Earmarked loans and credit contraints

A research agenda for the Brazilian economy

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Abstract

Credit constraints are pervasive in the Brazilian economy (Ambrozio et. al. 2017). Recent evidence has shown that regulatory reforms to increase legal protection to creditors (Fonseca and Doornik 2019) and banking competition (Joaquim and Doornik 2019) are capable of alleviating its effects. Beyond regulatory changes, earmarked credit might, for better or worse, play a role in the policy toolbox. Earmarked loans represent roughly 38% of the outstanding credit for firms in the Brazilian economy. It is relevant to understand if and how these policies contribute to alleviating (or exacerbating) problems associated with credit constraints. This research proposal presents three questions that could be explored to improve policy-makers understanding about the interaction of earmarked loans and credit constraints in the Brazilian economy.

JEL Classification: O16; H25; H81; G21; G28

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1 Motivation

Unlike the majority of other markets, transactions on the credit market are realized under a payment promise. That means banks have to deliver their product (loans), trusting that their clients will

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pay for it in the future. Due to this peculiarity, Stiglitz and Weiss (1981) defended that the credit sector is particularly prone to suffer from asymmetrical information.

Still, according to these authors, the reaction of banks to that market failure systematically produce *equilibrium* conditions characterized by credit constraints. By trying to protect themselves from rising default rates, the banks tend to increase interest rates. However, that movement drives out better clients, which might lead to further increases in default rates. Under certain hypotheses, signaling (A. M. Spence (1973), M. Spence (2002)) and screening (Stiglitz and Rothschild (1976)) mechanisms can work to alleviate this dynamic. On the other hand, under extreme conditions, that process of adverse selection can even lead to a complete shutdown of the market (Akerlof (1970)).

The theory suggests that credit constraints could have relevant effects on the real economy by jeopardizing the capacity of entrepreneurs to push forward investment projects that would generate social benefits. The evidence seems to corrobate that suggestion. Financially constrained firms have lower levels of investment (Choi et al. (2018)), sales (Banerjee and Duflo (2014), McKenzie (2017)), exports (Zia (2008), Minetti and Zhu (2011)), rentability (Banerjee and Duflo (2014), McKenzie (2017)), employment (McKenzie (2017)), and productivity gains (Choi et al. (2018)).

All these negative impacts have severe impacts on countries' macroeconomic performance. Investment and trade flows are engines of entrepreneurship and economic growth. Therefore, by forgoing the execution of profitable projects and reducing the engagement in foreign markets, the firm is not the only one affected. The entire economic system may end up with lower competitiveness levels, which implies inferior economic growth and welfare for the entire society.

For all these reasons, and especially in developing countries, there is room for *pareto improvement* through public policies that correctly address that market failure and alleviate its effects. However, the efficacy of such policies is directly dependent on their capacity to target the right entrepreneurs. Otherwise, public action may be innocuous or, in the worst-case scenario, lead to efficiency loss by artificially directing credit to companies that use it only to replace more expensive funding sources, without changing their investment decisions. If a policy is not able to target credit-constrained companies with more accuracy than the available lending technologies used by the financial sector, a *pareto improvement* would be achieved only by chance.

2 A tale of two banking systems: earmarked credit policies in the Brazilian economy

Credit constraints are pervasive in the Brazilian economy(Ambrozio et al. 2017). Recent evidence has shown the importance of regulatory reforms to increase legal protection to creditors (Fonseca and Doornik 2019) and banking competition (Joaquim and Doornik 2019) to alleviate its effects. However, beyond regulatory changes, earmarked credit might, for better or worse, play a role in the policy toolbox. Earmarked loans represent roughly 38% of outstanding credit for firms in the the Brazilian economy..[1] Thus, it is important to understand if and how these set of policies contribute to alleviate (or exacerbate) problems associates with credit constraints.

In particular, earmarked loans provided by the Brazilian Development Bank (BNDES) have historically represented a relevant part of the Brazilian financial market. Still, their results have been mixed. Lazzarini et al. (2015) and Bonomo, Brito, and Martins (2015) found no effects. In contrast, Machado, Grimaldi, and Albuquerque (2018) found positive impacts, while the results obtained by Cavalcanti and Vaz (2017) and Grimaldi et al. (2018) suggest a positive investment response only among micro, small, and medium (SMEs) companies.

