BRAZILIAN DEVELOPMENT BANK

EFFECTIVENESS EVALUATION REPORT

V.7, No.21 (2025)

Strengthening local credit: an assessment of the impact of **BNDES Procapcred** in Brazilian municipalitiess

BNDES

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Strengthening local credit: an assessment of the impact of BNDES Procapcred in Brazilian municipalities

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1. EXECUTIVE SUMMARY

Credit cooperatives are important in mitigating credit constraints, especially in areas where banking services are scarce. In this sense, this work seeks to investigate the impact of the Credit Cooperative Capitalisation Program (BNDES Procapcred) on the strengthening of supported cooperatives, observing data at the municipal level. The program is based on granting financing for the acquisition of shares in individual credit cooperatives by their members, so that the contracted resources are transferred to the issuing cooperative. The program's operation is carried out by the Brazilian Development Bank (BNDES) through indirect operations. From 2006 to 2024, BNDES Procapcred conducted 504,453 operations with 386,983 different cooperative members in 818 municipalities, with a total of BRL 6.2 billion in resources released, according to deflated values referring to 2024.

The assessment considered the financial support between 2015 and 2023 and verified that BNDES Procapcred achieved its objectives. The support is associated with growth in the total number of cooperative members of +30.1%, with emphasis on individuals (+31.7%), in addition to the growth in the number of cooperative members with checking accounts (+23.7%), fixed term deposits (+38.8%) and credit operations (+66.5%). Greater effects were observed for higher intensity support and for municipalities with smaller populations, lower levels of urban hierarchy (that is, less centrality and greater dependence on services provided in other locations), lower Municipal Human Development Index (MHDI), and lower depth of the bank credit market. In other words, the municipalities most benefited by the program are precisely those less developed and more likely to suffer from credit restrictions.

Thus, the results obtained in this evaluation point to the importance of maintaining and expanding BNDES Procapcred, extending its coverage throughout the Brazilian territory, in order to serve municipalities whose characteristics are associated with greater credit restrictions from sources other than cooperatives.

2. INTRODUCTION

BNDES Procapcred is a program created in 2006 aiming to promote the strengthening of the equity structure of Brazilian credit cooperatives. It is based on granting financing for the acquisition of shares in individual credit cooperatives by members, so that the contracted resources are transferred to the issuing cooperative. The operation of the program is carried out by the BNDES, through indirect operations, carried out through a partnership with a network of accredited financial agents, who are responsible for analysing the projects and negotiating conditions with clients.

From 2006 to 2024, BNDES Procapcred carried out 504,453 operations with 386,983 different members in 818 municipalities, with a total of BRL 6.2 billion in resources released, in 2024 values. Of the operations, about 20% were conducted with recurring clients, that is, those who accessed the program more than once. Most of the clients are individuals and micro and small-sized legal entities. According to a previous empirical study (Martini *et al.*, 2023), BNDES Procapcred had an important countercyclical effect on the supply of credit during the economic crisis caused by the COVID-19 pandemic (2020–2021).

This work seeks to investigate the impact of BNDES Procapcred on strengthening the supported credit cooperatives. As cooperatives are important institutions for mitigating credit constraints in developing economies, and credit constraints in Brazil are partly influenced by the availability of financial services at the local level, the analysis was chosen at the municipal level. This is a pioneering work, as it estimates the effect of the intervention over a long period, allowing the identification of long-term effects of the program. For this purpose, a methodology based on the staggered difference-in-differences model, proposed in Callaway and Sant'Anna (2021), is employed.

The effects on the total number of cooperative members (both individuals and legal entities) were investigated, as well as on the number of cooperative members who conducted financial transactions with their cooperatives, such as term deposits and credit operations. For this purpose, data on BNDES Procapcred operations in the period from 2015 to 2023 were cross-referenced with data from the Central Bank of Brazil – BCB (Cooperative Members by Municipality and Estban), the National Treasury (Municipal Finances – Finbra), the Brazilian Institute of Geography and Statistics (IBGE), and the United Nations Development Programme (UNDP).

The assessment found that BNDES Procapcred was effective in relation to the variables considered. Support from the program is associated with growth in the total number of cooperative members in the municipalities, especially individuals, and the number of cooperative members with checking accounts, fixed term deposits, and credit operations. Greater effects were observed for higher intensity support and for municipalities with smaller populations, lower levels of urban hierarchy (i.e., lower centrality and greater dependence on services provided in other locations), lower Municipal Human Development Index (MHDI), and lower depth of the bank credit market.

This report is organised as follows: this introduction is followed by a literature review – both theoretical and empirical – which includes a description of BNDES Procapcred and the evolution of its operations over time, as well as a description of the economic importance of credit cooperatives. Next, the database, the evaluation outcome variables, and the descriptive statistics are presented, followed by a description of the methodology. The results are then described, including the average treatment effects and the dynamic effects in relation to the year of the first support for each municipality (event study). Disaggregated results are also presented, accounting for heterogeneity in the intensity of support and in municipal characteristics, as well as robustness tests of the estimates. Finally, the concluding remarks are presented, both from the Department for the Analysis and Evaluation of Public Policies (DEAP) of the Strategic Planning Area (AP), responsible for preparing this study, and from the Operations and Digital Channels Area (ADIG), responsible for operationalising the program.

3. CONTEXT

3.1. Program Description

Cooperatives are societies of people formed to provide services to their members, without the objective of profit.[1] Credit cooperatives, in turn, are financial institutions formed by the association of people to provide financial services exclusively to their members. Among the services, it is worth mentioning the granting of credit, collection of demand and time deposits, checks, provision of collection, custody and receipt services, and payments on behalf of third parties under agreement with public and private financial institutions and correspondents in the country, in addition to other specific operations and attributions established in the legislation in force (Pinheiro, 2008). In view of the importance of these institutions, the Credit Cooperative Capitalisation Program (Procapcred) was originally instituted and regulated on February 8, 2006 by Resolution 3,346 of the National Monetary Council (CMN) (BCB, 2006), aiming to promote the strengthening of the equity structure of credit cooperatives.

The program works by granting financing directly to cooperative members for the acquisition of shares[2] in single credit cooperatives[3] that have been in operation for more than one year. Once the financing is contracted, the funds are immediately transferred to the cooperative issuing the financed shares, which will register the respective contribution to its share capital in the name of the said cooperative member. The funds are deposited into an individual capital account, enabling them to receive the respective returns. According to the resolution, already accredited cooperative members, both individuals and legal entities dedicated to rural, fishing or industrial production, commerce or services, may be beneficiaries of Procapcred.

1 According to Law 5.764/1971, which defines the National Policy on Cooperativism (BRAZIL, 1971).

2 Shares are portions of the cooperative's share capital. They confer rights and duties to the member and are not intended to generate individual profit. In addition, they can be used as a form of project financing.

3 The National Cooperative Policy establishes three types of credit cooperatives: single cooperatives, central cooperatives or federations of cooperatives, and confederations of cooperatives. Single cooperatives are made up of at least twenty individuals, and legal entities whose economic activities are related to those of individuals and are characterised by the direct provision of services to members are allowed to participate. Central cooperatives or federations of cooperatives are made up of at least three single cooperatives and may exceptionally admit individual members. They aim to organise the economic and welfare services of interest to their members, integrating and guiding their activities, as well as facilitating the reciprocal use of services, which allows for economies of scale. Finally, confederations of cooperatives are made up of at least three federations of cooperatives and seek to coordinate the activities of their members in cases where the scale of the undertakings exceeds the scope of capacity or convenience of action of the central cooperatives and federations.

BNDES Procapcred operations utilise resources from the BNDES, which also assumed the role of regulating the program's financial conditions.[4] BNDES Procapcred is executed by the Bank through indirect operations, which are carried out in partnership with a network of accredited financial institutions that act as intermediary agents. The intermediary agent is responsible for analysing the financing and assumes the risk of default, thus having the prerogative to approve the credit. In addition, the shares acquired through financing from BNDES Procapcred, as well as with the beneficiary's own resources as a counterpart, must remain integrated into the capital of the issuing cooperative until the respective credit operation is settled.

According to the Circular Letter SUP/ADIG 4/2024-BNDES[5] and subsequent amendments, financing conditions are based on compound interest rates: (i) BNDES base financial cost (BNDES Fixed Rate – TFB, Long-Term Rate – TLP, Selic, Development Credit Letter Rate – LCD, Compound Fixed Rate or Compound Fixed Rate for SMEs); (ii) BNDES remuneration of 1.35% per year (or 0.95% per year for cooperative members residing or headquartered in the North and Northeast regions); and (iii) the financial agent's fee, limited to 3% per year. The funding has a participation of up to 100% of the acquired shares. The maximum financing amount per client is BRL 100,000 every 24 months. In addition, the sum of the basic values of each cooperative, relating to the balances of the pending financing granted to their respective members, must not exceed 100% of their reference equity (PR). The term of the operation is up to 15 years for members residing or headquartered in the North and Northeast regions, and up to 12 years for members from other regions, including up to two years of a grace period.

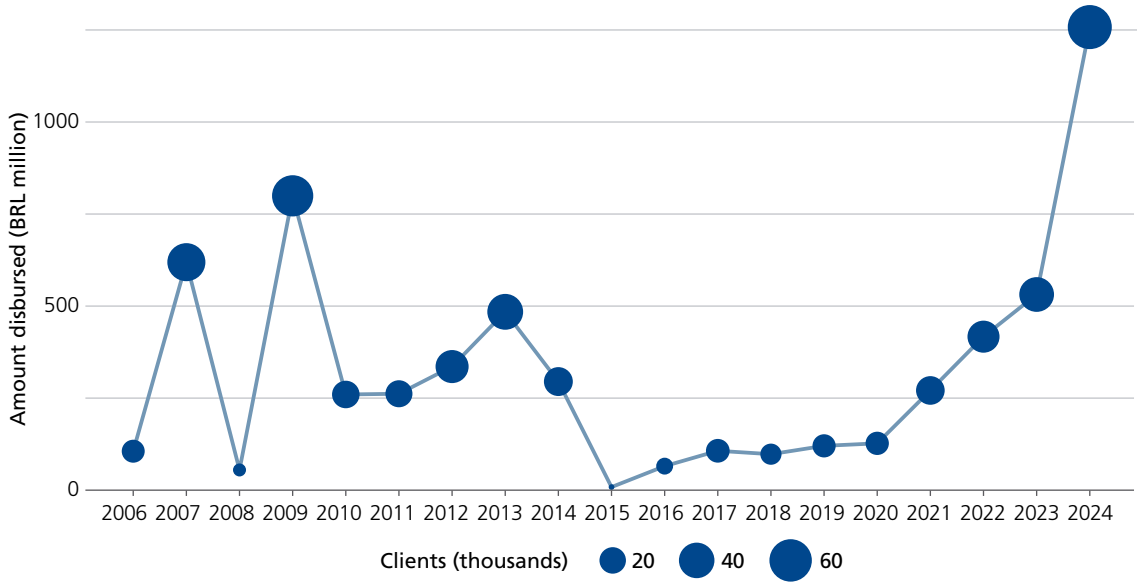
In the period covered by the database (2006–2024), BNDES Procapcred carried out 504,453 operations with 386,983 different clients in 818 municipalities, with temporal distribution as shown in Graph 1. The amount released reached BRL 6.2 billion.[6] The year with the most transactions was 2024, with over 65,000 clients served and a total amount disbursed of BRL 1.3 billion. Approximately 20% of the transactions were with recurring clients.

4 In 2015, through Resolution 4,406, of April 23, 2015, the CMN revoked the program. However, considering the potential contribution of credit cooperatives to banking decentralisation and credit diversification, especially for people with smaller economic status (a public traditionally supported by the Bank in the indirect modality), the BNDES maintained the essence of the program's original design in its portfolio, renaming it the BNDES Credit Cooperative Capitalisation Program, or BNDES Procapcred.

