects and a linear time trend, and columns (3) and (4) are population-weighted. In Panel A, govbank is the fraction of total bank branches in a locality that is government-owned, and in Panel B, govbank is a dummy equal to 1 if the fraction of government-owned bank branches is above the median for all localities.

* significant at 10%; ** significant at 5%; *** significant at 1%.

Table 8: Interactions with Credit Dependence

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Dep. Variable:	Credit	GDP	Hours	Wages	Firms	Credit	GDP	Hours	Wages	Firms
High:	High Fraction Small Firms					High External Dependence				
Panel A: Govbank=Frac. Branches Govt Owned										
Post	-0.4765***	0.0061	-0.0371*	-0.0527**	0.0087	-0.4806***	-0.0100	-0.0602***	-0.0809***	-0.0053
	(0.1031)	(0.0096)	(0.0203)	(0.0230)	(0.0058)	(0.0994)	(0.0085)	(0.0196)	(0.0217)	(0.0057)
PostXGovbank	0.6801***	0.0182	0.0141	0.0001	0.0216**	0.6712***	0.0356***	0.0532*	0.0421	0.0298***
	(0.1437)	(0.0147)	(0.0316)	(0.0346)	(0.0100)	(0.1436)	(0.0117)	(0.0304)	(0.0324)	(0.0092)
PostXHigh	0.0684	-0.0161	-0.0123	-0.0249	-0.0319***	0.0723	0.0124	0.0281	0.0252	-0.0027
	(0.1474)	(0.0126)	(0.0200)	(0.0231)	(0.0068)	(0.1326)	(0.0106)	(0.0176)	(0.0200)	(0.0064)
PostXHighXGovbank	-0.0912	0.0270	0.0297	0.0423	0.0029	-0.0724	-0.0010	-0.0415	-0.0332	-0.0175
	(0.1789)	(0.0174)	(0.0313)	(0.0345)	(0.0117)	(0.1724)	(0.0166)	(0.0293)	(0.0322)	(0.0115)
Panel B: Govbank=High Govt Bank Dummy										
Post	-0.3414***	0.0129	-0.0375**	-0.0629***	0.0112***	-0.3569***	0.0002	-0.0485***	-0.0724***	0.0007
	(0.0740)	(0.0079)	(0.0151)	(0.0174)	(0.0042)	(0.0704)	(0.0071)	(0.0144)	(0.0164)	(0.0042)
PostXGovbank	0.4062***	0.0050	0.0137	0.0178	0.0161***	0.4228***	0.0166*	0.0303	0.0256	0.0180***
	(0.0854)	(0.0110)	(0.0199)	(0.0219)	(0.0061)	(0.0866)	(0.0092)	(0.0185)	(0.0200)	(0.0056)
PostXHigh	0.0227	-0.0200*	0.0000	-0.0024	-0.0277***	0.0479	0.0038	0.0190	0.0149	-0.0049
	(0.1142)	(0.0103)	(0.0152)	(0.0177)	(0.0053)	(0.0977)	(0.0084)	(0.0127)	(0.0146)	(0.0047)
PostXHighXGovbank	-0.0122	0.0314**	0.0065	0.0007	-0.0046	-0.0403	0.0138	-0.0242	-0.0134	-0.0132*
	(0.1084)	(0.0124)	(0.0191)	(0.0214)	(0.0073)	(0.1011)	(0.0116)	(0.0174)	(0.0196)	(0.0071)
For both panels:										
PostXControls	x	x	x	x	x	x	x	x	x	x
Locality Fixed Effects	x	x	x	x	x	x	x	x	x	x
Observations	13,005	13,005	13,005	13,005	13,005	13,005	13,005	13,005	13,005	13,005
Number of Localities	2,601	2,601	2,601	2,601	2,601	2,601	2,601	2,601	2,601	2,601

