Policy Research Working Paper 8952

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WORLD BANK GROUP
Development Economics
Development Research Group
July 2019

Policy Research Working Paper 8952

Abstract

A common strategy to improve access to credit and mitigate the effects from large financial shocks is to channel public funds to firms via private banks at regulated interest rates. Using comprehensive loan-level data from Brazil, the authors study how government loan subsidies are transmitted (or not) to targeted firms when banks exert market power. They conjecture that banks with greater market power circumvent the interest rate ceiling by increasing the price of other products to firms that receive subsidized loans. The results of this analysis have important policy implications for the design and effectiveness of government interventions in credit markets.

This paper is a product of the Development Research Group, Development Economics. It is part of a larger effort by the World Bank to provide open access to its research and make a contribution to development policy discussions around the world. Policy Research Working Papers are also posted on the Web at http://www.worldbank.org/prwp. The authors may be contacted at apedrazamorales@worldbank.org and cruizortega@worldbank.org.

Market Power and the Transmission of Loan Subsidies

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Originally published in the Policy Research Working Paper Series on *July 2019*. This version is updated on *May 2023*.

To obtain the originally published version, please email prwp@worldbank.org.

JEL Classification: G21, H81, E43
Keywords: bank lending, government credit programs, credit risk, cross-selling strategies

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This project is supported by the Finance, Competitiveness and Innovation Global Practice and the Brazil Country Management Unit of the World Bank. This work should not be reported as representing the views of the Banco Central do Brasil. The views expressed in the paper are those of the authors and do not necessarily reflect those of the Banco Central do Brasil, the International Bank for Reconstruction and Development/World Bank and its affiliated organizations, or those of the Executive Directors of the World Bank or the governments they represent. An earlier version of this paper was entitled "Winners and Losers When Private Banks Distribute Government Loans: Evidence from Earmarked Credit in Brazil".

1. Introduction

A commonly held view about the effectiveness of government credit argues that, when led by state-owned banks, these programs may fail to fulfill their social role due to incentive problems inherent to the public sector (Claessens et al. 2008).[5] Alternatives to direct government lending include interventions that use public funds but rely on private banks to allocate credit.[6] For example, national development banks or state agencies may provide funding for loans to strategic sectors or during periods of credit supply contraction. This credit is intermediated by private lenders, who price, disburse, and service the loans, ultimately bearing the credit risk. The rationale for government intervention is that under perfect competition, banks price loans at average cost, and a reduction of funding costs is expected to lower the borrowing cost for targeted firms. However, if lenders have market power, when the government reduces the funding cost, the transmission to firms might be significantly weaker, as banks might only partially reduce the interest rate to final borrowers.

In this paper, we aim to study how government-sponsored loan subsidies are transmitted (or not) to targeted firms when banks exert market power. Understanding frictions associated with such transmission is crucial for policy design. Moreover, despite the ubiquity of government-driven credit around the world, little is known about its impact on the strategies of private lenders and on its effectiveness when banks have market power.

Our analysis is based on *Earmarked Credit* for firms in Brazil, a government-sponsored program designed to stimulate investment and capital expenditures (detailed in Section 2). Importantly, a large portion of the funds for earmarked credit are transferred from the Brazilian National Development Bank to private banks that then select loan recipients. Earmarked loans complement the usual market for commercial credit, which is not earmarked and is domestically known as *free-market credit*.[7] As is common in these programs, the government's strategy to reduce the interest rate for the final borrower is to regulate such rates, that is, impose interest rate ceilings or require that banks use the subsidized program to only charge rates within certain ranges.

We develop our hypothesis as follows. If a bank could fully adjust the pricing of an earmarked loan, the transmission of funding cost into the final borrowing cost would be perfectly captured by the interest rate of the loan. However, if a lender cannot fully adjust this rate –because of rules on the rates for earmarked credit–, a bank with market power might get around such rules

[5] For example, the political view of public banking assumes politicians have career concerns that conflict with social objectives (Sapienza 2004; Dinc 2005; Khwaja and Mian 2005; Dinc and Gupta 2011; Carvalho 2014).

[6] One example comes from the recent COVID-19 crisis, where governments moved swiftly to provide liquidity to small businesses. In the United States, through the CARES Act Paycheck Protection Program, the government established a 350 billion USD fund of partially forgivable loans. Private banks intermediate the financial assistance application process, screening, disbursement, and loan servicing. Developing countries have also introduced or strengthened similar credit programs that leverage the private financial sector to provide funds to many small and medium-sized enterprises (IMF 2020).

[7] Throughout the paper, we use non-earmarked and free-market credit interchangeably to refer to loans that are not part of the government program—that is, loans issued by banks without special funding or directive from the government.

by increasing the borrowing cost in other loans to the same client.[8] In other words, lenders with market power would offer borrowers subsidized loans together with other more expensive loans that partially offset some of the discounts on the subsidized credit. In this context, the transmission of the subsidy to the final borrower has to be studied in terms of its effects on the total cost of credit (i.e., interest rates on both earmarked and non-earmarked loans). We argue that such cross-product pricing strategies should be present whenever the bank cannot fully adjust the interest rate of the earmarked loan, that is, when the interest rate ceiling is binding as is the case for riskier borrowers. Furthermore, these price adjustments should be more pronounced if banks have more market power, for example, in less competitive lending markets or for firms that are less likely to switch between lenders.

We use administrative loan-level data from the Brazilian Central Bank credit registry, which includes the universe of (free-market) working capital loans issued to close to nine hundred thousand firms by 127 private banks between 2005 and 2016. Financing of working capital accounts for 44% of the total outstanding volume of private credit to businesses in the free market. We further augment our data by including information (e.g., originating bank, date, and credit type) on all earmarked loans received during the period for each firm in the sample. In all, this unique data set allows us to analyze how banks allocate earmarked loans across firms and how the government program may impact credit terms on their new free-market loans.

We document a novel cross-selling strategy whereby banks "bundle" government-sponsored loans with privately funded short-term credit. We show that when a bank issues a government loan, it increases the interest rate of non-earmarked loans to the same borrower –on average a 0.34 percentage points (pp) increase in the interest rate of working capital loans disbursed together or after the earmarked loan (i.e., a 1.3 percent increase of the average interest rate in our sample). Notably, there is substantial heterogeneity in banks' strategies. These bundles of earmarked and non-earmarked loans are more likely among riskier borrowers, and the price adjustment of the non-earmarked loan is exclusive to riskier clients, with interest rates increasing by 1.08 pp. Consistent with our hypothesis on the role of market power, we find that in geographical locations where the banking industry is more concentrated, the price increase is more pronounced, with borrowers paying an additional 1.47 pp in their non-earmarked loans.

There are some major challenges to test our hypothesis. For example, firms that apply for and receive earmarked loans are likely to differ from nonrecipient firms. Among recipients, the willingness to obtain loans in bundles might be a signal of project riskiness. To address these concerns, we proceed as follows. First, we saturate our empirical specifications with a series of fixed effects at the bank-year and firm-bank level that allow us to isolate variation in the data in different ways. For instance, the inclusion of firm-bank fixed effects allows us to exploit variation in the interest rates on all working capital loans of the same firm-bank pair over time and examine how these rates change after the pair starts an earmarked credit relationship. To more cleanly reduce the selection problem, we further restrict the sample to recipient firms—those that at some point receive an earmarked loan—and examine how the credit terms of these firms change after they obtain this loan. Consistently, our impact estimates remain similar throughout our different specifications.

[8] It is well-established that banks derive multiple benefits from their lending relationships, such as enhanced sales in other products (Petersen and Rajan 1994; Kanatas and Qi 2003; Bharath et al. 2007).

We also examine two alternative hypotheses that might explain the documented price increase in working capital credit. One possibility is that when banks issue an earmarked loan to a firm, they increase the cost of other loans to the same borrower to limit their total exposure, especially if the client is riskier –the *credit reallocation* channel. Relatedly, if firm leverage increases due to the government lending program, banks might adjust the risk assessment and pricing of new loans to these borrowers. To test these alternative mechanisms, we study the loan volume and loan provisions for new working capital loans to borrowers. We do not observe a consistent reduction in the lending volume to riskier firms headquartered in regions where the banking sector is more concentrated; there is in fact some suggestive evidence that the size of working capital loans to these firms increases. Similarly, while banks raise the loan provisions for firms that obtain earmarked credit, there are no substantial differences in the cross-section. That is, banks do not change the provisions for firms that are ex-ante riskier, or for those located in areas where lenders possess more market power. Overall, the evidence is mostly consistent with a cross-product pricing channel, rather than a credit reallocation or credit risk explanation.

The extent of the documented price markups appears to suggest that the transmission mechanism from the subsidized funding to borrowing costs is largely weakened when banks have higher market power. Our evidence also highlights the limits of policies attempting to reduce firms' borrowing costs using subsidies, even when the government directly tries to regulate the final rate set by lenders.