5 It should be noted that the program's conditions varied during the period analysed by the evaluation.

6 All monetary values have been deflated according to the National Consumer Price Index (IPCA) for December 2024.

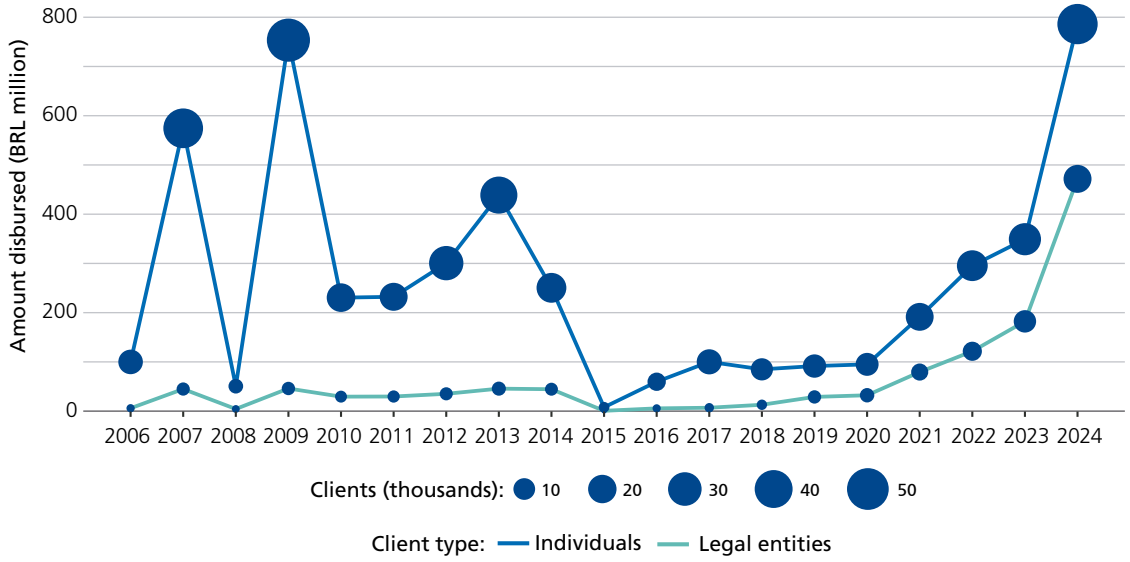
GRAPH 1 ● BNDES PROCAPCRED: AMOUNT DISBURSED AND NUMBER OF CLIENTS PER YEAR (2006-2024)



Source: The authors.

Most of the BNDES Procapcred operations were carried out with individuals, as shown in Graph 2. There were 436,911 operations individuals, involving 327,433 clients in 814 municipalities and BRL 5 billion released in total, compared to 67,542 operations with legal entities, which served 51,991 clients in 439 municipalities and released BRL 1.2 billion. Operations with legal entities became relatively more frequent from 2021 onwards. The recurrence rate of operations with the same clients was 21.6% for individuals and 11% for legal entities.

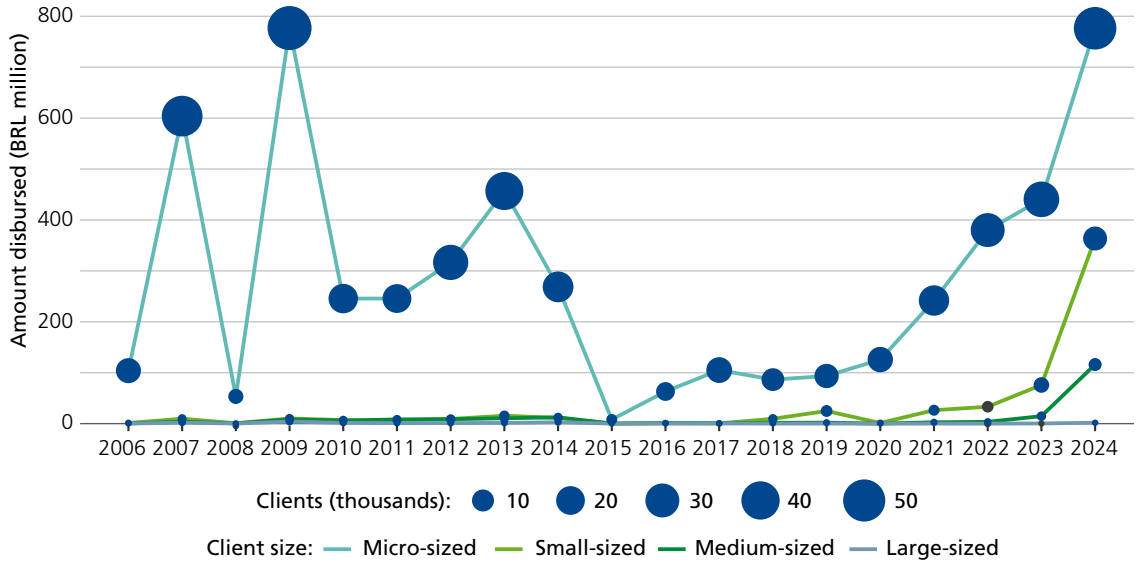
GRAPH 2 ● BNDES PROCAPCRED: AMOUNT DISBURSED AND NUMBER OF CLIENTS ACCORDING TO CLIENT TYPE AND YEAR (2006-2024)



Source: The authors.

Most operations involved micro-sized clients (a total of 472,840 operations, with 361,113 clients in 816 municipalities), as shown in Graph 3. Most of the resources released were also directed to clients of this size (BRL 5.4 billion). The recurrence rate of operations among micro-sized clients was 20.3%. For other sizes, it did not exceed 6%.

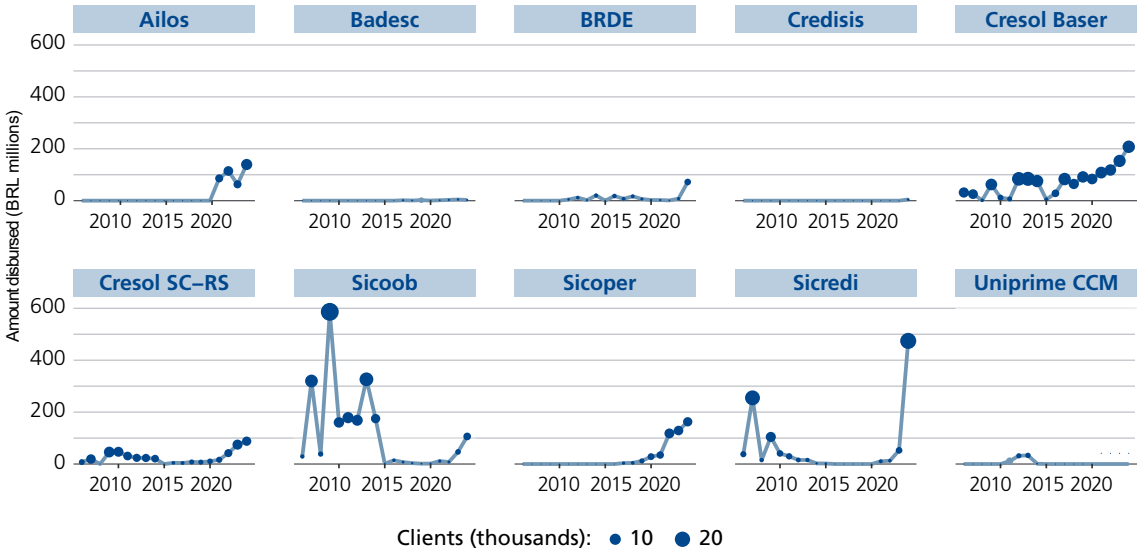
GRAPH 3 ● BNDES PROCAPCRED: AMOUNT DISBURSED AND NUMBER OF CLIENTS ACCORDING TO CLIENT SIZE AND YEAR (2006-2024)



Source: The authors.

BNDES Procapcred is based on indirect operations; therefore, they are executed by a network of partner financial agents. A total of ten agents carried out operations with BNDES Procapcred, as shown in Graph 4. Those standing out are the Brazilian Credit Cooperative System – Sicoob (105,216 operations, with 91,935 clients in 457 municipalities and BRL 2.1 billion released) and the Rural Credit Cooperative System with Solidarity Interaction (Cresol) Baser (179,162 operations, with 116,622 clients in 123 municipalities and BRL 1.3 billion released). Another highlight is the participation of the Cooperative Credit System – Sicredi (22,658 operations in 2024, with 22,170 clients in 34 municipalities and BRL 474 million released), which resulted in the largest volume released by a financial agent in a single year in the entire database. Regarding the recurrence of transactions between clients, the highlights are Cresol Baser (31.8%) and Cresol SC-RS (25.2%).

GRAPH 4 • BNDES PROCAPCRED: AMOUNT DISBURSED AND NUMBER OF CLIENTS PER FINANCIAL AGENT AND YEAR (2006-2024)



Source: The authors.

Most BNDES Procapcred transactions were concentrated in the South region of Brazil – 381,124 operations, with 133,735 clients served in 368 municipalities and BRL 3.9 billion disbursed, as shown in Table 1. This region also concentrated the largest share of recurring clients (22.3%). Most of the program's operations took place in the state of Paraná (161,383 operations, with 109,883 clients in 111 municipalities and BRL 1.6 billion released), followed by Santa Catarina (117,329 operations, with 90,421 clients in 127 municipalities and BRL 1.2 billion released) and Rio Grande do Sul (102,412 operations with 81,846 clients in 130 municipalities and BRL 1.1 billion released). In absolute terms, however, the state with the most municipalities with program operations is Minas Gerais (147).

Since February 2, 2024, the Bank's remuneration rate on BNDES Procapcred operations in the North and Northeast regions has been reduced.[7] In the North region, 7,593 operations were carried out, with 6,497 clients served in 46 municipalities and BRL 103 million released. The average ticket was BRL 15,700, and the recurrence rate was 13.5%. In the Northeast, 2,007 operations were carried out, with 1,903 clients in 40 municipalities and BRL 34 million released. The average ticket was BRL 17,600, and the recurrence rate was 5.1% of clients.

7 As per Circular Letter SUP/ADIG 4/2024-BNDES.

TABLE 1 ● BNDES PROCAPCRED: AMOUNT DISBURSED AND NUMBER OF CLIENTS PER REGION AND YEAR (2006-2024)

	Region									
	Midwest		Northeast		North		Southeast		South	
Year	Disb.	Clients	Disb.	Clients	Disb.	Clients	Disb.	Clients	Disb.	Clients
2006	11,859	594	0	0	339	14	26,689	999	66,898	12,537
2007	58,514	3,070	1,292	55	4,674	187	287,291	12,240	267,501	31,320
2008	3,061	145	1,676	77	2,110	93	32,369	1,474	15,707	1,645
2009	44,530	2,027	9,453	458	4,162	192	505,178	23,860	236,098	29,767
2010	15,516	750	8,131	556	2,508	121	110,568	5,925	123,187	14,561
2011	11,048	564	4,074	301	188	10	141,481	8,020	105,072	12,088
2012	21,835	1,182	2,545	179	670	36	137,298	8,166	173,367	24,299
2013	22,651	1,246	2,143	135	6,191	594	295,839	15,751	157,595	23,033
2014	12,728	441	3,958	184	7,928	544	128,951	5,709	141,368	17,761
2015	1,641	68	0	0	155	21	933	139	5,692	860
2016	2,495	145	0	0	7,341	402	7,667	622	47,772	5,386
2017	3,258	175	0	0	7,060	716	8,729	1,569	87,922	12,814
2018	1,366	102	0	0	4,639	305	8,273	1,234	83,463	9,929
2019	1,729	129	0	0	6,337	541	11,500	1,538	100,817	12,258
2020	2,906	212	8	1	2,938	292	6,443	763	114,899	13,359
2021	2,612	151	2	1	4,316	371	7,753	1,020	256,170	22,595
2022	2,825	162	9	10	6,591	497	9,122	1,040	398,393	29,771
2023	20,296	1,095	167	42	7,534	529	38,032	2,261	465,460	34,032
2024	92,234	3,761	75	6	26,833	1,971	88,416	3,424	1,050,279	56,186