Notes: Robust standard errors, clustered at the locality level, in parentheses. Results are shown from regressing the natural logarithms of total credit, GDP, total hours, total wages, and number of establishments on post, postXgovbank, postXhigh, and postXhighXgovbank, where high is alternately a dummy equal to 1 if the locality has above the median share of small firms (columns (1)-(5)) or a dummy equal to 1 if the locality has above the median share of externally dependent employment (columns (6)-(10)). Controls include urbanization, population, total income, and education, all for 2000, and total exports in 2005, the total number of bank branches in 2007, and the propensity score. All estimations include locality fixed effects and a linear time trend. In Panel A, govbank is the fraction of total bank branches in a locality that is government-owned, and in Panel B, govbank is a dummy equal to 1 if the fraction of government-owned bank branches is above the median for all localities.
* significant at 10%; ** significant at 5%; *** significant at 1%.

Table 9: Political Economy and Lending

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dep. Variable:	Total Credit Operations							
Alignment:	PT Mayor				Coalition Mayor			
Panel A: Govbank=Frac. Branches Govt Owned								
Post	-0.4540***	-0.5052***	-0.0781***	-0.2927***	-0.3699***	-0.4208***	-0.0742***	-0.2916***
	(0.0457)	(0.0498)	(0.0195)	(0.0327)	(0.0654)	(0.0693)	(0.0247)	(0.0386)
PostXGovbank	0.7224***	0.8410***	0.1922***	0.3858***	0.6380***	0.7387***	0.1978***	0.3825***
	(0.0590)	(0.0718)	(0.0289)	(0.0469)	(0.0787)	(0.0906)	(0.0412)	(0.0575)
PostXAlignment	0.0515	-0.0967	0.0132	-0.0134	-0.1216	-0.1529*	0.0037	-0.0056
	(0.1015)	(0.0911)	(0.0453)	(0.0415)	(0.0860)	(0.0834)	(0.0358)	(0.0310)
PostXAlignmentXGovbank	0.0376	0.1716	0.0485	0.0656	0.1418	0.1921*	-0.0055	0.0203
	(0.1613)	(0.1493)	(0.1105)	(0.1071)	(0.1109)	(0.1092)	(0.0578)	(0.0522)
Panel B: Govbank=High Govt Bank Dummy								
Post	-0.3299***	-0.3651***	-0.0180	-0.1537***	-0.2658***	-0.3035***	-0.0158	-0.1535***
	(0.0375)	(0.0400)	(0.0151)	(0.0191)	(0.0534)	(0.0556)	(0.0233)	(0.0246)
PostXGovbank	0.4609***	0.5462***	0.0666***	0.1253***	0.4131***	0.4921***	0.0644**	0.1180***
	(0.0381)	(0.0490)	(0.0173)	(0.0228)	(0.0523)	(0.0635)	(0.0267)	(0.0310)
PostXAlignment	0.1275*	-0.0246	0.0240	0.0057	-0.0696	-0.1028	0.0065	0.0014
	(0.0737)	(0.0649)	(0.0228)	(0.0202)	(0.0677)	(0.0645)	(0.0289)	(0.0239)
PostXAlignmentXGovbank	-0.1041	0.0219	-0.0022	-0.0042	0.0503	0.0901	-0.0011	0.0097
	(0.0876)	(0.0819)	(0.0419)	(0.0420)	(0.0718)	(0.0717)	(0.0334)	(0.0309)
For both panels:								
PostXControls		x		x		x		x
Locality Fixed Effects	x	x	x	x	x	x	x	x
Population Weighted			x	x			x	x
Observations	96,237	96,237	96,237	96,237	96,237	96,237	96,237	96,237
Number of Localities	2,601	2,601	2,601	2,601	2,601	2,601	2,601	2,601

Notes: Robust standard errors, clustered at the locality level, in parentheses. Results are shown from regressing the natural logarithm of total monthly credit on post, postXgovbank, postXalignment, and postXalignmentXgovbank, where alignment is an electorate-weighted average of a municipality's mayoral alignment with the presidential party, the PT, (columns (1)-(4)), or with one of the parties in the federal government's coalition (columns (5)-(8)) in either 2004 or 2008. Depending on the specification, postXcontrols include urbanization, population, total income, and education, all for 2000, and total exports in 2005, the total number of bank branches in 2007, and the propensity score. All estimations include locality fixed effects and a linear time trend. In Panel A, govbank is the fraction of total bank branches in a locality that is government-owned, and in Panel B, govbank is a dummy equal to 1 if the fraction of government-owned bank branches is above the median for all localities.