Our project aims to contribute to three strands of the literature. The first is the literature that examines the competitiveness of the banking industry and its effect on the supply of credit. The traditional *market power view* suggests that less competitive lending markets are associated with less credit availability and higher prices (e.g., Hannan & Berger, 1991; Berger et al., 2004). An alternative view argues that the impact of competition on credit may be related to the level of asymmetric information in the market (Petersen & Rajan, 1995; Einav et al., 2012; Lester et al., 2019). For example, Crawford et al. (2018) show that banks' market power can mitigate the negative effects from increases in adverse selection. While this literature has largely focused on the supply of credit under different market structures, we look at a less studied area of credit markets, namely, the effectiveness of government programs when lending markets are more or less competitive. Overall, our analysis illustrates how banks' market power can alter the transmission of subsidies to the end recipients of these programs.

The second is the literature that studies the nature and benefits of lending relationships. Bharath et al. (2007) examine the impact of a lending relationship on the ability to win future loan business.[9] Ioannidou and Ongena (2010) find a dynamic pattern of bank loan conditions consistent with the idea that banks first offer loans at low interest rates to attract new clients and later increase their prices. We contribute to this literature by studying how pricing strategies connect across products. Once we analyze the bundles of earmarked and non-earmarked loans together, the transmission of the subsidy to the final borrower is much weaker. Here, the borrower still benefits from the offered credit, but could benefit significantly more from the subsidized loan in isolation without other compensations required by the private lender. Notably, such documented cross-

[9] Drucker and Puri (2005), Yasuda (2005), and Ljungqvit et al. (2006) report that prior lending relationships are associated with a higher probability of winning future investment banking business, especially for debt underwriting.

product pricing strategies are more pronounced in lending markets and for firms for which banks can exert more market power.

Finally, we contribute to the literature that studies government-driven lending. A large body of empirical work examines whether government credit crowds in or out credit by private lenders, and whether public lending promotes financial development and growth (King and Levine 1993; Demirgüç-Kunt and Maksimovic 1998; Rajan and Zingales 1998). These earlier studies explored the aggregate effects of government credit, but more recent work relies on rich firm- and loan-level data from government-owned banks to evaluate real effects (Carvalho 2014; Ru 2017). An important yet overlooked question is related to the role of private banks as intermediaries of government loans. In Brazil, private commercial banks disburse up to 40% of government-sponsored loans. We use detailed loan-level data to provide comprehensive analysis on the allocation of credit and pricing strategies of private banks participating in the government-sponsored lending program. Our evidence that banks engage in cross-selling strategies suggests that the design of government programs should consider the credit market structure. For example, banks might prioritize larger firms due to the potential added sales in nonlending products (e.g., investment banking services, deposit-related products, etc.). Whether an excessive focus on large firms is a desirable outcome depends on the policy objectives, but such behavior might arise naturally as banks react by spreading the cost of lending over multiple products.

The rest of the paper is organized as follows. Section 2 describes the institutional background and data. We derive our hypotheses in Section 3 and present our empirical methodology in Section 4. Section 5 documents the findings. In Section 6, we present additional evidence that provides further support for the cross-product pricing hypothesis. We conclude in Section 7.

2. Institutional Background and Data

In this section, we describe the main features of the Brazilian credit market and describe our comprehensive dataset of loans to firms.

2.1. Brazil's Credit Market

The credit market of Brazil is characterized by an extensive presence of government-driven lending. Public interventions include a complex web of price and quantity regulations, reserve requirements, tax exemptions, and forced savings schemes to target credit to specific projects. Lending directed by these initiatives is known as earmarked credit. Earmarked loans in Brazil complement the usual market for credit provided by commercial banks. Over the years, earmarked lending has grown substantially, exceeding 50% of total credit by 2015. Earmarked credit has been used as a policy response to alleviate credit constraints and promote access to credit among individuals and firms, including micro, small, and medium-sized businesses.

Earmarked credit to firms is largely directed to finance specific projects that include fixed investments, infrastructure, development projects, and rural activities.[10] Among all the earmarked loans issued to firms between 2005 and 2016, 88% financed fixed-asset purchases such as new

[10] Earmarked credit to households mostly targets real estate financing.

machinery. While large firms usually obtain earmarked loans directly from the National Development Bank (BNDES), earmarked loans to medium and small firms are indirectly allocated through other financial institutions. By 2016, nearly 40% of the outstanding indirect earmarked loans to firms was originated by private banks. In their role as intermediators of earmarked loans, private banks screen and select loan applicants, price, disburse, and service the loans, and ultimately bear the credit risk.

In terms of pricing, earmarked loans are characterized by interest rate ceilings that vary across earmarked programs and are regulated by the government. Although the funding of earmarked loans comes from government sources at rates below the interbank market, private banks can add an interest rate spread to cope with credit losses as long as the final interest rate is below the interest rate ceiling. Due to these ceilings, interest rates of earmarked loans are not only substantially lower than those of free-market loans, but also below the monetary policy rate (i.e., the SELIC rate), and in some cases below inflation rates (see Appendix Figure A1).

2.2. Data

Our analysis relies on two large data sources of corporate loan contracts in the Credit Registry maintained by the Central Bank of Brazil for the period between January 2005 and December 2016.

The first data set comprises all working capital loans above a 5,000 *reais* threshold (approximately 2,200 USD) that were originated by all private banks during the period. For each loan, we observe the contracted interest rate, the loan amount, its maturity, collateral, and risk rating.[11] The data set also reports information about the borrower, including its industry (at the 2-digit CNAE level), location (at the 2-digit zip code level), number of workers, and the number of years with a relationship with the bank. There are two advantages of studying the universe of working capital loans. First, working capital is the main non-earmarked credit product of firms in Brazil, representing 44% of non-earmarked total outstanding loans. Second, working capital financing is almost exclusively accessed through the free market, as it accounts for a negligible share of earmarked loans (only 0.3%). Thus, the pricing of a working capital loan is decided by the issuing bank and is not subject to interest rate caps.

Our second data set includes information on the origination of earmarked loans for every firm-bank pair in our sample. Each record includes the date and credit type of all earmarked loans originated in the country. Two patterns emerge from the earmarked credit data. First, the relationship of earmarked credit between a lender and its borrowers is highly persistent. More precisely, 92% of the firms that obtain their first earmarked credit and receive consecutive earmarked loans will use the same bank. Second, firms that receive earmarked loans obtain these loans on a frequent basis. The median time between consecutive earmarked loans in the data is nine months. Based on these patterns, we create an indicator variable, *Earmark*, that records when an earmarked credit relationship starts between a firm-bank pair.

[11] Each rating is associated with a minimum loan accounting provision, which is an estimate of the probability of default. The possible ratings are AA, A, B, C, D, E, F, G, H. However, we exclude from our sample all ratings below E, which account for less than 1% of the observations and are loans associated with evergreening processes.

To examine how the credit terms in free-market loans change after a borrower obtains an earmarked credit, we restrict the sample to recipient firms—those that at some point of our sample period receive an earmarked loan for the first time. The summary statistics of our sample are displayed in Table 1-Panel A.[12] Our final data set contains 397,427 working capital loans to 67,000 recipient firms issued by 35 private commercial banks. The average annual interest rate spread of working capital loans is 27%. We calculate interest rate spreads as the difference between the loan interest rate and the Treasury yield for the same maturity. The average size of working capital loans is 66,836 reais (~29,200 USD), with an average provision rate of 1.75% and an average maturity of 16 months. Of all working capital loans, 79% are backed up by collateral.

3. Hypotheses

In this section, we examine a series of hypotheses that explain why banks might adjust the interest rate of working capital loans after issuing an earmarked loan.

3.1. Cross product pricing

If banks can fully adjust the pricing of earmarked credit, the transmission of funding costs into final borrowing costs would be entirely captured by the contracted interest rates of earmarked loans. However, when the interest rate of these loans is capped by regulation, banks would only issue earmarked loans to firms for which the interest rate spread –the difference between the rate ceiling and the funding cost– is enough to cover for the firm's default risk and for other intermediation costs. Conversely, banks would refrain from allocating earmarked credit to riskier firms, those for which the interest rate ceiling is binding.