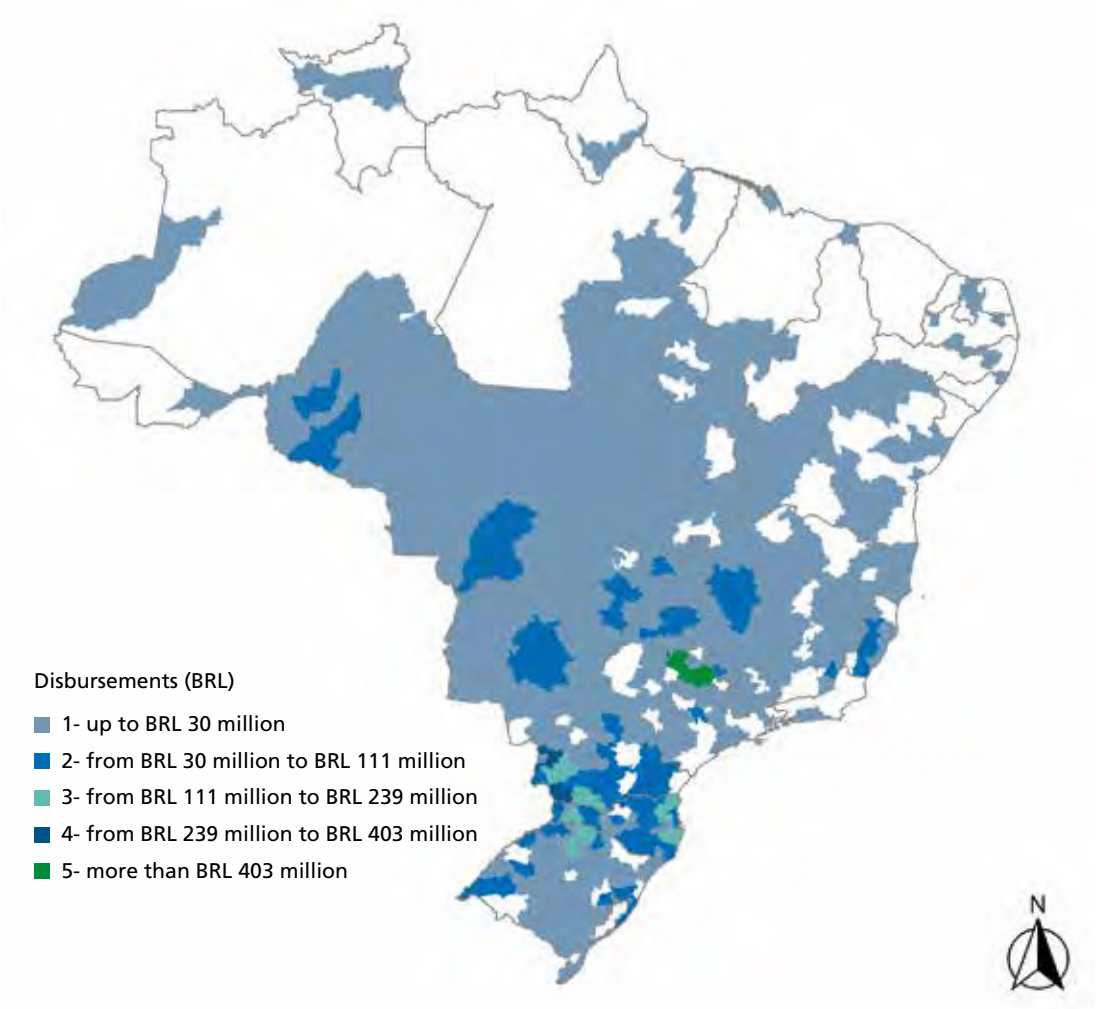
Source: The authors.

Note: Disbursements in thousands of reais.

The total amount of BNDES Procapcred disbursements by microregion[8] is shown in Figure 1. Most BNDES Procapcred operations occurred in the South and Midwest states, and western Minas Gerais. In terms of the number of operations, the microregion of Francisco Beltrão (PR) stood out, with a total of 35,617 operations, 24,697 clients in 18 municipalities, and BRL 313 million disbursed. The microregion with the highest number of clients and disbursements was Barretos (SP), with 29,721 operations, 25,874 clients in one municipality, and BRL 612 million disbursed.

8 The division by microregion is based on the classification of Brazilian municipalities into immediate urban articulation regions, as defined in the research on the regions of influence of cities – Regic (IBGE, 2020), and in the urban-regional division of Brazil (IBGE, 2017). Regic is a research that seeks to identify the hierarchy of Brazilian urban centres and delimits the regions of influence associated with them. This identification is conducted through the classification of urban centres that have certain facilities and services and that attract populations from other locations. This includes public and business services, such as the headquarters of public bodies and companies. More details can be found in IBGE (2020). Based on the results of this research, immediate geographic regions are defined as groupings of municipalities that primarily use the urban network as a reference point and have a local urban centre as their base. The development of this indicator considered the connection between nearby cities through relationships of dependence and population movement in search of goods, services, and work. Intermediate regions, in turn, are groupings of immediate regions that are articulated through the influence of a metropolis, regional capital, or representative urban centre within the group.

FIGURE 1 ● TOTAL VALUE OF BNDES PROCAPCRED DISBURSEMENTS PER MICROREGION[9]

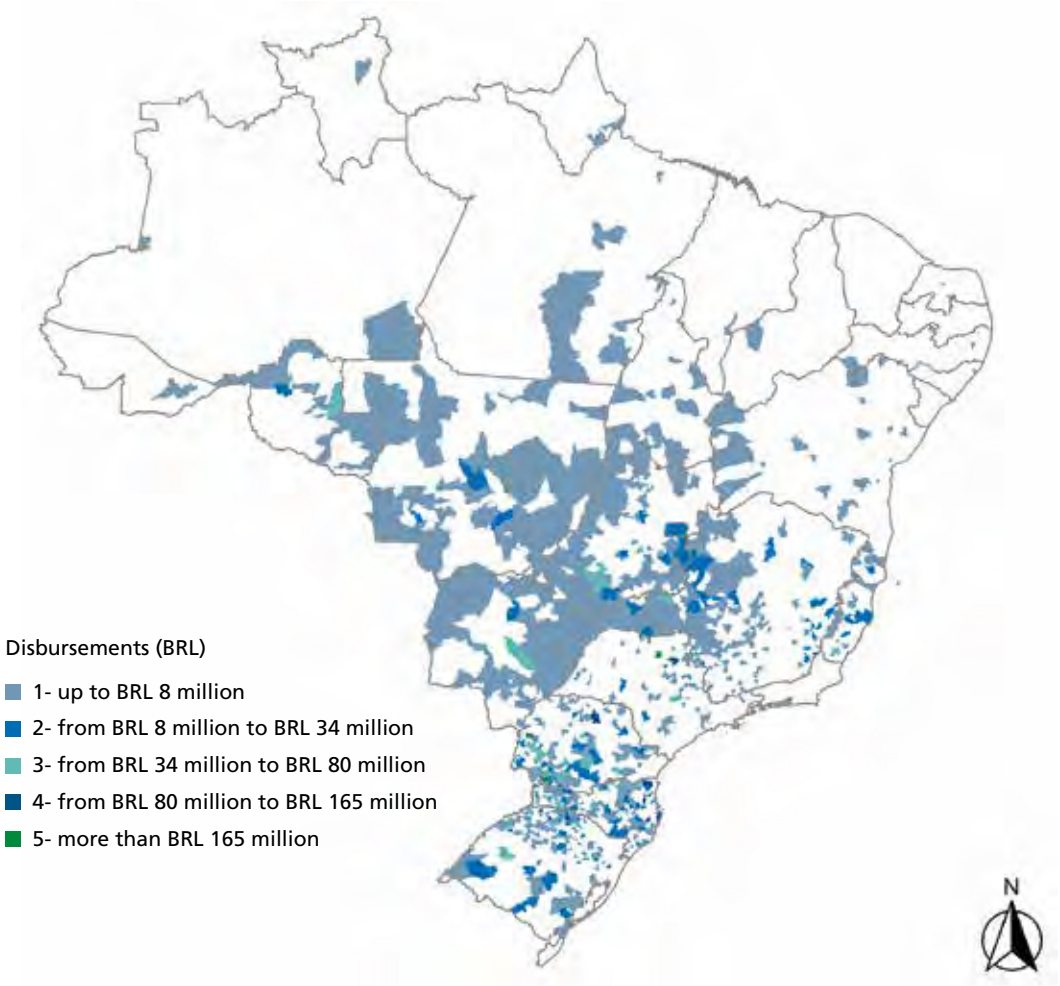


Source: The authors.

The total value of BNDES Procapcred disbursements per municipality is shown in Figure 2. The standout municipality was Bebedouro (SP), where 29,721 operations were carried out, with 25,874 clients and a total of BRL 612 million in disbursements.

9 In all maps in this section, the classification of BNDES Procapcred disbursements into ranges was calculated according to the head/tail breaks methodology (Martini; Teixeira, 2016).

FIGURE 2 ● TOTAL AMOUNT OF BNDES PROCAPCRED DISBURSEMENTS PER MUNICIPALITY



Source: The authors.

3.2. Theoretical Framework

Credit restriction is a phenomenon that can inhibit investment and production growth in an economy. It is partly caused by the asymmetry of information between lenders and borrowers in the credit market, so that lenders have difficulty differentiating between potentially good and bad payers clearly, and, in some cases, prefer simply not to offer their resources rather than assume high risks. Credit restriction can occur through two mechanisms related to information asymmetry: adverse selection and moral hazard (Stiglitz; Weiss, 1981). Adverse selection occurs when the interest rate charged by the lender is so high that it drives all lower-risk entrepreneurs out of the market, making the pool of demanders more risk-prone and more likely to default. According to the mechanism of moral hazard, a high interest rate can cause entrepreneurs to change their behaviour and undertake higher-risk projects, that is, with a lower probability of success, but with a higher return if they are successful.

Banks are institutions responsible for mitigating these informational problems in the credit market. However, in the case of younger, smaller firms with fewer assets available as collateral and without a history of relationships with banks, the information asymmetry can be so great as to cause a restriction of bank credit (Stiglitz; Weiss, 1983). Therefore, a closer relationship between the lender and the borrower could, in these cases, reduce the information asymmetry between them and benefit allocative efficiency (Angelini; Di Salvo; Ferri, 1998).

In this sense, credit cooperatives can play an important role in developing economies, according to two hypotheses (Banerjee; Besley; Guinnane, 1994). The first one, long-term interaction among its members, is based on two mechanisms: the community's ability to apply social sanctions to its members if they make opportunistic decisions (Besley; Coate, 1995) and the fact that cooperatives are sustained by repeated interactions among their members, so that they are incentivised to maintain a good reputation.

The second hypothesis assumes that the cooperative provides an efficient means of monitoring borrowers by their peers (Stiglitz, 1990). According to this, even if a community has a shortage of capital and needs to resort to external bank financing, neighbours (cooperative members) have a lower cost of obtaining information about borrowers than banks. There are three mechanisms that explain this hypothesis: the other members of the cooperative, acting as guarantors, can be held liable for the default of one member; a portion of each loan can be co-financed by another member of the cooperative, so that, in case of default, the other members are also harmed; and the interest rate charged on loans from other members can vary according to the default history of all members. Regarding the last point, the credit cooperative can be understood as a self-selection mechanism in which, in the presence of systemic risks and adverse selection, the creditworthiness of the borrower is indicated and they can, therefore, negotiate lower interest rates and more favourable conditions with banks (Smith; Stutzer, 1990).