* significant at 10%; ** significant at 5%; *** significant at 1%.

Table 10: Quality of Loans

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dep. Variable:	Capitalization Ratio		Borrowers' Credit Rating		Loan Loss Provisions		Credit Earnings	
Post	-0.0013	-0.0002	-0.0220***	-0.0235***	-0.0624**	-0.0725*	-0.0017	0.0006
	(0.0062)	(0.0068)	(0.0062)	(0.0068)	(0.0291)	(0.0381)	(0.0063)	(0.0071)
PostXGovbank	-0.0029	-0.0403**	0.0157	0.0405**	0.0265	0.0976	0.0083	-0.0186
	(0.0114)	(0.0204)	(0.0101)	(0.0179)	(0.0283)	(0.0935)	(0.0079)	(0.0153)
PostXControls:		x		x		x		x
Bank Fixed Effects	x	x	x	x	x	x	x	x
Observations	4,440	4,440	4,440	4,440	4,255	4,255	3,959	3,959
Number of Banks	120	120	120	120	115	115	107	107

Notes: Robust standard errors, clustered at the bank level, in parentheses. Results are shown from regressing the monthly capitalization ratio (columns (1) and (2)), borrowers' average credit ratings (columns (3) and (4)), loan loss provisions (columns (5) and (6)), and credit earnings (columns (7) and (8)) on post, postXgovbank, bank fixed effects, a linear time trend, and depending on the specification, on postXcontrols, where controls include total assets, capitalization ratio, a weighted average of borrowers' credit ratings, and credit as a share of assets, all for August 2006, prior to the onset of the financial crisis. We restrict the sample to 120 banks in continuous operation between 2006 and 2009; the sample size is limited by data availability to 115 banks in columns (5) and (6) and to 107 banks in columns (7) and (8).

* significant at 10%; ** significant at 5%; *** significant at 1%.

Table 11: Interactions with Local Capital Intensity and Labor Market Flexibility

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dep. Variable:	GDP	Total Emp.	GDP	Total Emp.	GDP	Total Emp.	GDP	Total Emp.
Additional Control:	Industry Fraction		High Industrial		Informal Fraction		Unemployment Rate	
Panel A: Govbank=Frac. Branches Govt Owned								
Post	-0.0115**	-0.0350***	-0.0023	-0.0483***	-0.0172***	-0.0379***	-0.0144***	-0.0373***
	(0.0056)	(0.0094)	(0.0074)	(0.0152)	(0.0055)	(0.0097)	(0.0056)	(0.0095)
PostXGovbank	0.0479***	0.0122	0.0584***	0.0369*	0.0603***	0.0208	0.0541***	0.0185
	(0.0084)	(0.0126)	(0.0098)	(0.0199)	(0.0081)	(0.0137)	(0.0083)	(0.0131)
PostXControl	-0.0081	0.0129	-0.0185*	0.0239	0.0213***	0.0144	0.0009	0.0121
	(0.0063)	(0.0086)	(0.0108)	(0.0169)	(0.0046)	(0.0115)	(0.0052)	(0.0103)
PostXControlXGovbank	-0.0167*	-0.0314***	-0.0196	-0.0436*	-0.0208***	-0.0119	-0.0117	-0.0147
	(0.0089)	(0.0122)	(0.0173)	(0.0257)	(0.0072)	(0.0176)	(0.0078)	(0.0157)
Panel B: Govbank=High Govt Bank Dummy								
Post	-0.0080*	-0.0363***	-0.0059	-0.0476***	-0.0074	-0.0336***	-0.0087*	-0.0363***
	(0.0047)	(0.0079)	(0.0069)	(0.0136)	(0.0047)	(0.0072)	(0.0047)	(0.0080)
PostXGovbank	0.0371***	0.0134	0.0583***	0.0323**	0.0401***	0.0125	0.0404***	0.0153*
	(0.0058)	(0.0084)	(0.0080)	(0.0149)	(0.0058)	(0.0079)	(0.0058)	(0.0086)
PostXControl	-0.0022	0.0100	-0.0041	0.0214	0.0137***	0.0133	0.0018	0.0111
	(0.0050)	(0.0072)	(0.0086)	(0.0141)	(0.0039)	(0.0091)	(0.0043)	(0.0084)
PostXControlXGovbank	-0.0255***	-0.0239***	-0.0429***	-0.0351**	-0.0090	-0.0100	-0.0116**	-0.0116
	(0.0064)	(0.0085)	(0.0118)	(0.0172)	(0.0056)	(0.0113)	(0.0056)	(0.0100)
For both panels:								
Locality Fixed Effects	x	x	x	x	x	x	x	x
Observations	13,005	13,005	13,005	13,005	13,005	13,005	13,005	13,005
Number of Localities	2,601	2,601	2,601	2,601	2,601	2,601	2,601	2,601