An alternative to excluding riskier borrowers from earmarked credit is to use cross-product pricing strategies. For instance, when the capped interest rate of an earmarked loan does not compensate the bank for its risk taking, the lender might issue the earmarked loan to the borrower but may adjust the price of other products to the same borrower to generate additional revenue. In this case, the bank issues an earmarked loan to a risky firm at the maximum allowed rate but increases the price of other loans or services to its client. Here, firms benefit because they obtained earmarked credit at low rates but pay a premium for other bank products. Since our sample of non-earmarked credit covers the universe of working capital loans, we hypothesize that the contracted interest rate for these loans is higher after firms receive an earmarked loan from their lender. Formally stated:

Hypothesis 1. *Banks charge higher interest rates for working capital loans after issuing an earmarked loan to the same client.*

Hypothesis 1 implies that in the presence of earmarked credit, the interest rate of new working capital loans increases for the average borrower. In the cross-section, the pricing mark-up should be more pronounced for high-risk firms, those for which the interest rate ceiling is more likely to be binding in the first place. In turn, our second hypothesis is:

Hypothesis 2. *The increase in the interest rate of working capital loans is more pronounced for riskier borrowers.*

[12] Table A1 in the Appendix lists definitions of all the variables.

The extent to which banks are able to adjust the pricing of non-earmarked products depends on their market power. For example, if a firm is located in a competitive lending market, the bank would not be able to unilaterally increase the price of a new loan beyond its marginal cost, because the firm would easily switch lenders. In contrast, if only a small number of lenders supply earmarked credit, a bank could increase the price of non-earmarked loans without the threat of firms switching lenders. Since borrowers benefit from subsidized loans, they might be willing to pay the mark-up in other products contracted with the bank. The most basic source of variation in our setting are differences across markets. If banking concentration at the geographical location of the firm is a good proxy for banks' market power (Canales and Nanda, 2012; Crawford et al., 2018), we argue that the increase in the cross-product pricing strategy should be more pronounced where the lending market is highly concentrated. We formalize our hypothesis in terms of market power as follows:

Hypothesis 3. *The increase in the interest rate of working capital loans to a recipient of an earmarked loan is more pronounced in locations where the banking industry is more concentrated.*

From Hypotheses 2 and 3, it then follows that the increase in the cost of non-earmarked products should be greater for riskier firms that obtain an earmarked loan and are headquartered in locations with a more concentrated banking sector. An implication from the derived hypotheses in this section is that banks, particularly those with greater market power, will tend to bundle earmarked loans with non-earmarked products (e.g., working capital loans) to facilitate the cross-product pricing strategies for riskier firms.

3.2. Credit reallocation

A related explanation is that if banks increase one type of lending to a firm (e.g., subsidized long-term loans), they might want to limit their total exposure to the borrower, reducing the volume of free-market credit (e.g., working capital), particularly for firms with higher levels of risk. This credit reallocation –away from short-term and into long-term lending– can be achieved by increasing the price of working capital loans after firms receive earmarked credit. In competitive credit markets, borrowers can obtain working capital loans from other lenders and offset the price increase of short-term credit. On the contrary, when lenders have market power, borrowers are less able to obtain working capital loans from alternative sources and firms might experience more tightening conditions in short-term credit.

The credit reallocation mechanism can also rationalize an effect on the pricing of working capital loans that is stronger: (i) for riskier borrowers and (ii) when lenders have market power. This would be in line with Hypotheses 1, 2 and 3 above. Importantly, the credit reallocation channel also implies that when banks issue earmarked credit, they would simultaneously reduce their lending volume in other credit products. We formally state the hypothesis as follows:

Hypothesis 4: *Banks reduce the volume of working capital loans after issuing an earmarked loan to the same client, with the reduction being more pronounced for riskier firms located where the banking industry is more concentrated.*

3.3. Credit risk

One alternative channel is that as firms obtain more government-sponsored credit, they become riskier due to their higher leverage. In turn, banks increase the price of free-market loans after they issue an earmarked loan. While this mechanism is in line with Hypotheses 1 and 2, there is an important distinction to be made. In the cross-product pricing hypothesis, only the bank issuing an earmarked loan is expected to increase the price of free-market credit to the firm. Other lenders of the same firm are not expected to adjust the price and quantities of working capital loans. Conversely, if earmarked credit signals higher firm risk, both the bank issuing the earmarked loan and other banks would increase the interest rate in new working capital loans to the firm.[13]

While the credit risk channel does not explicitly generate testable implications based on the banks' market power, it is possible that riskier firms are precisely located in areas where the banking sector is more concentrated. Consequently, there would be a mechanical relation between the increase in earmarked credit and the interest rate of working capital loans in places where lenders have more marker power (a composition effect). If the price change in working capital loans is related to changes in firm risk, banks should adjust their provision rates precisely for firms and in loans where they are increasing the interest rate. Formally stated:

Hypothesis 5: *After issuing an earmarked loan, banks increase the provision rate of working capital loans to the same client, and the increase is more pronounced for riskier firms located where the banking industry is more concentrated.*

To summarize, price mark-ups in working capital loans for (i) riskier firms and (ii) among banks with higher market power are broadly in line with cross-product pricing strategies. While the credit reallocation and credit risk channels might also explain these outcomes, such alternative hypotheses generate additional predictions. For instance, under the credit reallocation channel, we would expect to observe a simultaneous decline in working capital loan volume to recipients of earmarked loans; a behavior that should be more pronounced for riskier firms and banks with market power. In the case of credit risk, we would expect to observe an increase in loan provisions, precisely for firms that pay the highest mark-ups in new working capital loans.

4. Empirical Methodology

4.1. Test of cross-product pricing strategies (Hypothesis 1)

We first examine whether banks adjust the pricing of non-earmarked products after a borrower receives an earmarked loan. The empirical specification is summarized as follows:

$$y_{lfbt} = \alpha_0 + \alpha_1 Earmark_{fbt} + X_{lfbt} + \gamma_{bt} + \gamma_{fb} + u_{lfbt} \qquad (1)$$

In Equation (1), y_{lfbt} denotes the interest rate spread of a working capital loan *l* issued at month *t* to firm *f* by bank *b*. We introduce the variable $Earmark_{fbt}$ to capture the start of an earmarked credit relationship of a firm-bank pair. This indicator variable equals one after the first earmarked loan is issued to firm *f* by bank *b* and zero otherwise. Thus, our test of Hypothesis 1 is

[13] In Brazil, information sharing through the credit registry helps banks distinguish loan applicants with earmarked loans; hence, it is expected that all banks internalize this information and price new free-market loans accordingly.

given by α_1. More concretely, $\alpha_1 > 0$ would indicate that the interest rate spread on working capital loan *l* issued to firm *f* by bank *b* increases after the pair initiates an earmarked relationship.[14]

4.2. Test of cross-product pricing strategies by borrowers' risk (Hypothesis 2)

We examine whether the price increase of working capital loans is more pronounced for riskier borrowers. To do so, we compare the changes in the interest rate of working capital loans after the start of an earmarked relationship across recipient firms with different ex-ante risk. Ex-ante credit risk is measured by the average risk ratings assigned by banks to all new loans issued to a firm in the year prior to obtaining its first earmarked credit. The variable $Risk_{ft}$ is an indicator variable that equals one for recipient firms that one year prior to their earmarked relationship had average ratings below the median and zero otherwise. We augment the baseline specification as follows:

$$y_{lfbt} = \beta_0 + \beta_1 Earmark_{fbt} + \beta_2 Earmark_{fbt} \times Risk_{ft} + \beta_3 Risk_{ft} + X_{lfbt} + \gamma_{bt} + \gamma_{fb} + u_{lfbt} \quad (2)$$

The coefficient of the interaction term $Earmark_{fbt} \times Risk_{ft}$ captures if the adjustment in interest rates of working capital loans differs across ex-ante low- and high-risk borrowers.

4.3. Test of cross-product pricing strategies by banks' market power (Hypothesis 3)

Our last hypothesis predicts that banks are more likely to adjust the price of non-earmarked loans when they exert greater market power. To test this hypothesis, we further augment our baseline specification by including interaction terms between market power (MP) with the firm's ex-ante risk and whether it received an earmarked credit. The full model is:

$$y_{lfbt} = \delta_0 + \delta_1 Earmark_{fbt} + \delta_2 Earmark_{fbt} \times Risk_{ft} + \delta_3 Earmark_{fbt} \times MP_{ft} + \delta_4 Earmark_{fbt} \times Risk_{ft} \times MP_{ft} + \delta_5 Risk_{ft} \times MP_{ft} + \delta_6 Risk_{ft} + X_{lfbt} + \gamma_{bt} + \gamma_{fb} + u_{lfbt} \quad (3)$$

We proxy for market power using the concentration of the banking sector at the location where the firm is headquartered. In this case, MP_{ft} is an indicator variable that classifies firms according to the banking concentration of their 2-digit ZIP codes measured by the Herfindahl Index. More precisely, MP_{ft} is equal to one for firms headquartered in locations where the banking concentration is above the median and zero otherwise.

In Equation (3), the coefficients δ_3 and δ_4 capture the role of market power in our setting. For instance, a positive δ_4 would indicate that the price increase of new working capital loans is more pronounced for riskier clients of lenders with more market power.