In formal terms, the credit union member's problem can be summarised as a profit maximisation decision that depends on the difference between the revenues generated by the investment project and the costs of capital and monitoring provided by the cooperative (Banerjee; Besley; Guinnane, 1994), as per equation (1). The credit union is assumed to act simultaneously as the project financier, guarantor and monitor of the entrepreneur.

$$V \equiv E(\pi) - M(c) - \rho K + (K - b)\delta \quad (1)$$

In this equation, the profit V depends on $E(\pi)$, which represents the revenue derived from a project whose probability of success is equal to π. The other terms represent the costs related to monitoring and the application of penalties in case of default by the cooperative $M(c)$; the opportunity cost of the invested capital ρK; and the cost of capital for the cooperative, which depends on resources obtained from external sources, such as banks $(K - b)\delta$.

It is important to highlight that, for a given level of risk aversion on the part of the cooperative, the choice of project by the member depends on the volume of external capital $\boldsymbol{b}$, the

volume l of guarantees offered by the cooperative, the internal interest rate r charged to the member and the level of penalty c imposed on the defaulting member. In other words, the choice depends on parameters related to the constitution of the cooperative and its monitoring activity.

$$\pi = g(b, l, r, c) \quad (2)$$

Based on this framework, BNDES Procapcred can be understood as a policy that seeks to capitalise the credit cooperative, affecting the parameters related to its constitution (b, l, r). The program reduces dependence on external capital b, allowing members to negotiate better credit conditions, while increasing the cooperative's resource allocation that can be employed to provide services to members, such as the provision of guarantees l, and to offer more favourable interest rates r to its members. In this way, members can invest in projects with a higher probability of success, which reduces credit constraints caused by information asymmetry and enables new investments.

3.3. Empirical Literature Review

Cooperativism has been a subject of empirical studies in international literature in recent decades. In short, this literature highlights the role of cooperatives as a safe alternative for deposits, as well as being a relevant source of credit for families and micro, small and medium-sized enterprises, focusing on maximising benefits for their members (McKillop *et al.*, 2020). The differentiating factor of cooperatives would be to offer more favourable conditions for credit operations to their members, in terms of cost and availability (Angelini; Di Salvo; Ferri, 1998). Other studies highlight the countercyclical role of these institutions, which would present less abrupt responses to fluctuations in the financial market and economic cycles compared to other financial institutions (Lu; Swisher, 2020; McKillop *et al.*, 2020). Another aspect of the literature investigates the effects of belonging to a cooperative on the investments of its members. This literature verifies that cooperativism allows access to investments in technological improvements for rural producers in developing economies (Kolade; Harpham, 2014; Wossen *et al.*, 2017), including in its intensive margin (Zhang *et al.*, 2020).

In Brazil, some benefits of cooperativism have already been identified, such as the charging of lower spreads[10] compared to private banks, regardless of the relationship history and risk profile of borrowers (BCB, 2020b). This result can be explained by the inverse relationship between interest rates and the degree of cooperativism in the municipality (BCB, 2020ª). Relevant differences are also observed between the interest rates charged in personal credit operations without payroll deduction by cooperatives and commercial and multiple banks in similar operations (Annibal; Koyama, 2011). Cooperative interest rates are lower, but without a competitive effect on banks. Another important point is the fact that the profile of companies supported by cooperatives is

10 Bank spread is the difference between what a bank pays investors to obtain their funds and what it charges its clients to lend those funds.

predominantly micro and small-sized, with less participation of problematic assets (BCB, 2019). Finally, a relevant countercyclical role of credit cooperatives in Brazil was observed in the context of the 2008-2009 global crisis (Aghabarari *et al.*, 2021), since these institutions offered 17% more credit than commercial banks, with positive effects on employment and average wages in micro-enterprises that received credit.

There is evidence that the presence of credit cooperatives has positive impacts on local economies in Brazil, especially in relation to the agricultural sector. Schuntzemberger *et al.* (2015) observed that the creation of credit cooperatives in the period from 2006 to 2008 had an average impact of BRL 988.00 on the per capita agricultural gross domestic product (GDP) compared to municipalities without cooperatives. However, when compared with municipalities that already had cooperatives established before this period, the result was not significant. Jacques and Gonçalves (2016) verified an effect of BRL 1,825.00 on the per capita GDP of municipalities that created credit cooperatives between 2007 and 2010. Recently, Meneghini (2019) estimated that a 1% increase in cooperative credit would have a 0.31% impact on the agricultural income of municipalities in the state of Paraná. The author employed indicators related to the historical context of land access as instruments to enable an exogenous variation in the financial development of these municipalities. Going beyond credit, Sant'Anna *et al.* (2025) show that municipalities with agricultural cooperatives supported by the BNDES had an increase in the value of production, with gains in their intensive land use margin.

Specifically regarding the role of BNDES Procapcred, there are descriptive studies. Maia *et al.* (2014) describe the importance of BNDES support (including Procapcred) in the coffee sector in Brazil. Risson and Flach (2014) highlight BNDES Procapcred in the Bank's relationship with Cresol in the South region.

The only study that sought to evaluate the effectiveness of the BNDES Procapcred program investigated its countercyclical effects in the context of the COVID-19 economic crisis, between 2020 and 2021 (Martini *et al.*, 2023). When compared to municipalities with similar characteristics but without support, positive results were observed in the number of cooperative members with credit operations (between 40% and 42%) and the number of cooperative members with term deposits (between 40% and 48%) in municipalities with supported cooperative members. The effects were stronger in municipalities more dependent on services from other locations and in those with a less deep banking credit market. However, the analysis of the effectiveness of this program in the medium and long term is an unexplored point in the literature that this study seeks to fill.

4. THEORY OF CHANGE

The Theory of Change is an approach employed to plan, describe, and evaluate interventions (such as programs, public policies, or projects) that proposes an explicit and logical representation of the cause-and-effect relationships between the activities of an intervention and its expected results. Through the Theory of Change, the aim is to understand how and why a given initiative is expected to lead to certain results or impacts.

Chart 1 brings together the main elements applicable to the program: target population, problem, cause, solution, inputs, activities, products and services, general objectives, and specific objectives. Of the elements included in the ex-ante analysis, it is suggested to that we pay particular attention to the general and specific objectives of BNDES Procapcred, especially since the outcome variables of this work represent proxies for some of these objectives.

CHART 1 • BNDES PROCAPCRED THEORY OF CHANGE FRAMEWORK[11]

<table>
<tr><th>Target population</th><th>General Objective</th></tr>
<tr><td>Individual members, as well as corporate members dedicated to rural, fishing, or industrial production activities, commerce, or services.</td><td rowspan="6">Expand Access to Credit for Cooperative Members</td></tr>
<tr><td>Problem</td></tr>
<tr><td>Restricted access to credit for self-employed producers and smaller companies, which is especially evident in locations with low economic dynamism and/or small municipalities in the interior of the country.</td></tr>
<tr><td>Cause</td></tr>
<tr><td>Limitations in the equity structure of individual cooperatives for the expansion of credit operations, among other causes.</td></tr>
<tr><td>Solution</td></tr>
<tr><td>Granting financing directly to cooperative members so that they can acquire shares in individual credit cooperatives.</td></tr>
<tr><th>Inputs</th><th>Specific Objectives</th></tr>
<tr><td>Financial resources that make up the funding of the financial instrument;
Adequate financial conditions for small borrowers;
Partner financial institutions capable of carrying out operations with the target audience;
Operational platforms and regulations that govern and establish conditions to be applied by the agents.</td><td rowspan="5">Promote the strengthening of the equity structure of individual credit cooperatives;
Contribute to the decentralisation of banking and the diversification of credit in the Brazilian economy, especially aimed at smaller economic groups;
Promote the participation of cooperative members to strengthen credit cooperatives.</td></tr>
<tr><td>Activities</td></tr>
<tr><td>Maintain operational and regulatory systems updated;
Analyse and approve operations through operational systems;
Monitor and manage the portfolio of ongoing operations;
Manage the availability of resources for the financial instrument;
Monitor the guidelines and activities of the Central Bank, within the scope of the BC# Agenda;
Foster partnerships with financial institutions and relationships with central credit cooperatives.</td></tr>
<tr><td>Products and services</td></tr>
<tr><td>Credit operations carried out;
Members supported;
Individual cooperatives supported.</td></tr>
</table>

Source: The authors.

11 The BNDES Procapcred Theory of Change applicable to ex-ante analysis was registered through Joint Note AP/DEPEC 19/2022, ADIG/DEMOD 5/2022, dated December 30, 2022 (BNDES, 2022).

In addition to the Theory of Change Framework itself, the ex-ante analysis establishes a set of effectiveness and efficiency indicators that must be monitored annually and reported through a Self-Assessment Report. As of the publication of this report, the BNDES Procapcred Self-Assessment Reports for 2023, 2024, and 2025 have been published.[12] Table 2 presents some of the most recently obtained effectiveness indicators. Comparing indicators for supported and unsupported cooperatives, it is observed that, for both years with available data, growth in the first group is substantially higher within the scope of the objectives "to promote the strengthening of the equity structure of individual credit cooperatives" and "to contribute to the decentralisation of banking and the dispersion of credit in the Brazilian economy." This result suggests that credit cooperatives supported by the program achieved these objectives more dynamically. The relationship is inverse in the indicators related to the objective "to promote the participation of members to strengthen credit cooperatives." It is important to highlight that it cannot be stated, based on this comparative exercise per se, that there is a causal relationship, that is, that such a difference stems from the support of BNDES Procapcred: it is possible that there are attributes (observable or not) present in the cooperatives that were capitalised that substantially differentiate them from the others. The empirical exercise reported throughout this RAE aims precisely to identify and measure the causal relationship between the program's support and the set of outcome variables related to its objectives.

TABLE 2 • EFFECTIVENESS INDICATORS: BNDES PROCAPCRED SELF-ASSESSMENT REPORT

Objective	Indicator	2022	2023	2024
Promote the strengthening of the asset structure of individual credit cooperatives	Average percentage change in the value of assets of individual cooperatives supported by BNDES Procapcred	32.5%	30%	20.4%
	Average percentage change in the value of assets of non-supported individual cooperatives	16.2%	15.4%	12.6%
	Average percentage change in the value of term deposits of individual cooperatives supported by BNDES Procapcred	35.4%	27.3%	26.1%
	Average percentage change in the value of term deposits of non-supported individual cooperatives	21.2%	19.2%	24.3%
Contribute to the decentralisation of banking and the diversification of credit in the Brazilian economy, especially aimed at the lower-income public	Average percentage change in the loan portfolio of individual cooperatives supported by BNDES Procapcred	29.8%	24.9%	19.4%
	Average percentage change in the loan portfolio of non-supported individual cooperatives	12%	9.9%	9.5%
	Average change in the share of the loan portfolio of cooperatives supported by BNDES Procapcred in relation to the loan portfolio of their municipalities	0.582	0.319	0.242
	Average change in the share of the loan portfolio of non-supported cooperatives in relation to the loan portfolio of their municipalities	0.158	-0.164	-0.032

12 The BNDES Procapcred Self-Assessment Reports are public and can be accessed on the BNDES website at: https://www.bndes.gov.br/wps/portal/site/home/transparencia/resultados-para-a-sociedade/efetividade/indicadores/programa-bndes-de-capitalizacao-de-cooperativas-de-credito-bndes-procapcred/.

Objective	Indicator	2022	2023	2024
Promoting member participation to strengthen credit cooperatives	Average percentage change in the number of cooperative members with credit operations in municipalities covered by individual cooperatives supported by BNDES Procapcred	19.2%	12.1%	5.4%
	Average percentage change in the number of cooperative members with credit operations in municipalities covered by non-supported individual cooperatives	25.1%	18.3%	8.9%
	Average percentage change in the number of cooperative members with term deposits in municipalities covered by individual cooperatives supported by BNDES Procapcred	69.4%	9.4%	10.5%
	Average percentage change in the number of cooperative members with term deposits in municipalities covered by non-supported individual cooperatives	78.8%	18.1%	18.5%

Source: The authors.