A distinct pattern related to these studies is that Lazzarini et al. (2015) and Bonomo, Brito, and Martins (2015) used samples of publicly traded companies to assess the impact of BNDES loans on investment. Such firms are not expected to face particular challenges associated with credit constraints. If it is true, it should not come as a shock that they have used the loans to replace other funds. Machado, Grimaldi, and Albuquerque (2018), Cavalcanti and Vaz (2017), and Grimaldi et al. (2018) used datasets with private and publicly traded firms. Therefore, a higher concentration of credit-constrained companies, especially among SMEs, would explain why these last authors have found positive impacts on investment levels.

Still, it is unclear how subsidized funds could affect commercial banks' behavior and induce them to reach otherwise credit-constrained customers through second-tier operations. Haas Ornelas et al. (2019) suggest commercial banks use subsidized funds to overcharge their customers in other financial operations under a cross-selling strategy. However, the real impact of this behavior on

[1] Central Bank of Brazil's Banking Report, 2019.

customers was not fully explored.

3 The policy problem and the research agenda

The fact is that, despite its importance within the Brazilian economy, the effects of earmarked credit policies are not adequately understood. In particular, except by the recent work of Haas Ornelas et al. (2019), the earmarked credit system's interaction with the competitive banking system has not received much attention from the recent specialized literature.

The consequence is that Brazilian policy-makers still lack high-quality evidence to support concrete proposals to redesign earmarked credit policies. Without such support, policy proposals could end up showing unexpected (or even negative) impacts. For instance, if the earmarked and the competitive systems are rivals, initiatives to promote competitiveness in the second one might end up showing lower efficiency in economic segments where the first one is relevant. On the other hand, if the earmarked loans complement the free-market system and contribute to alleviating credit-constraints, a drastic reduction in their volume might end up jeopardizing overall entrepreneurship and economic growth.

This proposal presents three questions that, if properly answered, could inform policy-makers and improve the quality of further proposals to redesign Brazilian earmarked policies. The following sections explore those questions and present the methods that could be applied to tackle them.

3.1 Does the price of earmarked loans affect banks' profits on free-market loans?

Haas Ornelas et al. (2019) show that commercial banks tend to increase the spread of working capital loans for customers benefited by second-tier earmarked operations. It suggests that commercial banks might use a cross-selling strategy to capture, at least part, of the subsidies targeted to firms. In this context the first research question (**RQ1**) that is: do higher subsidies imply higher capture capacity by commercial banks?

To further investigate such questions, it is possible to apply a causal Difference-in-Differences (DID) approach around the implementation of *Programa de Sustentação do Investimento* (PSI). PSI was announced in the middle of 2009 as a countercyclical measure. Realistically, it was basically an

increase in the dosage of subsidies embarked on Finame, a traditional second-tier credit line operated by BNDES since the late 1960s. At Finame, firms' final interest rate was equivalent to a fund cost, given by long-term interest rate (TJLP), plus spread from BNDES and second-tier banks. Under PSI, the final interest rate became a fixed and explicitly subsidized value, defined by the Brazilian federal government.

At the time of the inauguration of PSI, it is reasonable to assume that the vast majority of Brazilian firms were not expecting it.[2] After July of 2009, PSI slowly replaced normal Finame operations. Still, for a while, they coexisted. It is worthy of highlighting that, at the time, BNDES was approving operations for roughly 200 firms daily, and the average approval time within Finame was around 15 days. It means that at the dawn of PSI, very similar firms were receiving higher interest rates just because they have submitted their operations a few days earlier.