4.4. Credit reallocation and credit risk

[14] The specification includes a series of controls X_{lfbt} (e.g., loan volume, loan maturity) as well as fixed effects at the bank*month (γ_{bt}) and firm*bank (γ_{fb}) level. To rule out that our results are driven by changes in the demand for credit of firms once they start an earmarked relationship, we saturate our specifications with fixed effects that control for time-varying changes in credit demand (location*sector*month, firm*year and firm*quarter level).

To test the credit reallocation and credit risk channels, we estimate equations (1)-(3) using as dependent variable: (i) the volume of working capital loans and (ii) the provision rate of each working capital loan. Examining credit volumes helps us test whether banks increase interest rate spreads to restrict their supply of free-market credit to firms receiving earmarked loans. More precisely, we test whether credit reallocation is more pronounced for riskier firms located in areas where the banking sector is more concentrated (Hypothesis 4). Similarly, we use the provision rate to test if the increase in interest rate spreads is related to a deterioration of the creditworthiness of firms once they obtain earmarked credit (Hypothesis 5).

5. Results

5.1. Test of Hypothesis 1

Columns 1 to 3 in Table 2 display the results from estimating Equation (1) on the interest rate spreads of working capital loans. In column 1, the coefficient α_1 indicates that once a firm starts an earmarked credit relationship with a bank, it experiences an increase of 0.34 pp in the average interest rate spread on working capital loans issued by that bank (i.e., a 1.3 percent increase). As estimates in columns 2 and 3 show, this effect is robust after exhaustively controlling for time-varying changes in the demand of credit (proxied by the inclusion of fixed effects at the location*sector*month and firm*year level). These results are consistent with the prediction in Hypothesis 1 that earmarked credit triggers banks to increase the pricing in other loans. That is, recipients of earmarked credit start to pay higher interest rate spreads on their working capital loans after they begin an earmarked credit relationship with a bank.

5.2. Test of Hypothesis 2

We present the estimates of Equation (2) on interest rate spreads in columns 1 to 3 of Table 3. Across all specifications, which already control for changes in the demand of credit over time, there is an economically large and statistically significant increase in the pricing of working capital loans after high-risk firms start an earmarked credit relationship with their lenders. For example, estimates in column 1 indicate that after a high-risk borrower starts an earmarked credit relationship with a bank, the interest rate spread on future working capital loans issued by that bank increases in 1.08 pp (i.e., [0.70] + [0.38], which corresponds to a 3.8 percent increase). In contrast, the adjustment in spreads of working capital loans to low-risk firms is not only substantially lower in magnitude but also statistically insignificant in columns 2 and 3. To the extent that the interest rate ceiling is less likely to be binding for these firms, the earmarked loan rate might fully cover the cost of credit to the bank, and in turn, cross-product pricing is less prominent. This preliminary evidence is consistent with Hypothesis 2, as banks that issue earmarked loans to *risky* firms appear to increase the interest rate of new working capital loans to these borrowers.

5.3. Test of Hypothesis 3

In columns 4 to 6 of Table 3, we present the estimates of Equation (3). The estimated coefficient δ_4 is economically large and statistically significant. The evidence indicates that high-risk borrowers in regions where banks have more market power experience larger increases in the interest rate of working capital loans once they receive an earmarked loan. From column 4, we can

read the magnitude of the effect as follows: after receiving an earmarked loan, riskier firms located in areas where the banking sector is more concentrated pay an additional 1.47 pp for new working capital loans (i.e., [0.47] + [0.60] + [0.40], which is an increase of 5.2 percent relative to the unconditional mean).

5.4. Credit reallocation and credit risk

In columns 4 to 6 of Table 2, we summarize the results of Equation (1) using as dependent variable the log volume of working capital loans. The estimates suggest that starting an earmarked relationship with a bank does not lead to a contraction in the volume of working capital loans issued by that bank. This preliminary evidence is not consistent with the credit reallocation hypothesis, as the average firm appears to obtain working capital loans of similar or slightly larger volumes at a higher price after its earmarked relationship starts.

In Table 4, we display the estimates of Equations (2) and (3) exploiting the cross-section of firms. Overall, we find that the credit reallocation hypothesis does not consistently explain the increase in the price of working capital loans experienced by certain borrowers after the start of their earmarked relationships. First, we find that loan volume adjustments are not robust across specifications –depending on the time-varying controls, loan volumes of ex-ante riskier firms remain unchanged, decrease, or even increase after the start of their earmarked relationship. Second, even in specifications where loan volumes decline, the effect is similar for borrowers in areas with varying banking concentration. That is, the contraction in loan volume does not coincide with the documented increase in spreads across different groups of firms and lenders.

Table 5 also rules out the credit risk hypothesis. This table presents the estimates of Equations (2) and (3) using the provision rate of working capital loans as dependent variable. Once an earmarked relationship starts, there is an increase in the provision rates for newly issued working capital loans to the same firm – the coefficient of $Earmark_{fbt}$ is positive and statistically significant. This is consistent with the view that increased leverage is associated with higher credit risk. However, we do not find any differences in the provisions for new loans among firms that are ex-ante riskier, or those located in more concentrated lending markets. That is, while interest rates of new working capital loans increase for riskier firms located in more concentrated lending markets, the provision rates for these loans do not adjust differentially.

5.5. Alternative measure of credit risk

If banks use cross-product pricing strategies, the interest rate adjustment in working capital loans should be stronger for firms paying earmarked rates precisely at the regulatory cap. So far, we use the ratings of working capital credit 12 months prior to an earmarked loan to identify firms that are ex-ante riskier, for which the interest rate ceiling is presumably binding. Unfortunately, there is no consolidated information on the interest rate cap of each earmarked program. At a given point in time, even a single firm might face different interest rate ceilings from the same bank if it obtains earmarked loans from different government programs (subject to varying regulations). Thus, absent information on the interest rate cap of each program, there is no direct way to determine the exact cases for which the ceiling is binding.

As an alternative measure of firm risk, we use the rating of the first earmarked loan issued to each firm f.[15] We classify firm risk as an indicator variable that equals one for firms with earmarked rating below the median in that month and zero otherwise. The results are presented in Table A2 in the Appendix. Overall, we confirm that riskier firms operating in regions where the banking sector is more concentrated experienced larger increases in the price of new working capital loans. These firms pay an additional 1.84 pp in the interest rate of working capital loans, which correspond to a 6.5 percent increase relative to the mean.

5.6. Alternative measure of market power

In the analysis, we refer interchangeably to market power and market concentration. That is, we identify regions where the banking industry concentration, measured by the Herfindahl Index at the 2-digit zip code, is above the median of that year. To the extent that a small number of large banks dominate these markets, they might have more power to set prices. As a robustness check, we run our baseline specifications using two alternative measures of market power and confirm that our results remain unchanged.

The first measure corresponds to the banks' Lerner Index, which captures the lender's ability to set prices above its marginal costs (Bikker & Haaf 2002). As the Lerner Index uses aggregate bank balance sheet data, one limitation in our set up is that this measure is calculated at the bank-time level. Thus, we cannot exploit important heterogeneity within a lender across different locations where firms operate at a given point in time. Despite this limitation, we estimate Equation (3) defining MP_{bt} as equal to one for banks with a Lerner Index above the median and zero otherwise. The results of this exercise are summarized in Panel A of Table A3 in the Appendix. We confirm the main finding: after issuing an earmarked loan, banks with more market power tend to increase the interest rate of new working capital loans to riskier borrowers. Notably, these banks do not reduce their lending volume to these firms.

Exploiting the fact that asymmetric information is a natural source for imperfect competition, we use the number of bank relationships for each firm as an alternative measure of market power. The intuition behind this measure is that a bank can extract rents for firms that are more informationally opaque because of the limited ability of these firms to find new lenders. For instance, if a bank is the sole provider of credit to a firm, it gains valuable information about the borrower's risk through its longstanding relationship, which can be then used to extract rents from the client (Greenbaum, Kanatas, and Venezia, 1989; Sharpe, 1990; Petersen and Rajan, 1994; Bharath et al., 2007; Ioannidou and Ongena, 2010). We estimate Equation (3) defining MP_{ft} as equal to one if the firm only receives credit from a single bank and zero if the firm has credit relationships with multiple banks prior to obtaining earmarked credit. The results of this check, displayed in Panel B of Table 4 in the Appendix, show that while price mark-ups in working capital loans are more pronounced for riskier firms that obtain their credit from a single bank, their loan volumes remain unchanged.

[15] There are at least two advantages of this measure. First, banks set their loan provisions according to this rating. Thus, this variable provides useful information about the risk assessment of the firm at the exact time of its first earmarked loan. Second, different from our baseline risk variable, this measure does not require information about prior working capital loans of a firm; hence we capture more firms in the sample.