Notes: Robust standard errors, clustered at the locality level, in parentheses. Results are shown from regressing the natural logarithms of locality GDP and total employment on post, postXgovbank, postXcontrol, and postXcontrolXgovbank, where "control" is alternately the fraction of employment in industry (columns (1) and (2)), a dummy equal to 1 if the locality has above the median share of industrial employment (columns (3) and (4)), the fraction of the working population that is in the informal sector (columns (5) and (6)), and the fraction of the working-age population that is not employed (columns (7) and (8)). All estimations include locality fixed effects and a linear time trend. In Panel A, govbank is the fraction of total bank branches in a locality that is government-owned, and in Panel B, govbank is a dummy equal to 1 if the fraction of government-owned bank branches is above the median for all localities.
* significant at 10%; ** significant at 5%; *** significant at 1%.

Table 12: Alternative Sample Selection and Clustering

Dep. Variable:	(1) Credit Op.	(2) GDP	(3) Emp.	(4) Hours	(5) Wages	(6) Firms	(7) Credit Op.	(8) GDP	(9) Emp.	(10) Hours	(11) Wages	(12) Firms	Localities
(1) Base Case	0.6623***	0.0574***	0.0191	0.0382***	0.0542***	0.0687***	0.1780***	0.0649***	0.0343**	0.0545***	0.1335***	0.0999***	2,601
	(0.0845)	(0.0081)	(0.0131)	(0.0144)	(0.0160)	(0.0061)	(0.0443)	(0.0109)	(0.0136)	(0.0139)	(0.0143)	(0.0104)	
(2) Base Case:	0.6623***	0.0574***	0.0191*	0.0382***	0.0542**	0.0687***	0.1780***	0.0649***	0.0343**	0.0545***	0.1335***	0.0999***	2.601
S.E. Clustered at State-Year	(0.1931)	(0.0140)	(0.0111)	(0.0141)	(0.0210)	(0.0135)	(0.0371)	(0.0139)	(0.0142)	(0.0155)	(0.0287)	(0.0125)	
(3) Trim by Credit	0.6391***	0.0584***	0.0187	0.0380***	0.0571***	0.0770***	0.2190***	0.0543***	0.0318***	0.0551***	0.1161***	0.0951***	2,445
	(0.0860)	(0.0085)	(0.0118)	(0.0136)	(0.0154)	(0.0061)	(0.0282)	(0.0110)	(0.0121)	(0.0138)	(0.0158)	(0.0073)	
(4) Trim by GDP	0.6044***	0.0633***	0.0255*	0.0453***	0.0630***	0.0706***	0.6315***	0.0562***	0.0404***	0.0635***	0.1168***	0.0912***	2,445
	(0.0838)	(0.0085)	(0.0135)	(0.0146)	(0.0163)	(0.0062)	(0.1036)	(0.0109)	(0.0146)	(0.0153)	(0.0173)	(0.0074)	