This almost random assignment for a lower interest rate allows the estimation of a causal Difference-in-Difference model, around a cut-off date point. In this setting, two groups would be compared: firms that received PSI conditions, and firms allocated to typical FINAME.[3] Equation 2 summarizes this approach, where: $Spread_{i,t}$ represents the spread paid by firms on non-earmarked operations; PSI_i is equal to one if a firm received PSI financial conditions and zero if it received traditional Finame conditions; and $Post_t$ is a dummy that assumes value 1 for periods after the treatment (defined by the concession of PSI interest rates near the dawn of the program).

$$Spread_{i,t} = \beta_1 PSI_i + \beta_2 Post_t + \beta_3 Post_t PSI_i + X_{i,t}\gamma + \epsilon_{i,t} \tag{1}$$

The selection of interval times around the cut-off date point that can be used without compromising the comparability among Finame and PSI beneficiaries is crucial for this exercise. Beyond operative information from BNDES about the average time for credit approval, a balance assessment on X and tests for parallel pre-trends could guide that decision. The parameter of interest would be β_3, and a positive and statistically significant value would indicate that commercial banks were able to

[2] Maybe a few well-connected companies might have been aware of it, but those companies are not the bulk of beneficiaries of second-tier operations.

[3] Alternatively, this investigation could also be implemented through a fuzzy RDD.

charge higher spread rates from clients benefited from PSI's better financial conditions. It would reinforce the idea that subsidies might be indirectly captured by commercial banks that distribute earmarked credit lines.

3.2 Does the price of earmarked loans affect firms' expansion?

Naturally following RQ1, the second research question (**RQ2**) is how sensible the real impacts of earmarked loans on beneficiaries are to the amount of subsidies. Theoretically, if alleviating credit constraints is the main driver behind this policy's effectiveness, access should be more important than price. Using the number of employees as dependent variable in equation (2) would allow us to tackle this question. In that alternative specification, β_3 would indicate if the higher subsidies provided by PSI generated a higher expansion rate among the beneficiaries. The lack of a positive and statistically significant coefficient would suggest that PSI's improved conditions were ineffective for improving firms' performance compared to traditional Finame's operations.

3.3 How the expansion of earmarked credit affects the concession in competitive markets?

As previously noted, Haas Ornelas et al. (2019) provide evidence that commercial banks incorporate earmarked credit lines into their competitive strategy. Still, it is not clear to what extent these subsidized funds have been operating as complementary or substitute to non-earmarked operations. To address this third research question (**RQ3**), a causal inference could be implemented through a shift-share design (Bartik 1991; Adão, Kolesár, and Morales 2019). In this setting, we would have a typical two stage least squares setup, with the non-earmarked loans at municipality level ($FreeLoans_{m,t}$) as the dependent variable and a Bartik instrument ($BI_{m,t}$) defined according to equation (3), where: $\theta_{m,b,t-1}$ is the share, represented by the lagged relative weigh of the loan portfolio of bank b in municipality m; and $\delta_{b,t}$ is the shift, defined by expansion, at the national level, of earmarked loans of bank b.

$$BI_{m,t} = \sum_{m} \theta_{m,b,t-1} * \delta_{b,t}\beta_2 \tag{2}$$

An advantage of using this approach during the 2009-2015 period is that the expansion of earmarked credit lines was heavily influenced by political decisions that, considering the national scenario, exogenously determined financial condition for PSI. Since the access to PSI is influenced on the existence of commercial banks' branches at the local level, this sequence of decisions by the Brazilian federal government will likely generate a series of heterogeneous shocks at the local level, which will contribute to the consistency of the estimator (Goldsmith-Pinkham, Sorkin, and Swift 2018).

4 Objectives, institutional relevance, and timeline

As previously stated, this research proposal's main objective is to contribute to the design of future policies that could redesign Brazilian credit policies and alleviate the negative impacts of credit constraints on economic growth.

This research agenda is relevant for institutions that currently implement earmarked credit policies, specially BNDES. BNDES' officials can use these results to reflect on the impacts of traditional credit lines (such as Finame) and to inform future policies. It is also relevant for the Brazilian Central Bank (BCB) because it can inform about the systemic effects of earmarked credit policies within the Brazilian banking system.

To guarantee the quality of the research (and thus the validity of its results) this proposal intends to validate the findings among academics and policy-makers. The first step for such dissemination is to present an initial draft (after approval from BCB and BNDES) in seminars. The second step is to submit the research to blind peer-review processes, which is only possible by submitting the work to academic journals. There are several potential journals, but the selection should only be made once the main results are available.