6. Other supporting evidence

In this section, we analyze the characteristics of firms that receive earmarked credit and the features of banks that channel these loans. We also study the conditions in which banks issue simultaneously earmarked loans and working capital loans (i.e., loan bundles).

6.1. Recipients of Earmarked Loans

We examine which firms obtain earmarked credit, and which banks are more likely to issue these loans. To study the firm and bank characteristics associated with earmarked lending, we use the universe of firms in the credit registry. There are 871,392 firms that obtain working capital loans in the sample period (a total of 1.9 million loan-level observations) from 137 banks. Among these, around 67,000 receive at least one earmarked loan from a group of 35 banks.

We aggregate the loan-level data at the firm-bank-year level and run OLS regressions using as dependent variable a dummy variable equal to one if a firm-bank pair is observed with a new earmarked loan in a given year, and zero otherwise. We include as covariates firm size, firm age, the length of the bank-firm relationship, and the indicator variable $Risk_{fy}$, which equals one for firms with loan ratings below the median in year y. To analyze if the probability of issuing earmarked loans to firms of varying credit risk depends on the market power of lenders, we include as covariate the indicator variable MP_{fy} and its interaction with the variable $Risk_{fy}$. Finally, to capture the persistence of earmarked loans within a firm-bank pair over time, we include the covariate $Earmark_{fby}$.[16] This variable is equal to zero if the firm *f* has not obtained and earmarked loan from bank *b* prior to year *y* and is set to one for firm-bank pairs after the first earmarked loan is issued. To control for other bank- and time-specific factors related to the issuance of earmarked loans, such as aggregate changes in the earmarked program or banks' specialization in borrowers more likely to benefit from earmarked credit, we introduce year and bank fixed effects. To also control for other demand-specific factors influencing the issuance of earmarked loans (e.g., changes in the targeted population of earmarked programs), we introduce fixed effects at the industry and location level, and in some specifications, fixed effects at the industry*location, and industry*location*year level.

The results of this exercise, displayed in Table A4 in the Appendix, highlight four main findings. First, larger firms are more likely to obtain earmarked loans from banks. Second, the credit risk of firms is not statistically related to their likelihood of obtaining earmarked loans. While this finding might seem surprising, as the interest rate ceiling should prevent riskier borrowers from obtaining these loans, it is in line with *cross-product pricing* strategies. To the extent that banks can distribute the cost of an earmarked loan over multiple products, even riskier borrowers might be able to access the program. Third, we find that the likelihood that riskier firms obtain earmarked credit is higher in regions where the banking sector is more concentrated. This finding is also consistent with cross-product pricing, since banks with market power are precisely the ones that can adjust the price in free-market credit products.

[16] The summary statistics of the variables used in this exercise are shown in Panel B of Table 1. The definition of these variables is displayed in Table A1 of the Appendix.

Finally, we corroborate that earmarked relationships are very persistent –the probability that a firm-bank pair is observed with a new earmarked loan is ten times higher than the average probability if the firm-bank pair already started an earmarked credit relationship. The fact that earmarked relationships are sticky validates our empirical strategy of analyzing credit terms of recipient firms before and after the start of an earmarked relationship.

6.2. Bundles of earmarked and non-earmarked products

If banks rely on cross-product pricing strategies when issuing earmarked credit, they should be more likely to bundle earmarked loans with non-earmarked products, a behavior that should be more pronounced for riskier borrowers. To test for this, we restrict the sample of working capital loans to the years in which firm-bank pairs started an earmarked relationship (summary statistics are displayed in Panel C of Table 1). We then compare the likelihood that a firm-bank pair bundles the new earmarked loan with a working capital credit using the following specification:

$$Bundle_{fb} = \rho_0 + \rho_1 Risk_f + X_f + Z_{fb} + \rho_b + u_{fb} \quad (4)$$

The dependent variable $Bundle_{fb}$ is an indicator variable that equals one if firm *f* bundled its first earmarked credit with a working capital loan from bank *b* and zero otherwise. We define credit bundles as combinations of working capital loans and earmarked credit from a bank to a specific firm originated within a +/-30-day window.[17] The variable $Risk_f$ captures the credit risk of firm *f* at the time of the first earmarked loan. We present our results using our baseline measure of risk (i.e., based on the average risk rating of working capital loans of a firm one year prior to its first earmarked loan) as well as our alternative definition (i.e., based on the risk rating of the first earmarked loan of a firm).[18] Table A5 in the Appendix summarizes the results of Equation 4. In line with the cross-product pricing channel, the coefficient on the $Risk_f$ covariate indicates that the likelihood of bundling is greater among riskier firms and in regions with more banking concentration (columns 1-3). This result holds when using the alternative definition of firm's risk (columns 4-6). Moreover, in columns 4 to 6, the coefficient of the interaction $Risk_f * MP_f$ indicates that the probability of loan bundling for riskier borrowers is higher when these are located in areas with higher banking concentration, again consistent with the cross-product pricing hypothesis.

7. Conclusions

Focusing on Brazil, we analyze a common strategy used by governments to improve access to credit among small businesses and to alleviate negative effects from large financial shocks. This strategy consists of channeling public funds to firms via private banks, typically at regulated interest rates (e.g., interest rate ceilings) to reduce the cost of credit for the final borrower. The strategy is popular because it mitigates potential inefficiencies from direct lending by state-owned banks, such as political considerations often associated with credit misallocation. However, we

[17] We use alternative time windows to define a loan bundle (i.e., +/-15 and +/-60 days) and find that the results do not change with these definitions.

[18] X_f consists of other firm characteristics at the time of the first earmarked loan, including firm size and age, both measured in logs. Z_{fb} corresponds to the number of years of the relationship between bank *b* and firm *f* at the start of the earmarked credit relationship. We saturate the specification with bank-level fixed effects ρ_b.

conjecture that if a lender cannot fully adjust the interest rate of a subsidized loan (e.g., an earmarked loan in the context we study), a bank with market power might increase the pricing of other loans to the same client, weakening the transmission of the government subsidy. We establish a series of hypotheses related to the use of cross-product pricing strategies and test them using granular loan-level data. We evaluate two alternative hypotheses that might explain the average increase in interest rates: the credit reallocation and credit risk channels. Our findings are consistent with the view that banks with market power transfer part of the cost of earmarked lending into other lending products.

We provide novel evidence about the limits of government programs that rely on subsidies to reduce the cost of credit. These programs typically require banks to set interest rates in certain ranges. Our analysis illustrates why, even under such strategy, lenders with market power can prevent the transmission of subsidies to final borrowing costs.

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Table 1. Summary Statistics

	Mean	Median	Std Dev	# Obs
Panel A. Loan level data- working capital loans of recipient firms				
$Spread_{lfbt}$	27.13	20.69	22.97	397,427
$Volume_{lfbt}$	11.11	10.90	1.53	397,427
Provision $rate_{lfbt}$	1.75	1.00	1.56	397,427
$Earmark_{fbt}$	0.61	1.00	0.49	397,427
$Collateral_{lfbt}$	0.79	1.00	0.41	397,427
$Maturity_{lfbt}$	16.06	12.00	12.48	397,427
BF $Relation_{fbt}$	3.03	2.45	2.47	397,427
WC Loan $Rating_{ft}$	8.13	8.00	0.95	259,993
First Ear $Rating_{f}$	7.73	7.00	1.03	353,224
HH_{fy}	15.82	14.58	5.79	397,427
Panel B. Firm-bank-year level data				
Probability of new earmarked $loan_{fby}$	0.04	0.00	0.19	1,990,576
Firm age_{fy}	1.83	1.91	1.02	1,990,576
Firm $size_{fy}$	1.84	1.61	1.45	1,990,576
BF $Relation_{fby}$	1.72	0.94	2.02	1,990,576
WC Loan $Rating_{fy}$	8.47	9.00	0.95	1,990,576
HH_{fy}	15.81	14.78	5.34	1,990,576
Panel C. Firm-bank level data at the start of an earmarked relationship				
$Bundle_{fb}$	0.15	0.00	0.35	50,239
Firm age_{f}	1.63	1.65	1.08	50,239
Firm $size_{f}$	2.28	2.08	1.62	50,239
BF $Relation_{fb}$	1.89	1.29	1.89	50,239
HH_{f}	18.30	16.42	7.85	50,239
WC Loan $Rating_{f}$	8.17	8.00	0.97	36,918
First Ear $Rating_{f}$	7.78	8.00	1.04	44,272

Notes: The table displays the summary statistics of our sample for the period between January 2005 and December 2016. All variable definitions are listed in Appendix Table A1.