(5) Trim by Employment	0.6766***	0.0591***	0.0163	0.0352***	0.0507***	0.0694***	0.2543***	0.0577***	0.0281**	0.0509***	0.1049***	0.0878***	2,443
	(0.0911)	(0.0086)	(0.0122)	(0.0135)	(0.0155)	(0.0062)	(0.0338)	(0.0111)	(0.0138)	(0.0145)	(0.0167)	(0.0076)	
(6) Trim by Population	0.5843***	0.0639***	0.0269**	0.0478***	0.0650***	0.0663***	0.2680***	0.0655***	0.0406***	0.0642***	0.1179***	0.0879***	2,445
	(0.0840)	(0.0080)	(0.0137)	(0.0150)	(0.0166)	(0.0063)	(0.0362)	(0.0107)	(0.0144)	(0.0155)	(0.0176)	(0.0073)	
PostXControls	No	No	No	No	No	No	No	No	No	No	No	No	
Population Weighted	No	No	No	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	
(1) Base Case	0.6291***	0.0334***	0.0170	0.0309	0.0239	0.0225***	0.2450***	0.0334**	0.0196	0.0382	0.0389	0.0388***	2,601
	(0.0943)	(0.0096)	(0.0209)	(0.0208)	(0.0228)	(0.0069)	(0.0543)	(0.0147)	(0.0271)	(0.0247)	(0.0276)	(0.0122)	
(2) Base Case:	0.6291***	0.0334**	0.0170	0.0309*	0.0239	0.0225***	0.2450***	0.0334**	0.0196	0.0382**	0.0389	0.0388***	2.601
S.E. Clustered at State-Year	(0.1894)	(0.0129)	(0.0156)	(0.0185)	(0.0220)	(0.0076)	(0.0792)	(0.0135)	(0.0170)	(0.0182)	(0.0278)	(0.0106)	
(3) Trim by Credit	0.7268***	0.0277***	0.0081	0.0201	0.0149	0.0260***	0.3377***	0.0159	0.0067	0.0174	0.0179	0.0414***	2,445
	(0.1140)	(0.0102)	(0.0143)	(0.0163)	(0.0190)	(0.0070)	(0.0538)	(0.0137)	(0.0187)	(0.0187)	(0.0219)	(0.0104)	
(4) Trim by GDP	0.2457***	0.0359***	0.0240	0.0366*	0.0310	0.0215***	0.2787***	0.0247*	0.0259	0.0394	0.0309	0.0320***	2,445
	(0.0331)	(0.0100)	(0.0223)	(0.0218)	(0.0240)	(0.0071)	(0.0554)	(0.0130)	(0.0311)	(0.0278)	(0.0305)	(0.0110)	
(5) Trim by Employment	0.6816***	0.0328***	0.0164	0.0292	0.0186	0.0192***	0.2905***	0.0217	0.0180	0.0320	0.0197	0.0271**	2,443
	(0.1075)	(0.0101)	(0.0208)	(0.0205)	(0.0224)	(0.0070)	(0.0582)	(0.0140)	(0.0318)	(0.0281)	(0.0307)	(0.0109)	
(6) Trim by Population	0.6236***	0.0327***	0.0233	0.0379*	0.0300	0.0226***	0.2914***	0.0235*	0.0189	0.0361	0.0251	0.0262**	2,445
	(0.1037)	(0.0098)	(0.0223)	(0.0221)	(0.0242)	(0.0072)	(0.0587)	(0.0127)	(0.0310)	(0.0283)	(0.0310)	(0.0103)	
PostXControls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Population Weighted	No	No	No	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	