In the banking and finance area, natural candidates would be The Journal of Banking and Finance and The Journal of Finance. Depending on the results observed for firms (especially MSMEs), Review of Economic Studies and The Journal of Development Economics might be an exciting option. Lastly, for the first two questions, the work might be framed as an evaluation of a specif credit policy (PSI), which could favor the submission to The Journal of Policy Analysis and Management.

Considering the submission to an academic journal as the final step in this research agenda, Table 1

presents an initial timeline expected for the work. The idea is to initiate the datasets' exploration to validate the identification strategies during the first semester of 2021. After that, the work will evolve through the implementation of the econometric exercises. The results will be consolidated on an initial draft around the second semester of 2023. After that stage, the authors would initiate the dissemination of the research in academic seminars. Comments and critics received during this stage will serve to guide a review of the initial draft. Finally, the authors anticipate a submission to academic journals for the year 2025.

Table 1: Timeline for the research (in semesters)

Activities	Start	End
Initial exploration of the datasets	2021/I	2021/I
Basic coding preparation for RQ1	2021/II	2021/II
Implementation of RQ1	2021/II	2022/I
Basic coding preparation for RQ2 and RQ3	2022/II	2022/II
Implementation of RQ2 and RQ3	2022/II	2023/I
Working paper preparation (1st draft)	2023/II	2023/II
Dissemination of initial results	2024/I	2024/II
Working paper preparation (2nd draft)	2024/II	2025/I
Journal submissions and further dissemination	2025/I	2025/II

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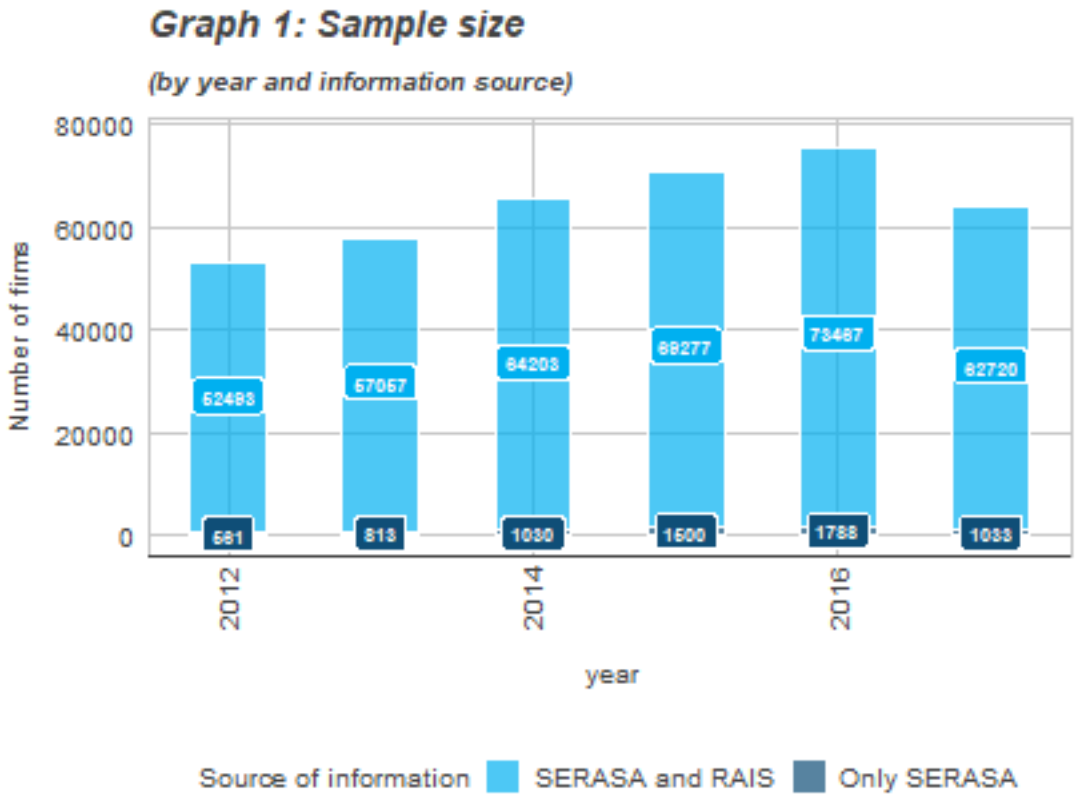
6 Apendix I: Overview of SERASA Dataset

SERASA's registries[4] are built through the collection of balance statements from different sources, such as notary offices, sectoral chambers, and regulatory authorities.[5] Information is grasped according to availability, so it does not intend to replicate perfectly the universe of Brazilian firms.