Table 2. Effect of earmarked relations on interest rate spreads and volume of working capital loans

	Interest rate spread			Volume (logs)		
	(1)	(2)	(3)	(4)	(5)	(6)
$Earmark_{fbt}$	0.340***	0.236***	0.334***	0.030**	0.024**	-0.010
	(0.115)	(0.059)	(0.101)	(0.011)	(0.010)	(0.017)
Observations	397,427	297,406	264,639	397,427	297,406	264,639
R-squared	0.723	0.797	0.839	0.878	0.913	0.921
Mean dependent variable	27.13	26.98	27.81	11.11	11.08	11.16
Firm*Bank FE	Yes	Yes	Yes	Yes	Yes	Yes
Bank*Month FE	Yes	Yes	Yes	Yes	Yes	Yes
Location*Sector*Month FE	No	Yes	No	No	Yes	No
Firm*Year FE	No	No	Yes	No	No	Yes

Notes: The table shows estimates of OLS regressions on our loan-level data for the sample of firms that at any time in our sample period begin an earmarked credit relationship with a bank. The dependent variables correspond to the interest rate spread (columns 1 to 3) and log volume (columns 4 to 6) of working capital loans. $Earmark_{fbt}$ is an indicator variable that equals one for all consecutive periods after a firm receives its first earmarked loan from a bank, and zero otherwise. Other controls include the length of the relationship duration of each firm-bank pair and an indicator variable that equals one for firms headquartered in locations above the median banking concentration (measured by the Herfindahl Index) and zero otherwise. Columns 1 to 3 control for maturity, volume and a dummy variable indicating if the loan was collateralized at the time of issuance. Columns 4 to 6 control for maturity, interest rate spread and a dummy variable indicating if the loan was collateralized at the time of issuance. All regressions include fixed effects for the ten loan rating categories established by regulators, as well as fixed effects for the type of loan (whether the loan has a fixed rate or a rate indexed by Brazil's CDI). Standard errors are doubled clustered at the bank and time level.

Table 3. Effect of earmarked relations on interest rate spreads of working capital loans (cross-section comparison)

	(1)	(2)	(3)	(4)	(5)	(6)
$Earmark_{fbt}$ * $Risk_{ft}$	0.703***	0.677***	0.401**	0.597***	0.494***	0.202
	(0.078)	(0.174)	(0.193)	(0.078)	(0.122)	(0.275)
$Earmark_{fbt}$	0.380**	0.300	0.143	0.472**	0.412**	0.255
	(0.149)	(0.235)	(0.156)	(0.207)	(0.198)	(0.184)
$Earmark_{fbt}$ * $Risk_{ft}$*MP_{ft}				0.401***	0.681***	0.737**
				(0.114)	(0.198)	(0.280)
$Risk_{ft}$ * MP_{ft}				-0.129	-0.545***	-0.185
				(0.143)	(0.114)	(0.161)
$Earmark_{fbt}$ * MP_{ft}				-0.349	-0.439***	-0.434**
				(0.257)	(0.103)	(0.187)
Observations	259,709	179,786	182,955	259,709	179,786	182,955
R-squared	0.716	0.802	0.837	0.716	0.802	0.837
Mean interest rate spread	28.10	28.04	28.81	28.10	28.04	28.81
Firm*Bank FE	Yes	Yes	Yes	Yes	Yes	Yes
Bank*Month FE	Yes	Yes	Yes	Yes	Yes	Yes
Location*Sector*Month FE	No	Yes	No	No	Yes	No
Firm*Year FE	No	No	Yes	No	No	Yes

Notes: The table shows estimates of OLS regressions on our loan-level data for the sample of firms that at any time in our sample period begin an earmarked credit relationship with a bank. The dependent variable corresponds to the interest rate spread of working capital loans. $Earmark_{fbt}$ is an indicator variable that equals one for all consecutive periods after a firm receives its first earmarked loan from a bank, and zero otherwise. $Risk_{ft}$ is an indicator variable that equals one for firms with credit risk prior to the start of their earmarked relationship above the median and zero otherwise. Credit risk is measured by the average rating of loans issued to firms one year prior to the start of their earmarked credit relationship. MP_{ft} is an indicator variable that equals one if the market power in period *t* of banks operating in firm *f*'s zip code (measured by the Herfindahl Index) is above the median and zero otherwise. Other controls include the length of the relationship duration of each firm-bank pair and loan characteristics at the time of issuance (maturity, volume and a dummy variable indicating if the loan was collateralized). All regressions include fixed effects for the ten loan rating categories established by regulators, as well as fixed effects for the type of loan (whether the loan has a fixed rate or a rate indexed by Brazil's CDI). Standard errors are doubled clustered at the bank and time level.

Table 4. Effect of earmarked relations on log volume of working capital loans (cross-section comparison)

	(1)	(2)	(3)	(4)	(5)	(6)
$Earmark_{fbt}$ * $Risk_{ft}$	-0.006**	-0.018***	-0.028**	-0.008**	-0.023***	-0.037**
	(0.002)	(0.004)	(0.014)	(0.003)	(0.005)	(0.015)
$Earmark_{fbt}$	0.023**	0.027***	0.004	0.023**	0.027**	0.013
	(0.009)	(0.009)	(0.022)	(0.009)	(0.009)	(0.025)
$Earmark_{fbt}$ * $Risk_{ft}$*MP_{ft}				0.008***	0.017**	0.033**
				(0.003)	(0.008)	(0.013)
$Risk_{ft}$ * MP_{ft}				-0.003	-0.018***	-0.018*
				(0.004)	(0.005)	(0.010)
$Earmark_{fbt}$ * MP_{ft}				0.002*	0.004	-0.032**
				(0.001)	(0.006)	(0.013)
Observations	259,709	179,786	182,955	259,709	179,786	182,955
R-squared	0.868	0.910	0.916	0.868	0.910	0.916
Mean loan volume (logs)	11.05	11	11.08	11.05	11	11.08
Firm*Bank FE	Yes	Yes	Yes	Yes	Yes	Yes
Bank*Month FE	Yes	Yes	Yes	Yes	Yes	Yes
Location*Sector*Month FE	No	Yes	No	No	Yes	No
Firm*Year FE	No	No	Yes	No	No	Yes

Notes: The table shows estimates of OLS regressions on our loan-level data for the sample of firms that at any time in our sample period begin an earmarked credit relationship with a bank. The dependent variable corresponds to the volume of working capital loans (in logs). $Earmark_{fbt}$ is an indicator variable that equals one for all consecutive periods after a firm receives its first earmarked loan from a bank, and zero otherwise. $Risk_{ft}$ is an indicator variable that equals one for firms with credit risk prior to the start of their earmarked relationship above the median and zero otherwise. Credit risk is measured by the average rating of loans issued to firms one year prior to the start of their earmarked credit relationship. MP_{ft} is an indicator variable that equals one if the market power in period *t* of banks operating in firm *f*'s zip code (measured by the Herfindahl Index) is above the median and zero otherwise. Other controls include the length of the relationship duration of each firm-bank pair and loan characteristics at the time of issuance (maturity, interest rate spread and a dummy variable indicating if the loan was collateralized). All regressions include fixed effects for the ten loan rating categories established by regulators, as well as fixed effects for the type of loan (whether the loan has a fixed rate or a rate indexed by Brazil's CDI). Standard errors are doubled clustered at the bank and time level.

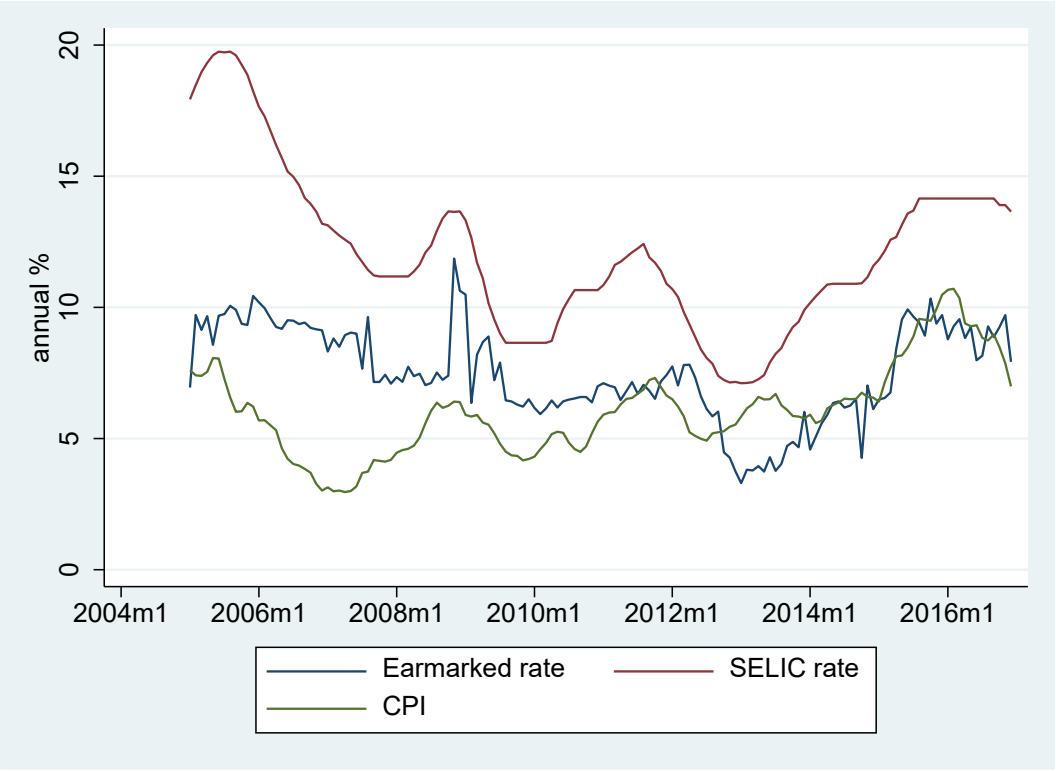
Table 5. Effect of earmarked relations on provision rates of working capital loans (cross-section comparison)