5. DATABASES

5.1. Data sources

This assessment was based on cross-referencing six municipal-level databases: BNDES Procapcred operations data, Cooperative Members by Municipality, Estban, Sidra-IBGE, IDHM, and Finbra. To identify the municipalities covered, data on BNDES Procapcred operations for the period from 2015 to 2023 were used.[13] This database contains information on each disbursement of program funds, including date, amount of disbursement, CPF/CNPJ (taxpayer registration number) of the supported cooperative member, municipality of the individual cooperative that capitalised the resource, type of client (individual or legal entity) related to the cooperative member and its size, and financial agent involved in the operation. To aggregate the operations database at a municipal level, information from the first BNDES Procapcred operation in each municipality during the analysis period was used.

To obtain results data on the effectiveness of the program, the municipalised database of resource disbursements was cross-referenced with other external municipal databases, which provide information on the economy, population, and public finances. The main database employed to analyse the effectiveness of BNDES Procapcred is "Cooperados por Município" (Cooperative Members by Municipality), from the Central Bank of Brazil (BCB). The data are generated based on document 5300 – Information on Cooperative Relationships,[14] which

13 BNDES Procapcred operations began in 2006. However, since the main basis for verifying the program's results (Cooperative Members by Municipality) only presents data from 2015 onwards, that year was used to build the analysis base.

14 Document 5300 – Information on Cooperative Relationships, the primary source of information on cooperative members by municipality, is governed by BCB Resolution 221, of March 30, 2022, and regulated by BCB Normative Instruction 297, of August 23, 2022, and must be prepared and submitted monthly to the BCB by individual credit cooperatives. Thus, the content of the information is the sole responsibility of the respective institution, in accordance with the regulations in force. Further details are available at: https://www.bcb.gov.br/estabilidadefinanceira/cooperados_municipio.

includes the number of cooperative members per municipality, in total terms and by type of person (individual or legal entity) and type of operation performed. It is updated monthly and covers the last six published months. To construct an annualised series, the values for December of each year were selected. The position for January 2016 was employed as a proxy for December 2015.

Estban, also from the BCB, presents information on bank credit without taking cooperatives into account. Its data were employed to categorise the depth of the credit market in the municipalities. The spreadsheet with the balances by municipality includes the monthly position of the balances of the main balance sheet items of commercial banks and multiple banks with a commercial portfolio by municipality. To construct an annual series, the December positions for each year were consolidated.

Data on population, GDP, and hierarchical level for the municipality were obtained from the IBGE Automatic Recovery System (Sidra), according to the 2018 Regic[15]. Population data were collected from population estimates sent to the Federal Court of Accounts (TCU) for each year of the series (IBGE, 2025).

The HDI, calculated by the UNDP in partnership with the Institute for Applied Economic Research (Ipea), is a measure that assesses the human development of a municipality based on three dimensions: health, education, and income. Because it depends on census data, the most recent information available refers to the year 2010.

Lastly, Finbra (Municipal Finances) consolidates information from declarations received by the National Treasury as mandated by Complementary Law 101/2000, the Fiscal Responsibility Law – LRF (Brazil, 2020). This database was created by the National Treasury Secretariat (STN) in conjunction with Caixa Econômica Federal and presents consolidated figures for Brazilian states and municipalities.[16] Indicators of municipal expenditures and revenues were obtained from this database.

The databases were cross-referenced according to two indexing variables: the municipality code according to the IBGE (seven digits) and the year. The outcome variables chosen for this evaluation seek to measure the impact of the BNDES Procapcred program in terms of strengthening the equity structure of individual credit cooperatives, using the number of individual members and their financial operations as indicators. As the program aims to alleviate credit constraints, it is worth highlighting the outcome variable of the total number of members with credit operations in cooperatives in the municipality. It is also worth highlighting the variable of members with term deposits, since this operation strengthens the cooperative's ability to

15 As previously mentioned, Regic is a survey that seeks to identify the hierarchy of Brazilian urban centres and delimit the regions of influence associated with them (IBGE, 2020).

16 The available information is obtained by receiving accounting data through Siconfi and the Accounting Data Collection System (SISTN). The accounting data information is declared by the legal representatives of the entities in the format of the Annual Accounts Declaration (DCA) or the Accounting Accounts Detailing Table (QDCC), both as approved by the STN.

grant credit to its membership base, as its results return to the members themselves, either in the form of distributed sums or better financing conditions for credit operations. All population, member count, and financial variables extracted from the database were converted to a logarithmic scale to control for the effects of extreme values.

CHART 2 • RESULT VARIABLES

Variable	Description
Members (total)	Total number of members in the municipality (Individuals + Legal Entities)
Members (Individuals)	Total number of active individual members in the municipality
Members (Legal Entities)	Total number of active legal entity members in the municipality
Members with a checking account	Number of members who have a checking account in a credit union in the municipality (Individuals + Legal Entities)
Members with fixed term deposit	Number of members who have a fixed term deposit in a credit union in the municipality (Individuals + Legal Entities)
Members with credit operations	Number of members who have a credit operation in a credit union in the municipality (Individuals + Legal Entities)

Source: The authors.

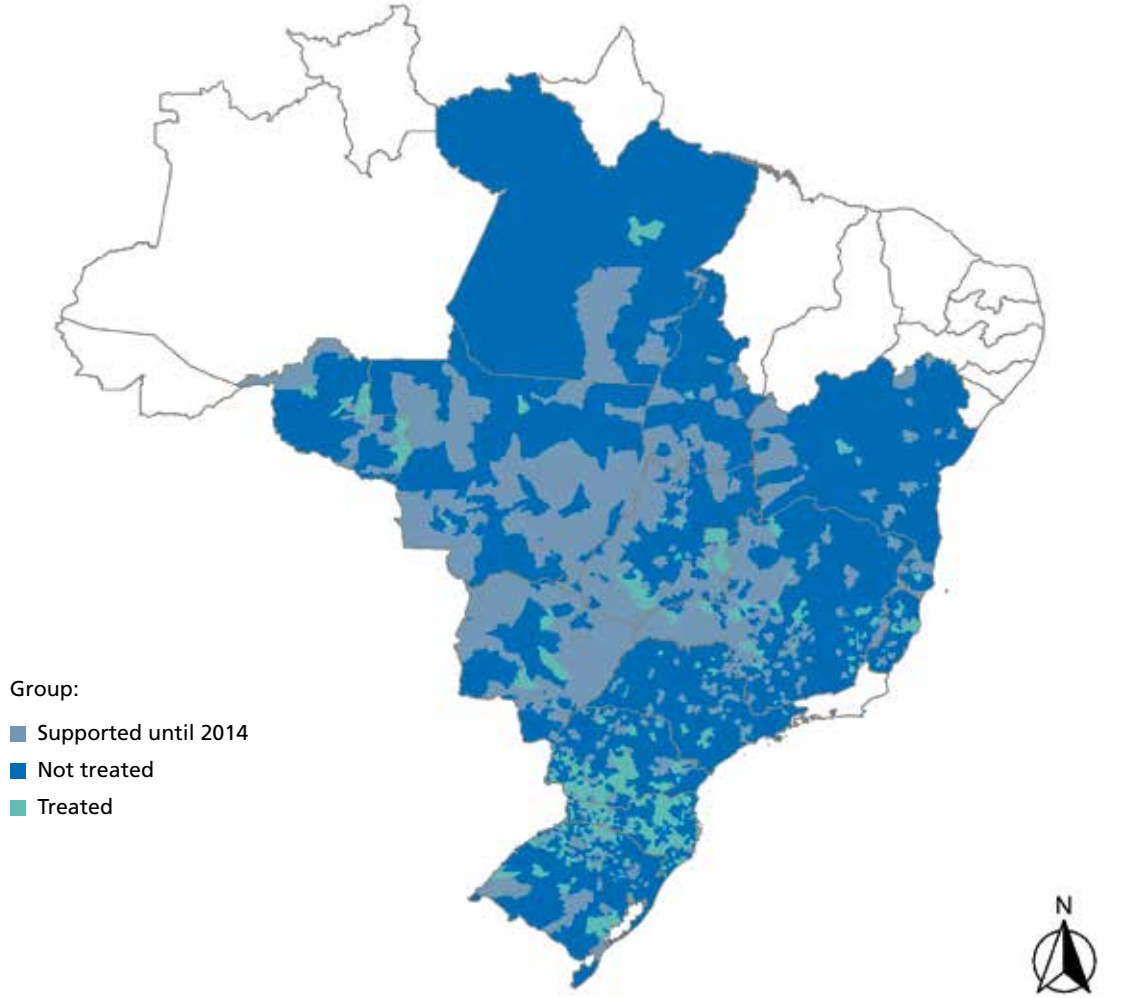
5.2. Descriptive Statistics

A total of 308 municipalities with a single cooperative capitalized with support from BNDES Procapcred between 2015 and 2023 were identified; these municipalities constitute the treatment group in this evaluation. The control group consists of 3,678 municipalities whose single cooperatives did not receive support during the period, but which have a credit cooperative in their territory and are in a state where there was at least one BNDES Procapcred operation in the period under analysis.[17] It should be noted that this set includes 482 municipalities that received some operation between 2006 and 2014, but not after that period. As this evaluation focuses on the direct effects of the program, it is assumed that these municipalities are no longer affected by the intervention. Even so, a robustness test of the estimates was performed without this subset, to test whether there was contamination of the results.

Figure 3 shows the distribution of municipalities across the two groups. In general, there is a greater concentration of supported municipalities in the South region. On the other hand, the municipalities supported only until 2015 included many localities in the Midwest region and western Minas Gerais. In the treatment group, the municipality that received the most resources from BNDES Procapcred during the analysis period (2015 to 2023), in values deflated to 2024, was Francisco Beltrão (PR), with BRL 123.2 million, followed by Blumenau (SC), with BRL 74.8 million, Águas Mornas (SC), with BRL 59.2 million, Frederico Westphalen (RS), with BRL 56.9 million and Joinville (SC), with BRL 53.8 million.

FIGURE 3 • MUNICIPALITIES IN THE TREATMENT AND CONTROL GROUPS

17 These states are: Rio Grande do Sul, Santa Catarina, Paraná, São Paulo, Minas Gerais, Espírito Santo, Bahia, Mato Grosso do Sul, Mato Grosso, Rondônia, Goiás, Distrito Federal, Tocantins, and Pará.



Source: The authors.

Most of the municipalities with BNDES Procapcred support have more than 10,000 inhabitants, a high HDI (Human Development Index), and are in the deepest range of their credit market,[18] as shown in Table 3. A population greater than 10,000 inhabitants was found in 64% of the treatment group and 51.1% of the control group, according to 2014 data, considered the reference year as it was immediately prior to the program evaluation. Regarding development, 74.7% of the municipalities in the treatment group and 43.9% in the control group presented an HDI of 0.70 or higher. In relation to the depth of the credit market, 58.8% of the municipalities in the treatment group and 28.4% in the control group are in the high-depth range. Considering the urban hierarchy categories of Regic, 61.7% of the municipalities in the treatment group and 81.2% in the control group were classified at the lowest level (local centre).

TABLE 3 • DISTRIBUTION OF MUNICIPALITIES BY HETEROGENEITY

18 The depth of the credit market is equivalent to the ratio between the amount of bank credit operations and the municipality's GDP. Using 2014 values as a reference, the "low depth" category includes municipalities in the first three quartiles of this ratio distribution, while the "high depth" category includes municipalities located in the last quartile of this ratio distribution. For more details on this indicator, see Djankov *et al*. (2007), Sant'Anna, Borça Júnior and Araújo (2009), and Martini *et al*. (2023).

Heterogeneity	Category	Number		Distribution	
		Control	Treated	Control	Treated
Total		**3,678**	**308**	**100%**	**100%**
Population range	More than 10,000 inhabitants	1,881	197	51.1%	64%
	Fewer than 10,000 inhabitants	1,797	111	48.9%	36%
HDI range	High (0.70 or more)	1,614	230	43.9%	74.7%
	Low and medium (up to 0.70)	2,059	78	56%	25.3%
Credit market depth	High (25.1% or more)	1,043	180	28.4%	58.4%
	Low (up to 25.1%)	2,635	128	71.6%	41.6%
Regic Hierarchy	Other levels	473	112	12.9%	36.4%
	Local centres	2,988	190	81.2%	61.7%

Source: The authors.