Notes: Robust standard errors in parentheses. Each cell reports the coefficient on postXgovbank from a different estimation. In Panel A, dependent variables are regressed on post and postXgovbank. Estimations reported in Panel B additionally include postXcontrols, where controls are urbanization, population, total income, and education, all for 2000, and total exports in 2005, the total number of bank branches in 2007, and the propensity score. All estimations include locality fixed effects and a linear time trend, and columns (7)-(12) include population-weighting. Standard errors are clustered at the locality level, except in row (2), where they are clustered at the state-year level. Rows (1) and (2) present the base-case results. Rows (3)-(6) present results trimming the sample by the top and bottom three percent of total credit, GDP, total employment, and total population, with standard errors clustered at the locality level. Govbank is the fraction of government-owned bank branches in a locality.
* significant at 10%; ** significant at 5%; *** significant at 1%.

Table 13: Productivity

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Dep. Variable:	TFP				Change in TFP		TFP				Change in TFP	
	TFP Calculated Using Labor=Total Employment						TFP Calculated Using Labor=Total Hours					
Panel A: Govbank=Frac. Branches Govt Owned												
Govbank					0.0142*	0.0235**					0.0149*	0.0241**
					(0.0075)	(0.0114)					(0.0076)	(0.0117)
Post	0.0065**	0.0158***	-0.0065	0.0204***			0.0053	0.0146***	-0.0086*	0.0198***		
	(0.0033)	(0.0037)	(0.0051)	(0.0044)			(0.0033)	(0.0037)	(0.0050)	(0.0046)		
PostXGovbank	0.0247***	0.0072	0.0341***	0.0036			0.0265***	0.0089	0.0375***	0.0050		
	(0.0042)	(0.0055)	(0.0057)	(0.0070)			(0.0043)	(0.0055)	(0.0058)	(0.0071)		
Panel B: Govbank=High Govt Bank Dummy												
Govbank					0.0074	0.0084					0.0081	0.0098
					(0.0052)	(0.0068)					(0.0053)	(0.0068)
Post	0.0102***	0.0188***	0.0021	0.0230***			0.0092***	0.0178***	0.0005	0.0214***		
	(0.0027)	(0.0031)	(0.0042)	(0.0032)			(0.0028)	(0.0031)	(0.0042)	(0.0037)		
PostXGovbank	0.0168***	0.0014	0.0171***	-0.0012			0.0182***	0.0028	0.0200***	0.0020		
	(0.0029)	(0.0040)	(0.0035)	(0.0037)			(0.0029)	(0.0040)	(0.0036)	(0.0042)		
For both panels:												
PostXControls		x		x				x		x		
Locality Fixed Effects	x	x	x	x			x	x	x	x		
Population Weighted			x	x		x			x	x		x
Observations	26,010	26,010	26,010	26,010	2,601	2,601	26,010	26,010	26,010	26,010	2,601	2,601
Number of Localities	2,601	2,601	2,601	2,601	2,601	2,601	2,601	2,601	2,601	2,601	2,601	2,601

Notes: Robust standard errors, clustered at the locality level, in parentheses. Results are shown from regressing yearly Solow residuals on post, postXgovbank, and depending on the specification, on postXcontrols, where controls include urbanization, population, total income, and education, all for 2000, and total exports in 2005, the total number of bank branches in 2007, and the propensity score. The Solow residual is alternately calculated using total employment (columns (1)-(6)) or total hours (columns (7)-(12)) as a measure of labor. Estimations reported in columns (1)-(4) and (7)-(10) include locality fixed effects, and columns (3), (4), (6), (9), (10), and (12) are population-weighted. Columns (5), (6), (11), and (12) show results from regressing the 2007-2009 change in the Solow residual on govbank. In Panel A, govbank is the fraction of total bank branches in a locality that is government-owned, and in Panel B, govbank is a dummy equal to 1 if the fraction of government-owned bank branches is above the median for all localities.