	(1)	(2)	(3)	(4)	(5)	(6)
$Earmark_{fbt}$ * $Risk_{ft}$	0.034	0.005	-0.031	0.027	0.000	-0.034
	(0.088)	(0.058)	(0.046)	(0.095)	(0.070)	(0.059)
$Earmark_{fbt}$	0.201***	0.186***	0.081***	0.207***	0.184***	0.084***
	(0.025)	(0.021)	(0.021)	(0.025)	(0.027)	(0.025)
$Earmark_{fbt}$ * $Risk_{ft}$*MP_{ft}				0.026	0.013	0.011
				(0.027)	(0.032)	(0.051)
$Risk_{ft}$ * MP_{ft}				-0.006	-0.008	-0.009
				(0.017)	(0.014)	(0.017)
$Earmark_{fbt}$ * MP_{ft}				-0.021	0.008	-0.011
				(0.018)	(0.030)	(0.027)
Observations	231,864	156,705	161,358	231,864	156,705	161,358
R-squared	0.527	0.683	0.770	0.527	0.683	0.770
Mean provision rate	1.873	1.872	1.891	1.873	1.872	1.891
Firm*Bank FE	Yes	Yes	Yes	Yes	Yes	Yes
Bank*Month FE	Yes	Yes	Yes	Yes	Yes	Yes
Location*Sector*Month FE	No	Yes	No	No	Yes	No
Firm*Year FE	No	No	Yes	No	No	Yes

Notes: The table shows estimates of OLS regressions on our loan-level data for the sample of firms that at any time in our sample period begin an earmarked credit relationship with a bank. The dependent variable corresponds to the provision rates of working capital loans. $Earmark_{fbt}$ is an indicator variable that equals one for all consecutive periods after a firm receives its first earmarked loan from a bank, and zero otherwise. $Risk_{ft}$ is an indicator variable that equals one for firms with credit risk at the start of the earmarked relationship above the median and zero otherwise. Credit risk is measured using the rating of the first earmarked loan issued to firm *f*. MP_{ft} is an indicator variable that equals one if the market power in period *t* of banks operating in firm *f*'s zip code (measured by the Herfindahl Index) is above the median and zero otherwise. Other controls include the length of the relationship duration of each firm-bank pair and loan characteristics at the time of issuance (maturity, volume and a dummy variable indicating if the loan was collateralized). All regressions include fixed effects for the ten loan rating categories established by regulators, as well as fixed effects for the type of loan (whether the loan has a fixed rate or a rate indexed by Brazil's CDI). Standard errors are doubled clustered at the bank and time level.

Appendix

Figure A1. Monetary policy rate, inflation rate, and interest rates of earmarked loans



Notes: The figure plots the average interest rate over time of earmarked loans (Earmarked rate), the domestic policy rate (SELIC rate), and inflation rate (CPI).

Appendix Table A1. Definition of Variables

Panel A. Loan level data- working capital loans of recipient firms	
$Spread_{lfbt}$	Interest rate spread of loan *l* issued to firm *f* by bank *b* at time *t.* Calculated as the difference between loan interest rate and Treasury yield for the same maturity.
$Volume_{lfbt}$	Log amount of loan *l* issued to firm *f* by bank *b* at time *t* (in logs).
Provision $rate_{lfbt}$	Provision rate of loan *l* issued to firm *f* by bank *b* at time *t*.
$Earmark_{fbt}$	Indicator variable equal to one in the periods after firm *f* and bank *b* establish an earmarked credit relationship, zero otherwise.
$Risk_{ft}$	Indicator variable equal to one if firm *f* is above the median risk measure at period t and zero otherwise.
MP_{ft}	Indicator variable equal to one if firm *f* is located in a 2-digit zip code with above the median banking sector concentration at period *t* and zero otherwise.
$Collateral_{lfbt}$	Indicator variable equal to one if loan *l* issued to firm *f* by bank *b* at time *t* was collateralized, zero otherwise.
$Maturity_{lfbt}$	Maturity (in months) of loan *l* issued to firm *f* by bank *b* at time *t.*
BF $Relation_{fbt}$	Length of relationship (measured in number of years) of firm *f* with bank *b* at time *t.*
WC Loan $Rating_{ft}$	Average rating of all working capital loans issued to firm *f* in the year prior to the start of its earmarked relationship.
First Ear $Rating_{f}$	Rating of the first earmarked loan issued to firm *f.*
HH_{fy}	Herfindahl Index, based on the market share of working capital loans of banks operating at firm *f*'s zip code at year *y.*
Panel B. Firm-bank-year level data	
Probability of new earmarked $loan_{fby}$	Indicator variable equal to one if firm *f* has a new earmarked loan from bank *b* at year *y,* zero otherwise.
Firm age_{fy}	Age of firm *f* at year *y* (in logs).
Firm $size_{fy}$	Number of workers of firm *f* at year *y* (in logs).
BF $Relation_{fby}$	Length of the relationship (measured in number of years) between bank *b* and firm *f* at year *y.*
WC Loan $Rating_{fy}$	Average rating of working capital loans issued to firm *f* at year y.
HH_{fy}	Herfindahl Index, based on the market share of working capital loans of banks operating at firm *f*'s zip code at year *y.*
Panel C. Firm-bank level data at the start of an earmarked relationship	
$Bundle_{fb}$	Indicator variable that equals one if bank *b* issues a working capital loan within 60 days of having started an earmarked credit relationship with firm *f.*
Firm age_{f}	Age of firm at the start of the earmarked relationship (in logs).
Firm $size_{f}$	Log number of workers of firm *f* at the start of the earmarked relationship.
BF $Relation_{fb}$	Length of the relationship (measured in number of years) between bank *b* and firm *f* at the start of the earmarked relationship.
$Risk_{f}$	Indicator variable equal to one if firm *f* is above the median risk measure and zero otherwise.
MP_{f}	Indicator variable equal to one if firm *f* is located in a 2-digit zip code with above the median banking sector concentration and zero otherwise.
HH_{f}	Herfindahl Index, based on the market share of working capital loans of banks operating at firm *f*'s zip code at the start of the earmarked relationship.
WC Loan $Rating_{f}$	Average rating of all working capital loans issued to firm *f* in the year prior to the start of its earmarked relationship.
First Ear $Rating_{f}$	Rating of the first earmarked loan issued to firm *f.*

Appendix Table A2. Effect of earmarked relations on interest rate spreads of working capital loans (using alternative definition of risk)

	(1)	(2)	(3)	(4)	(5)	(6)
$Earmark_{fbt}$ * $Risk_{fbt}$	0.753***	1.328***	0.493***	0.475***	1.086***	0.316**
	(0.038)	(0.107)	(0.063)	(0.088)	(0.085)	(0.129)
$Earmark_{fbt}$	0.175**	-0.348	0.122	0.339***	-0.227	0.235**
	(0.084)	(0.220)	(0.151)	(0.083)	(0.170)	(0.105)
$Earmark_{fbt}$ * $Risk_{fbt}$*MP_{ft}				1.025***	0.947***	0.704**
				(0.161)	(0.269)	(0.289)
$Risk_{fbt}$ * MP_{ft}				-0.723***	-0.752***	-0.200***
				(0.109)	(0.100)	(0.062)
$Earmark_{fbt}$ * MP_{ft}				-0.653***	-0.532**	-0.487
				(0.077)	(0.218)	(0.299)
Observations	298,328	211,450	199,070	298,328	211,450	199,070
R-squared	0.718	0.800	0.838	0.718	0.800	0.838
Mean interest rate spread	28.36	28.29	29.29	28.36	28.29	29.29
Firm*Bank FE	Yes	Yes	Yes	Yes	Yes	Yes
Bank*Month FE	Yes	Yes	Yes	Yes	Yes	Yes
Location*Sector*Month FE	No	Yes	No	No	Yes	No
Firm*Year FE	No	No	Yes	No	No	Yes

Notes: The table shows estimates of OLS regressions on our loan-level data for the sample of firms that at any time in our sample period begin an earmarked credit relationship with a bank. The dependent variable corresponds to the interest rate spread of working capital loans. $Earmark_{fbt}$ is an indicator variable that equals one for all consecutive periods after a firm receives its first earmarked loan from a bank, and zero otherwise. $Risk_{fbt}$ is our alternative measure to proxy for firm *f*'s risk and is equal to one for firms with ratings on their first earmarked loans below the median and zero otherwise. MP_{ft} is an indicator variable that equals one if the market power in period *t* of banks operating in firm *f*'s zip code (measured by the Herfindahl Index) is above the median and zero otherwise. Other controls include the length of the relationship duration of each firm-bank pair and loan characteristics at the time of issuance (maturity, volume and a dummy variable indicating if the loan was collateralized). All regressions include fixed effects for the ten loan rating categories established by regulators, as well as fixed effects for the type of loan (whether the loan has a fixed rate or a rate indexed by Brazil's CDI). Standard errors are doubled clustered at the bank and time level.