Note: 216 municipalities in the control group and six municipalities in the treatment group were not identified in the Regic survey.

Table 4 reinforces these points observed in the heterogeneity analyses. In terms of regional heterogeneity, 78.6% of the municipalities in the treatment group and 25.8% of the municipalities in the control group are located in the South region. The test of differences of means reveals that the greater concentration of municipalities in the treatment group in the South region, as well as its higher HDI level, greater depth of the banking credit market, and lower concentration at the lowest hierarchical level (local centres), are statistically significant.

TABLE 4 • MEANS BY TREATMENT STATUS AND T-TEST FOR THE DIFFERENCE OF MEANS (2014)[19]

Variable	Treated	Controls	t	p value
Bank branches	11.3	4	2.76	0.006
Bank loans (BRL million)	678.2	292.6	1.59	0.112
Bank financing (BRL million)	251.4	164.3	0.66	0.509
Bank credit operations (BRL million)	2,640.1	946.4	1.51	0.133
Education expenses *per capita* (BRL)	1,190.7	1.365.6	-6.91	0.000
Health expenses *per capita* (BRL)	1,124.1	1.193.2	-2.71	0.007
Property Tax Revenue *per capita* (BRL)	101.7	73.9	3.92	0.000
Service Tax Revenue *per capita* (BRL)	167.9	174.5	-0.62	0.536
Real Estate Transfer Tax Revenue *per capita* (BRL)	58.7	57.5	0.40	0.686
Tax revenue *per capita* (BRL)	457	408.1	2.32	0.021
GDP *per capita* (BRL)	45,816.5	37,484.5	6.44	0.000
Population	71,139.6	31,926.3	2.75	0.006
Value added by public administration *per capita* (BRL)	6,944.6	6,836.3	0.78	0.438
Value added by agriculture *per capita* (BRL)	8,889.2	7,842.9	2.39	0.017

19 According to the t-test, the null hypothesis is that the difference between the means of the two groups is zero. The alternative hypothesis is that the difference is not zero, regardless of whether it is greater for treated or controls.

Variable	Treated	Controls	t	p value
Value added by industry *per capita* (BRL)	9,064	7,701.1	1.78	0.076
Value added by services *per capita* (BRL)	16,931.8	12,082.8	8.26	0.000
HDI	0.725	0.681	15.44	0.000
Depth of credit market	29.8%	16.5%	10.78	0.000
Midwest Region	4.5%	12.3%	-5.95	0.000
Northeast Region	0.6%	11.3%	-15.31	0.000
North Region	2.3%	8.9%	-6.84	0.000
Southeast Region	14%	41.7%	-12.96	0.000
South Region	78.6%	25.8%	21.53	0.000
Regic – Local centre	61.7%	81.2%	-6.86	0.000
Regic – Other levels	36.4%	12.9%	8.39	0.000
Total number of municipalities	**308**	**3.678**		

Source: The authors.

The test also reveals that municipalities in the treatment group, compared to the municipalities in the control group, have lower per capita public spending, higher tax revenue, and higher per capita property tax (IPTU) and GDP, in addition to a larger population. The municipalities with supported cooperative members have an average population of 71,100 inhabitants, while those in the control group have approximately 31,900. Regarding the variables of volume of banking operations, as well as the other variables of municipal revenue, the t-test performed did not find significant differences between the means of the two groups at a significance level of 10%.

6. METHODOLOGY

This study aims to evaluate the effectiveness of the BNDES Procapcred program in strengthening credit cooperatives, in terms of both the number of members and the number of transactions carried out by members. Since approximately 44.6% of Brazilian municipalities lack a bank branch,[20] it is considered that the restriction of credit in the country has a local component, so that this lack of services can be mitigated through the activities of cooperatives (Schuntzemberger *et al.*, 2015). Therefore, this evaluation seeks to observe the effects of the program at the municipal level, and not of individual cooperatives.

The evaluation of the BNDES Procapcred effects on municipalities whose individual cooperatives received support presents two important challenges. First, the treatment is implemented in a staggered manner over time, given the presence of multiple periods and groups of treated municipalities. In this study, the evaluated municipalities received support between 2015 and 2023. Second, the effects of the treatment can be dynamic and vary according to the period since the first exposure to the treatment: $e = t - g$, where t indicates the period and g represents the year of initial treatment of the cohort of supported municipalities. For example, the strengthening of a credit cooperative may take several years to materialise, which may generate some lag in its effect on the credit operations of its members.

Since the data employed in this evaluation form a long panel with treatments phased over time, it makes sense to use a difference-in-differences model specification that allows capturing dynamic treatment effects. In this sense, the method developed by Callaway and Sant'Anna (2021) was chosen, which allows estimating the impact of the treatment for each treatment cohort g, for each period $t = 1, 2, \ldots, \tau$, and for each period since exposure to the treatment e, in a difference-in-differences framework. Like the traditional difference-in-differences method, the proposed estimator allows controlling for unobservable time-fixed characteristics of the units in the two comparison groups, which reduces distortions caused by selection bias. Finally, the control groups in this framework can be composed of units *never treated* or units *not yet treated.*

20 According to Estban data fromdata on December 2023.

The phased difference-in-differences estimator

Callaway and Sant'Anna (2021) developed a methodology for estimating the average treatment effect in cases where there is arbitrary heterogeneity of the treatment effect among the treated units and/or dynamic treatment effects for all units. The developed model starts from the identification of a disaggregated causal parameter of the treatment effect (group-time average treatment effect), which is equivalent to one parameter for each cohort g of treated units – identified by the initial year of treatment. Formally, assuming that there are no treatment anticipation effects, the average treatment effect on the outcome variable Y for municipalities belonging to cohort g in period t is denoted as:

$$ATT(g,t) = E\left[\left(\frac{G_g}{E[G_g]} - \frac{\frac{P_g(X)C}{1-P_g(X)}}{E\left[\frac{P_g(X)C}{1-P_g(X)}\right]}\right)(Y_t - Y_{g-1})\right] = \mathrm{E}[(w_g^G - w_g^C)(Y_t - Y_{g-1})]$$

$$= \mathrm{E}\{w_g^G(Y_t - Y_{g-1})|G_g = 1\} - \mathrm{E}\{w_g^C(Y_t - Y_{g-1})|C = 1\} \quad (3)$$

For each cohort-period pair, the estimator uses observable variables from the treatment and control groups to make the latter more similar to the former in terms of the probability of receiving the treatment. To do so, the propensity score for treatment is computed and defined as $P_g(X) = P\left(G_g = 1 \middle| X, G_g + C = 1\right)$ where X is a covariates vector, G_g is a binary variable for the treatment units belonging to cohort g, and C is a binary variable that takes the value 1 for the units of the control group. The propensity score is employed to construct weights that weight the observations in the treatment and control groups (w_g^G e w_g^C, respectively), whose sum equals 1, in order to balance the observable characteristics between treated and control groups. With these procedures, it is possible to estimate the average treatment effect for each cohort-period pair of treated individuals. The reference period employed in this estimation is the most recent one in which potential outcomes unaffected by the treatment are observed for the units in cohort g, that is, $t = g - 1$.

The specific parameters estimated are flexible enough to be aggregated, allowing the treatment effects to be calculated separately by cohort and by period. The temporal dimension of interest in this evaluation is the time of exposure to the treatment, that is, the time elapsed since the first contribution of resources to the supported municipalities. For a period equal to $e = t - g + 1$, the aggregate effect of the treatment in this dimension is:

$$\tilde{\theta}_D = \sum_{\tau}\sum_{\tau} 1\{e = t - g + 1\} ATT(g,t) P(G = g | e = t - g + 1) \quad (4)$$

In this equation, the parameter $\tilde{\theta}_D$ is the event-study estimator and is equivalent to the average effect of Procapcred for the municipalities treated in e years after the first resource allocation. The term $1\{e = t - g + 1\}$ has a value equal to 1 when the time elapsed since the first resource allocation is equal to e, and a value of 0 otherwise. The term $P(G = g|e = t - g + 1)$ is the proportion of municipalities treated in group g in year e. Therefore, the aggregate average treatment effect for the entire time dimension[21] is defined by:

$$\theta_D = \frac{1}{\tau - 1}\sum_{e=1}^{\tau-1}\tilde{\theta}_D(e) \quad (5)$$

The central hypothesis that underlies the estimator proposed in this methodology is that the control group would provide the trajectory of the mean of the outcome variable after treatment for the treated groups if they had not received it. In other words, the control group should represent the counterfactual for the treatment groups in the absence of the program. The validity of this hypothesis can be obtained through tests, for each treated cohort, on the similarity of the trajectories of the means of the outcome variable for the treated and control groups before the start of treatment.

The estimations made considered an unbalanced data panel – that is, one that uses information from all municipalities present in some period in the database. This choice is justified due to the absence of small municipalities in the database in some years. Thus, if the evaluation worked only with a balanced sample, it would end up being biased towards the effect on larger municipalities. Due to differences in the profile of treated and control groups before treatment, the control group included both municipalities never supported by BNDES Procapcred and those not yet supported, excluding those without the presence of cooperatives or located in states where there were no BNDES Procapcred operations during the analysis period.

The estimation and inference method adopted is *double robust*, which seeks, from a vector of chosen control variables, to model both the propensity score for treatment and the evolution of the outcome variable, with its result being robust to possible specification errors (Sant'Anna; Zhao, 2020). The control variables chosen were the population and the total number of cooperatives in the municipality. The population was included as a way to control for the effects of the municipality's size. The total number of cooperatives was included because it may jointly influence local outcome variables and the probability of a municipality receiving

21 Since the composition of the groups can change across different e values, the interpretation of this parameter can become complex. An alternative suggested by Callaway and Sant'Anna (2021), and adopted in this study, is the calculation of the average ATT from the aggregation of the effect parameters by cohort. The formalisation of this calculation is analogous to the equation presented here.

support.. On the one hand, since the number of institutions indicates the strength of local cooperativism, it affects the number of members and their operations in the municipality. On the other hand, municipalities with more cooperatives are more likely to have members supported by BNDES Procapcred.

It is observed that the temporal coverage of the effectiveness evaluation exercise (2015 to 2023) is shorter than the coverage of the Procapcred program's duration, which began in 2006, due to the limitations of the cooperative member database by municipality provided by the Central Bank of Brazil (BCB). Since many municipalities received their first actual support between 2006 and 2015, support prior to 2015 was disregarded for the identification of the treatment initiation cohort. As this evaluation focuses on the direct effects of the treatment (i.e., the number of cooperative members and their financial transactions), this choice is not expected to cause distortions in the estimates. For robustness testing purposes, the same estimates were replicated in an exercise where the control group included only municipalities without any transactions since the program was instituted, as well as in another exercise where the control group consisted only of municipalities with some transactions during the same period. If the estimates are robust, the results obtained from these tests should exhibit no substantial discrepancies.

7. RESULTS

This section presents the results of the estimations. For each variable, estimates of the average impact of BNDES Procapcred for the entire period are presented, as well as estimates of the dynamic effect of the support for up to 7 years after the treatment. After presenting the general results, results are presented considering the heterogeneities among the supported municipalities, according to the relative value of the supported project, the population range, the HDI range, the depth of the credit market, and the hierarchical level according to Regic.

7.1. Average effect of the treatment and event study

The first analysis point seeks to estimate the direct effects of BNDES Procapcred support on the number of cooperative members in the municipality. According to the estimates, there is evidence of a positive impact from the program, compared to municipalities without supported cooperative members. The support is associated with growth in the total number of cooperative members of +30.1%. The effect is greater for individuals (+31.7%) than for legal entities (+14.6%).