* significant at 10%; ** significant at 5%; *** significant at 1%

Appendix A: Propensity Score [Online Publication Only]

This appendix provides information for the propensity score matching. The propensity to have more than the median share of government-owned bank branches is calculated using the following locality characteristics taken from 2000 census data: 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. The results of the logit estimation are shown in Table A1. Localities are stratified into 18 propensity blocks. Within each propensity score block, we cannot reject at the 5% significance level that at least 95% of the covariates are statistically indistinguishable across localities. Figure A1 shows the overlap in the box plots of the estimated propensity scores for localities above and below the median share of government-owned bank branches.

Figure A1: Box Plot of Estimated Propensity Scores for Localities with High (1) and Low (0) Shares of Government-Owned Bank Branches

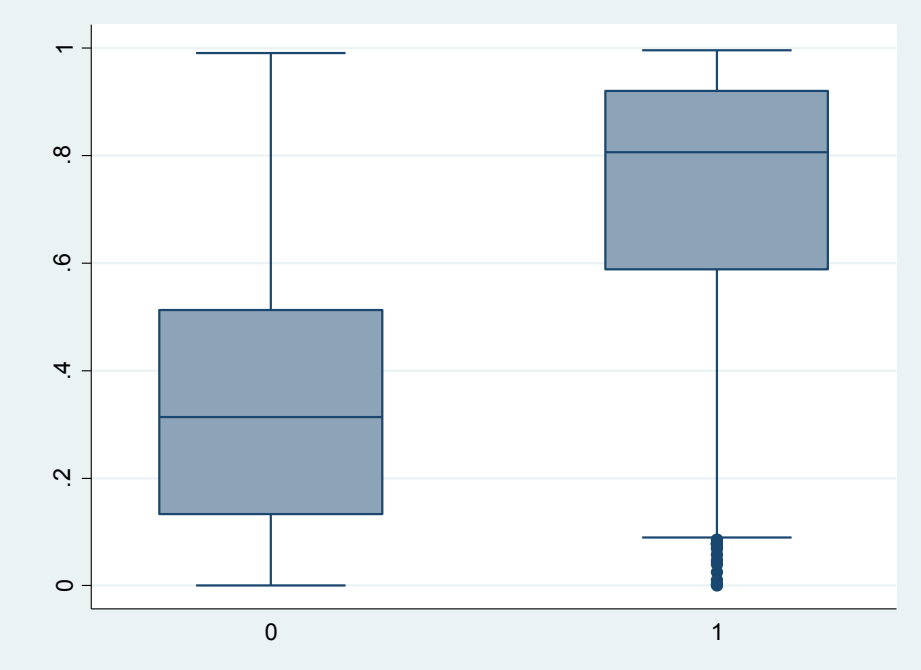


Table A1: Estimation of Propensity Scores

Years of Schooling	1.0434***
	(0.2258)
Urbanization	18.5914***
	(3.7240)
Ln(Population)	6.7971***
	(1.4356)
Ln(GDP)	6.9334***
	(1.2559)
Ln(Total Employment)	-0.2015
	(1.2783)
Ln(Human Capital)	-4.3854***
	(0.9187)
Income per Capita	0.0355***
	(0.0043)
Illiteracy Rate	0.1205***
	(0.0159)
Ln(GDP)XLn(Population)	-0.3832***
	(0.1342)
Ln(GDP)XLn(Total Employment)	-0.4279***
	(0.0819)
Ln(Total Employment)XLn(Population)	0.4883***
	(0.1321)
Ln(Population)XUrbanization	-1.3643***
	(0.3816)
Income per CapitaXUrbanization	-0.0439***
	(0.0045)
Income per CapitaXIlliteracy Rate	-0.0004***
	(0.0001)
Number of Localities	2601
Pseudo R-squared	0.33

Notes: Standard errors in parentheses. Estimation is based on a logit of the propensity of a locality to have above the median share of government-owned bank branches. All regressors are for 2000.

* significant at 10%; ** significant at 5%; *** significant at 1%