Despite that, Graph 1 shows that SERASA comprises around 60,000 firms yearly, bringing accounting information on private and publicly traded Brazilian firms for the 2012-2017 period. As Graph 1 shows, a small fraction of observations in SERASA does not find a match in RAIS.



Graph 2 shows that the SERASA sample still holds a relevant density for different sizes of companies. However, compared with the Brazilian population, larger firms are overrepresented in the final sample. Finally, Table 1 brings a list of all variables available at the SERASA data set.

[4] www.serasaexperian.com.br

[5] After collecting, SERASA analyzes and standardize the data.

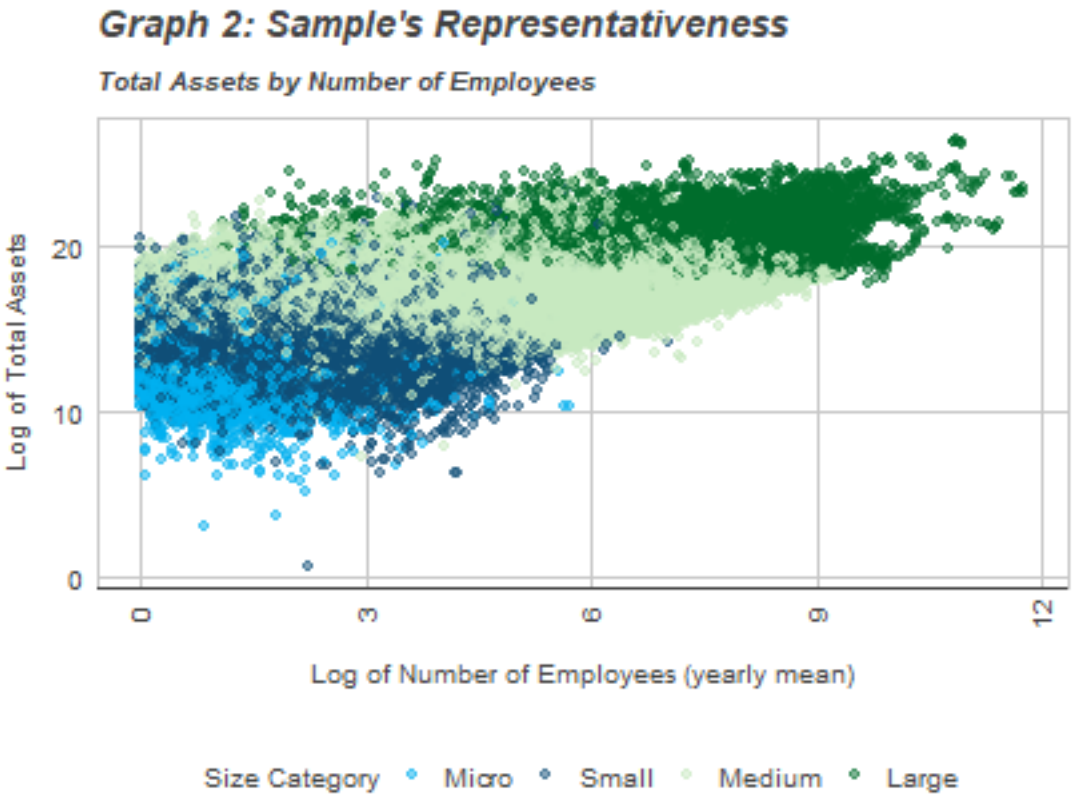


Table 2: List os Variables available in SERASA

CNPJ	2.1.6.SAL.TRIBS.CONTRIB
DÍG	2.1.7.ADIANT.CLIENTES
RAZÃO.SOCIAL	2.1.8.DIVID.GRAT.PARTIC
DATA.BALANÇO	2.1.9.C.C.AC.SOC.COLIG
1.ATIVO.TOTAL	2.1.10.OUTROS.DEBITOS
1.1.ATIVO.CIRCULANTE	2.2.PASSIVO.NÃO.CIRCULANTE
1.1.1.CAIXA.E.EQUIVALENTES.DE.CAIXA	2.2.1.FORNECEDORES
1.1.2.DUPLICATAS.RECEBER	2.2.2.CONTAS.A.PAGAR
1.1.3.ESTOQUES	2.2.3.EMPRESTIMOS.E.FINANCIAMENTOS
1.1.4.ALMOXARIFADO	2.2.4.DIVID.GRAT.PARTIC
1.1.5.IMOV.COMERCIALIZAR	2.2.5.C.C.AC.SOC.COLIG
1.1.6.APLIC.FINANCEIRAS	2.2.6.IMPOSTO.DE.RENDA
1.1.7.BCO.CTA.VINCULADA	2.2.7.IMPOST.PARCELADOS
1.1.8.CONTAS.A.RECEBER	2.2.8.TRIBUTOS.CONTRIB
1.1.9.ADIANTAMENTOS	2.2.9.CRED.AUMEN.CAPITAL
1.1.10.ADTO.FORNECEDORES	2.2.10.OUTROS.DEBITOS