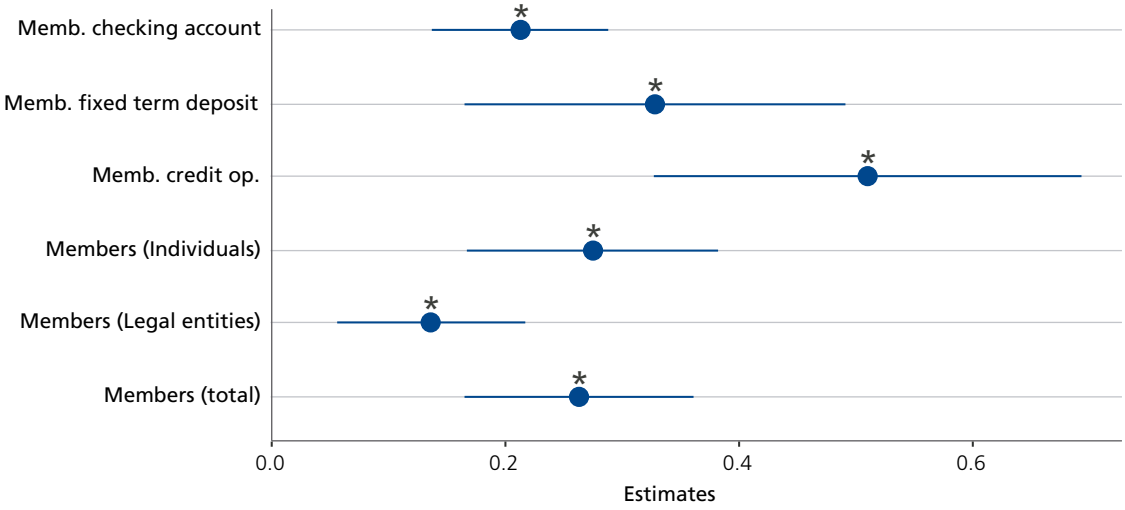
The next analysis point seeks to test the hypothesis that BNDES Procapcred support, by mitigating credit restriction problems, increases the number of cooperative members who carry out financial operations, whether deposits or credit operations. The estimates reveal evidence of a positive impact of the program on the variables considered, compared to municipalities

without supported cooperative members. Support from the program is associated with an increase in the number of cooperative members with checking accounts (+23.7%), with term deposits (+38.8%), and with credit operations (+66.5%).

The results obtained are consistent with the predictions made based on the Banerjee, Besley, and Guinnane (1994) model. A more intensively capitalised credit cooperative is able to offer a more favourable constitution (in terms of credit supply, service provision, and interest rates) to its members, which reduces the probability of default and credit restriction and encourages new investments. Furthermore, the results verified here corroborate Kolade and Harpham (2014), Wossen *et al.* (2017), and Zhang *et al.* (2020) regarding the importance of cooperatives in mitigating credit restriction and improving members' access to investments. It is important to note that this study did not obtain information regarding the types of investments made by the beneficiaries. Compared to the assessment of the countercyclical effects of Procapcred (Martini *et al.*, 2023), the effects verified here were similar for term deposits and greater in magnitude for credit operations.[22] Furthermore, the previous evaluation had not observed significant and robust results regarding the number of cooperative members. The divergence in the magnitude of results is certainly related to the method employed in this evaluation, which seeks to recover the dynamic effects of the treatment over long periods. Graph 5 presents the average effects of the support on the outcome variables presented in Chart 2.

22 When evaluating the countercyclical effects of BNDES Procapcred in the period 2019-2021, Martini et al. (2023) verified effects of the 3% support on the number of cooperative members in the municipality (total and individuals), between 39.6% and 41.7% on the number of cooperative members with credit operations, and between 39.6% and 47.6% on the number of cooperative members with term deposits.

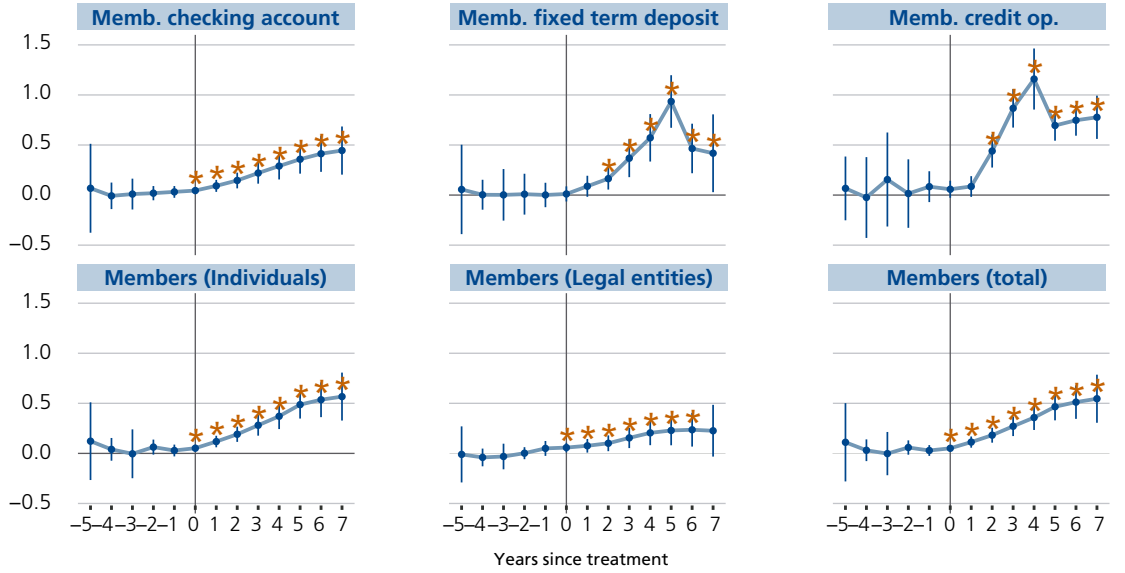
GRAPH 5 ● AVERAGE EFFECTS OF BNDES PROCAPCRED (OVERALL ATT, 2015-2023)



Source: The authors, based on data from BNDES, IBGE, and BCB.
Note: Dependent variables in log.

Graph 6 presents the dynamic effects of BNDES Procapcred on municipalities with individual cooperatives that received support. The horizontal scale represents the year since the treatment, where zero means the year of the first operation. The vertical scale represents the magnitude of the estimated treatment effect parameters. In each panel element, the points are the estimated coefficients, the vertical line crossing each point is the 95% confidence interval, and the asterisk above each point highlights coefficients that are significantly different from zero.

GRAPH 6 ● DYNAMIC EFFECTS OF BNDES PROCAPCRED



Source: The authors, based on data from BNDES, IBGE, and BCB.
Note: Dependent variables in log.

The results show that the effect of the support tends to be more immediate regarding the number of members and checking account transactions. The effects on term deposits and

credit operations, however, have a medium-term profile, beginning in the second year after treatment. These results are in line with expectations, since it can take some time for a capitalised cooperative to offer better credit conditions to its members. In general, the effects tend to be increasing, although with a tendency to decelerate. Finally, no statistically significant pre-treatment trends were observed, which reinforces the causality of the estimated results.

7.2. Heterogeneities

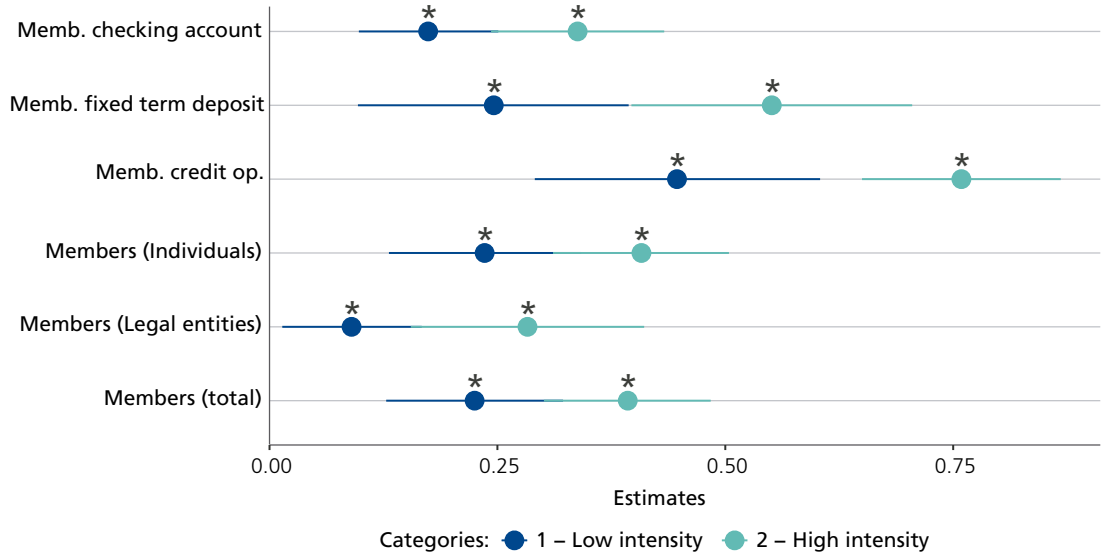
The heterogeneity analysis seeks to understand whether the effects of the intervention vary between different groups. In this paper, the disaggregated results are presented as a function of heterogeneities in the intensity of support and the following characteristics of the municipalities: population ranges, level of urban hierarchy, HDI ranges, and depth of the banking credit market.

7.2.1. Heterogeneities in the intensity of support

Since the BNDES Procapcred support is directed to individual cooperative members, with the contracted resources being transferred to the individual cooperative issuing the financed shares, there may be differences in the magnitude of the effects at the local level depending on the volume of operations carried out by the program, especially in terms of the value involved in these operations. Therefore, it is important to verify the heterogeneity of the estimated effects of the capitalised cooperative according to the relative value released per municipality. The relative value of the project was calculated as the ratio between the total value released by BNDES Procapcred throughout the period 2015-2023, in values deflated to 2024, and the municipality's GDP in the year of the first support. Based on the intensity of support, the municipalities were classified into two groups: high dose, for values in the upper quartile of the distribution, and low dose, for values in the lower three quartiles of the distribution.

The results show that the effects of BNDES Procapcred support were, on average, greater for higher intensity support than for lower intensity support (Graph 7). This trend was observed in the total number of members (an increase of +48.1% compared to +25.2%), both individuals (+50.4% compared to +26.6%) and legal entities (+32.7% compared to +9.4%). The same pattern was observed for the number of members with credit operations (+113.6% compared to +56.4%), with term deposits (+73.5% compared to +27.9%) and with checking accounts (+40.2% compared to +19%).

GRAPH 7 ● EFFECTS BY INTENSITY OF SUPPORT



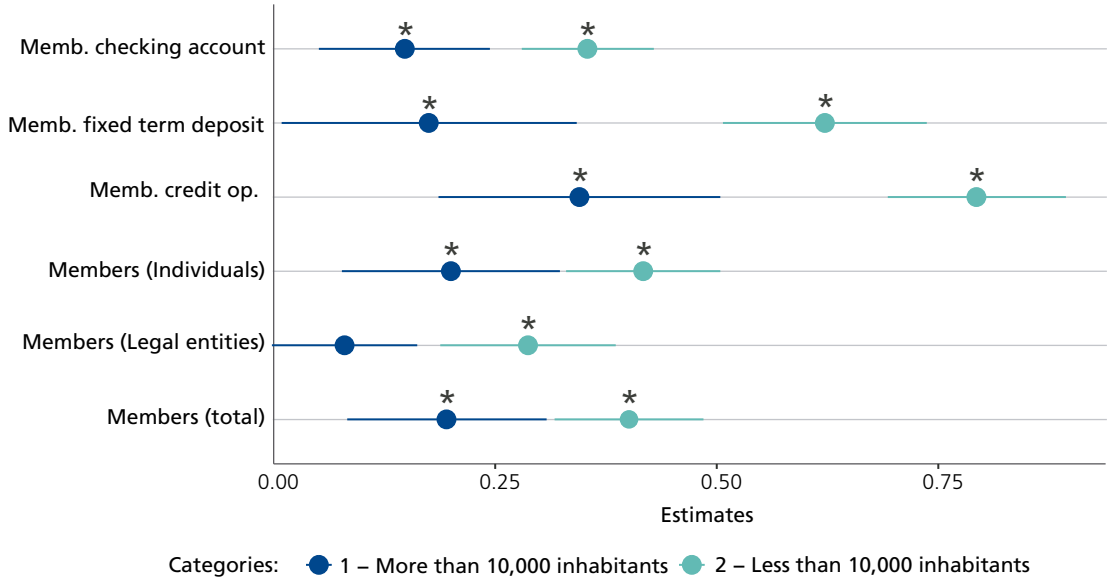
Source: The authors, based on data from BNDES, IBGE, and BCB.
Note: Dependent variables in log.