Appendix Table A3. Effect of earmarked relations on terms of working capital loans (using alternative measures of market power)

	Interest rate spreads			Log volume		
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A. Lerner Index as a Measure of Market Power						
$Earmark_{fbt}$ * $Risk_{fbt}$	0.590***	0.560***	0.355**	-0.009*	-0.021***	-0.034***
	(0.113)	(0.178)	(0.143)	(0.005)	(0.004)	(0.011)
$Earmark_{fbt}$	0.477**	0.362	0.181	0.029***	0.033***	0.014
	(0.185)	(0.234)	(0.156)	(0.005)	(0.007)	(0.018)
$Earmark_{fbt}$ * $Risk_{fbt}$ * MP_{bt}	0.873**	0.825***	0.254	0.013	0.010	0.023**
	(0.386)	(0.284)	(0.349)	(0.020)	(0.013)	(0.011)
Observations	259,693	179,775	182,942	259,693	179,775	182,942
R-squared	0.716	0.802	0.837	0.868	0.910	0.916
Panel B. Firms with Single Bank Relationships as a Measure of Market Power						
$Earmark_{fbt}$ * $Risk_{fbt}$	0.466***	0.450***	0.192	-0.006*	-0.016***	-0.032**
	(0.061)	(0.088)	(0.340)	(0.003)	(0.004)	(0.015)
$Earmark_{fbt}$	0.736***	0.662***	0.353	0.020**	0.021**	0.007
	(0.131)	(0.168)	(0.230)	(0.009)	(0.009)	(0.023)
$Earmark_{fbt}$ * $Risk_{fbt}$ * MP_{ft}	0.400***	0.795**	1.344*	-0.027***	-0.014	0.027***
	(0.074)	(0.367)	(0.785)	(0.007)	(0.015)	(0.006)
Observations	259,709	179,786	182,955	259,709	179,786	182,955
R-squared	0.717	0.802	0.837	0.868	0.910	0.916
Location*Sector*Month FE	No	Yes	No	No	Yes	No
Firm*Year FE	No	No	Yes	No	No	Yes

Notes: Panels A and B of the table show estimates of OLS regressions on our loan-level data for the sample of firms that at any time in our sample period begin an earmarked credit relationship with a bank. The dependent variables correspond to the interest rate spread (columns 1 to 3) and log volume (columns 4 to 6) of working capital loans. $Earmark_{fbt}$ is an indicator variable that equals one for all consecutive periods after a firm receives its first earmarked loan from a bank, and zero otherwise. $Risk_{fbt}$ is an indicator variable that equals one for firms with ex-ante risk above the median and zero otherwise. Ex-ante risk is measured by the average risk rating on loans issued to firms one year prior to the start of their earmarked credit relationship. In Panel A, MP_{bt} is an indicator variable that equals one for banks with Lernder Index at period t above the median and zero otherwise. In columns 4 to 6, MP_{ft} is an indicator variable equal to one for firms with only one bank lending relationship at period t and zero otherwise. All regressions include fixed effects at the Firm*Bank and Bank*Month levels. Other controls include the variables $Earmark_{fbt}$ and $Risk_{fbt}$ interacted with the measure of market power, as well as the length of the relationship duration of each firm-bank pair. Columns 1 to 3 control for maturity, volume and a dummy variable indicating if the loan was collateralized at the time of issuance. Columns 4 to 6 control for maturity, interest rate spread and a dummy variable indicating if the loan was collateralized at the time of issuance. All regressions include fixed effects for the ten loan rating categories established by regulators, as well as fixed effects for the type of loan (whether the loan has a fixed rate or a rate indexed by Brazil's CDI). Standard errors are doubled clustered at the bank and time level.

Appendix Table A4. Probability of new earmarked loan

	(1)	(2)	(3)	(4)
Firm age_{fy}	-0.001	-0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)
Firm $size_{fy}$	0.006***	0.008***	0.008***	0.008***
	(0.001)	(0.002)	(0.002)	(0.002)
BF $Relation_{fby}$	0.002	0.000	0.000	0.000
	(0.002)	(0.001)	(0.001)	(0.000)
MP_{fy}	-0.001***	-0.001*	-0.001**	0.000
	(0.000)	(0.001)	(0.000)	(0.000)
$Risk_{fy}$	0.013	0.007	0.007	0.007
	(0.009)	(0.007)	(0.007)	(0.007)
$Risk_{fy}$ * MP_{fy}	0.003***	0.002**	0.002**	0.002*
	(0.001)	(0.001)	(0.001)	(0.001)
$Earmark_{fby}$	0.381***	0.360***	0.358***	0.360***
	(0.040)	(0.043)	(0.044)	(0.043)
Observations	1,990,576	1,990,572	1,990,287	1,981,122
R-squared	0.209	0.227	0.231	0.250
Mean dependent variable	0.0362	0.0362	0.0362	0.0362
Year FE	Yes	Yes	Yes	-
Industry FE		Yes	-	-
Location FE		Yes	-	-
Bank FE		Yes	Yes	Yes
Industry*Location FE			Yes	-
Industry*Location*Year FE				Yes

Notes: The table shows estimates of OLS regressions on observations at the firm-bank-year level. The dependent variable is an indicator variable that equals if firm *f* has a new earmarked loan from bank *b* at year *y* and zero otherwise. *Firm* age_{fy} corresponds to the age of the firm and is measured in log years. *Firm* $size_{fy}$ is measured by the log of number of workers. *BF* $Relation_{fby}$ is the number of years of the bank-firm relationship. $Risk_{fy}$ is an indicator variable that equals one for firms with average loan ratings in a given year below the median and zero otherwise. MP_{fy} is an indicator variable that equals one if the market power in year *y* of banks operating in firm *f*'s zip code (measured by the Herfindahl Index) is above the median and zero otherwise. Standard errors are clustered at the bank level.

Appendix Table A5. Probability of Bundling Earmarked Loans and Working Capital Loans

	Baseline definition of $Risk_f$			Alternative definition of $Risk_f$		
	(1)	(2)	(3)	(4)	(5)	(6)
Firm age$_f$	-0.003	-0.000	0.000	-0.003	-0.003	-0.003
	(0.002)	(0.002)	(0.002)	(0.003)	(0.002)	(0.002)
Firm size$_f$	0.006***	0.004***	0.004***	0.007***	0.007***	0.007***
	(0.001)	(0.001)	(0.001)	(0.000)	(0.001)	(0.001)
BF Relation$_{fb}$	0.005***	0.004***	0.004***	0.006***	0.005***	0.005***
	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)
MP$_f$	0.018***	0.016***	0.022***		0.018***	0.011**
	(0.003)	(0.004)	(0.006)		(0.003)	(0.005)
Risk$_f$		0.028***	0.033***	0.025***	0.024***	0.018***
		(0.004)	(0.005)	(0.007)	(0.004)	(0.005)
Risk$_f$ * MP$_f$			-0.011			0.013*
			(0.008)			(0.007)
Observations	50,239	36,916	36,916	44,270	44,270	44,270
R-squared	0.044	0.035	0.035	0.014	0.014	0.014
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes

Notes: The table shows estimates of OLS regressions on data collapsed at the firm-bank level (i.e., in the year when a firm-bank pair starts an earmarked relationship). The dependent variable corresponds to an indicator variable that equals one if firm *f* obtained its first earmarked credit and a working capital loan within a window of +/-30 days from bank *b* and zero otherwise. In columns 1 to 3, the indicator variable $Risk_f$ is equal to one for firms with average working capital loan ratings one year prior to the start of their earmarked relationship below the median and zero otherwise. In columns 4 to 6, $Risk_f$ is equal to one if the rating of the first earmarked loan of a firm is below the median and zero otherwise. All regressions include fixed effects at the bank level.