1.1.11.ADTO.FUNCIONARIOS	2.3.RESULT.EXERC.FUTUR

Table 2: List os Variables available in SERASA *(continued)*

CNPJ	2.1.6.SAL.TRIBS.CONTRIB
1.1.12.IMPOSTOS.RECUPERAR	2.4.PATRIMONIO.LIQUIDO
1.1.13.C.C.AC.SOC.COLIG	2.4.1.CAPITAL.SOCIAL
1.1.14.DESP.EXER.SEGUINTE	2.4.2.RESERVAS
1.1.15.OUTROS.CREDITOS	2.4.3.RESULT.ACUMULADO
1.2.ATIVO.NÃO.CIRCULANTE	3.REC.OPERAC(+)
1.2.1.ESTOQUES	4.DED.RECEITA(-)
1.2.2.IMOV.COMERCIALIZAR	5.RECEITA.DE.VENDAS.DE.BENS.SERVIÇOS(=)
1.2.3.DUPLICATAS.A.RECEBER	6.CUSTOS.DOS.BENS.SERVIÇOS(-)
1.2.4.APLIC.FINANCEIRAS	7.RESULTADO.BRUTO(=)
1.2.5.CONTAS.A.RECEBER	8.DESPESAS.GERAIS.E.ADMINISTRATIVAS(-)
1.2.6.ADIANTAMENTOS	9.RECUP.DE.DESPESAS(+)
1.2.7.ADTO.FORNECEDORES	10.DESPESAS.DE.VENDAS(-)
1.2.8.IMPOSTOS.RECUPERAR	11.RESULTADO.ANTES.DO.RESULTADO.FINANCEIRO.E.DOS.TRIBUTOS(=)
1.2.9.C.C.AC.SOC.COLIG	12.RESULTADO.FINANCEIRO(+/-)
1.2.10.OUTROS.CREDITOS	12.1.DESP.FINANCEIRAS(-)
1.3.PERMANENTE	12.2.REC.FINANCEIRAS(+)
1.3.1.INVESTIMENTOS	13.DESPESAS.RECEITAS.OPERACIONAIS(+/-)
1.3.2.IMOBILIZADO	14.EQUIV.PATRIMONIAL(+/-)
1.3.3.DIFERIDO	15.RESULT.OPERACIONAL(=)
2.PASSIVO.TOTAL	16.RES.EXT.OPER(+/-)
2.1.PASSIVO.CIRCULANTE	17.RESULTADO.ANTES.IR.E.CS(=)
2.1.1.FORNECEDORES	18.PROV.IMPOSTO.RENDA.E.CONTRIBUIÇÃO.SOCIAL(-)
2.1.2.IMPORTACOES.PAGAR	19.IMPOSTO.DE.RENDA.CREDOR(+)
2.1.3.CONTAS.A.PAGAR	20.PART.GRAT.ESTATUT(-)
2.1.4.EMPRESTIMOS.E.FINANCIAMENTOS	21.RESULTADO.EXERCICIO(=)
2.1.5.IMPOSTO.DE.RENDA	22.DIVIDENDOS