7.2.2. Heterogeneities by population range

The next analysis seeks to identify differences in the effect of BNDES Procapcred according to the municipality's size. This aims to test the hypothesis that the program makes a greater difference in smaller municipalities, which supposedly have greater credit restrictions. Based on the estimated population in 2014 (the year immediately preceding the evaluation period), the municipalities were classified into two groups: those with more or fewer than 10,000 inhabitants.

The results show that the effects of BNDES Procapcred support were, on average, greater in municipalities with fewer than 10,000 inhabitants compared to the others (Graph 8). This trend was observed in all variables, such as the total number of cooperative members (an effect of +49.3% compared to +21.5%), especially individuals (+51.7% compared to +22.1%), as well as the number of cooperative members with credit operations (+121% compared to +41.2%), with checking accounts (+42.5% compared to +16%), and with term deposits (+86.3% compared to +19.1%). Only municipalities with fewer than 10,000 inhabitants showed significant effects on the number of corporate cooperative members (33.2%).

GRAPH 8 ● EFFECTS BY POPULATION RANGE



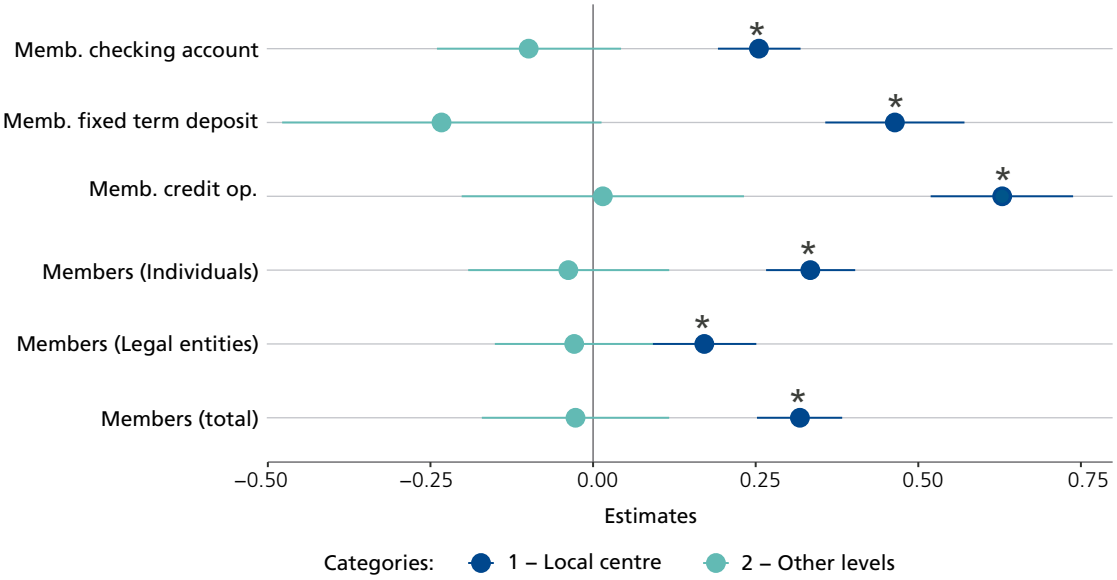
Source: The authors, based on data from BNDES, IBGE, and BCB.
Note: Dependent variables in log.

7.2.3. Heterogeneities of Urban Hierarchy Level (Regic)

The next exercise sought to test the hypothesis that BNDES Procapcred had greater effects on the most deprived municipalities in terms of public and private services. In this exercise, the municipalities were divided into two groups based on their urban hierarchy level, as defined by the 2018 Regic survey (IBGE, 2020). As one of the dimensions of the urban centrality indicator measured by Regic is the existence of bank branches in the municipality, the hierarchy among Brazilian cities identified by the survey is directly related to the availability of credit. One of the groups concentrates the municipalities of lower hierarchy — the local centres — which are the majority of municipalities in Brazil and exert influence restricted to their own territorial limits. That is, they have weak centrality in their business and public management activities, so that their population depends on other urban centres of higher hierarchy for daily shopping and service activities, as well as for access to public and business sector activities. In addition, they exhibit relatively poorer connectivity with other municipalities, meaning their population has greater difficulty accessing services in their surrounding area. The other group includes municipalities from all other hierarchical levels.

The results show that the effects of Procapcred support were only statistically significant in local centres (Graph 9), a category that concentrated 62% of the total municipalities with supported single cooperatives. This was verified in all variables, such as the total number of members (effect of +37.4%), both individuals (+39.7%) and legal entities (+18.6%), as well as the number of members with credit operations (+87.6%), checking accounts (+29%), and term deposits (+59%).

GRAPH 9 ● EFFECTS BY LEVEL OF URBAN HIERARCHY (REGIC)



Source: The authors, based on data from BNDES, IBGE, and BCB.

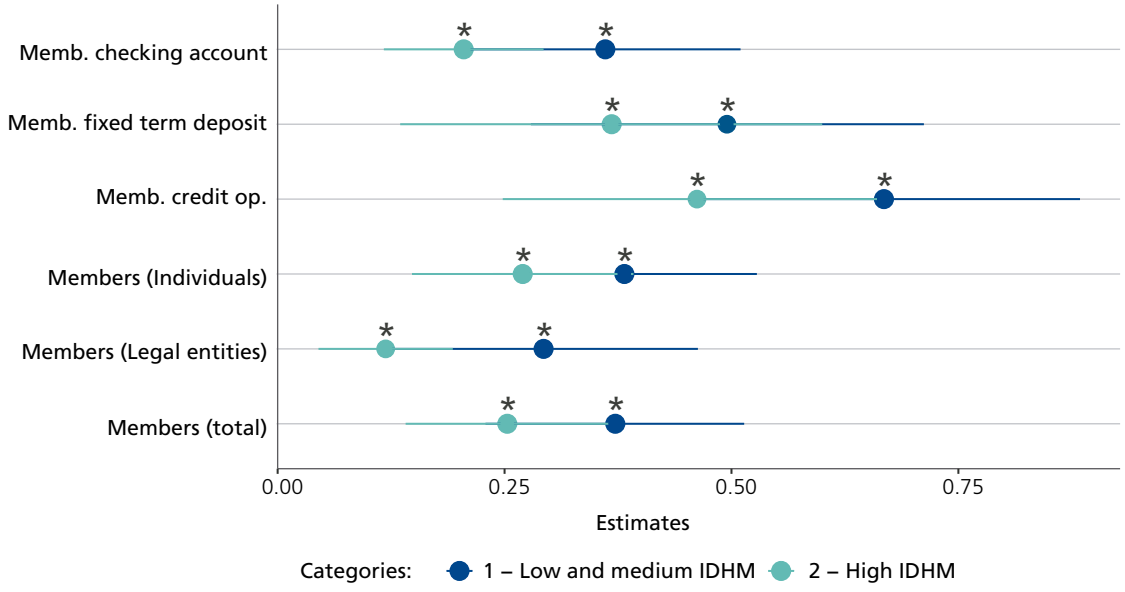
Note: Dependent variables in log.

7.2.4. Heterogeneities by HDI range

The next analysis point refers to heterogeneities related to the initial development level of the municipalities with supported cooperatives. This study seeks to test the hypothesis that BNDES Procapcred has a greater effect on less developed municipalities, supposedly with greater credit restrictions. The municipalities were classified according to two ranges related to their 2010 HDI level: for HDI below 0.7 as "low and medium HDI", and above 0.7 as "high HDI".

The results show that the effects of BNDES Procapcred support were, on average, greater for municipalities with low HDI. The highlights were the average effects on the number of members (+45.1% compared to +28.8%), both individuals (+46.5% compared to +31%) and legal entities (+34% compared to +12.6%), as well as on the number of members with credit operations (+95% compared to +58.7%), with checking accounts (+43.5% compared to +22.8%), and with term deposits (+64% compared to +44.5%).

GRAPH 10 ● EFFECTS BY HDI RANGE



Source: The authors, based on data from BNDES, IBGE, and BCB.
Note: Dependent variables in log.

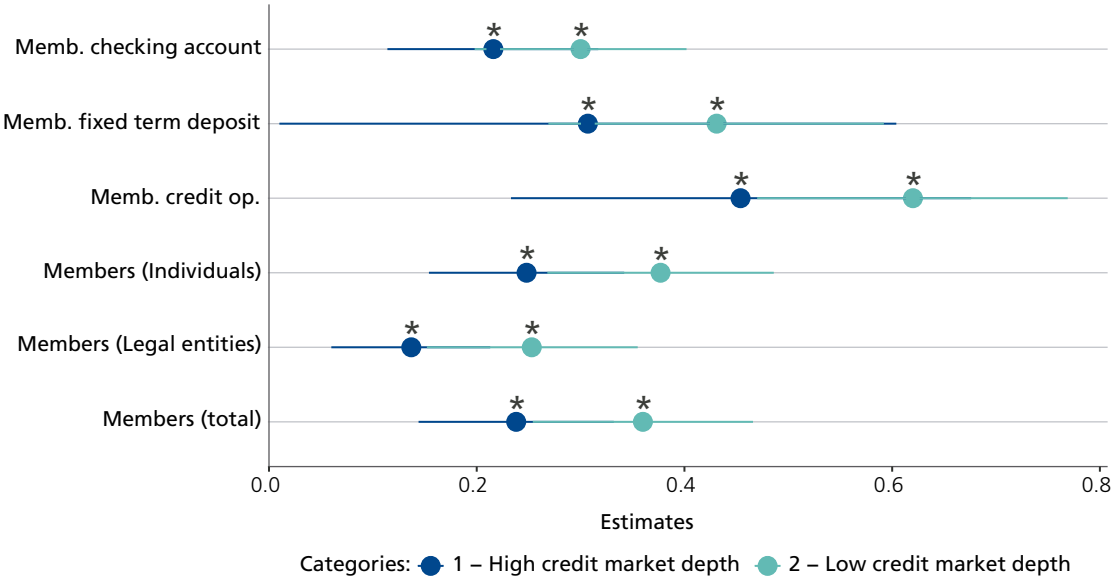
7.2.5. Heterogeneities by Depth of Bank Credit Market

The next exercise sought to test the hypothesis that BNDES Procapcred had a greater effect on municipalities with less access to bank credit, which were more dependent on cooperatives to finance their economic activities. Thus, the impact of BNDES Procapcred on municipalities was compared according to a measure of this depth,[23] conceived as the ratio between the total bank credit balances and the municipality's GDP in 2014. Two groups of municipalities were compared: those located in the first three quartiles of the distribution of this ratio ("low depth") and those located in the last quartile of the distribution of this ratio ("high depth"). This cutoff line was chosen in order to minimise any micronumerosity problems in the treatment group, since, as shown in Table 3, the municipalities in this group had greater depth of the credit market than those in the control group.

The results show that the effects of Procapcred support were, on average, greater for municipalities with less depth in the bank credit market. The highlights were the average effects on the number of cooperative members (+43.3% compared to +26.9%), both individuals (+45.8% compared to +28.1%) and legal entities (+28.8% compared to +14.7%), as well as the number of cooperative members with credit operations (+85.9% compared to +57.5%), checking accounts (+35% compared to +24.1%), and term deposits (+53.9% compared to +35.9%).

23 Further details about this indicator can be found in Djankov, McLiesh and Shleifer (2007).

GRAPH 11 • EFFECTS BY LEVEL OF DEPTH OF THE BANKING CREDIT MARKET



Source: The authors, based on data from BNDES, IBGE, and BCB.
Note: Dependent variables in log.

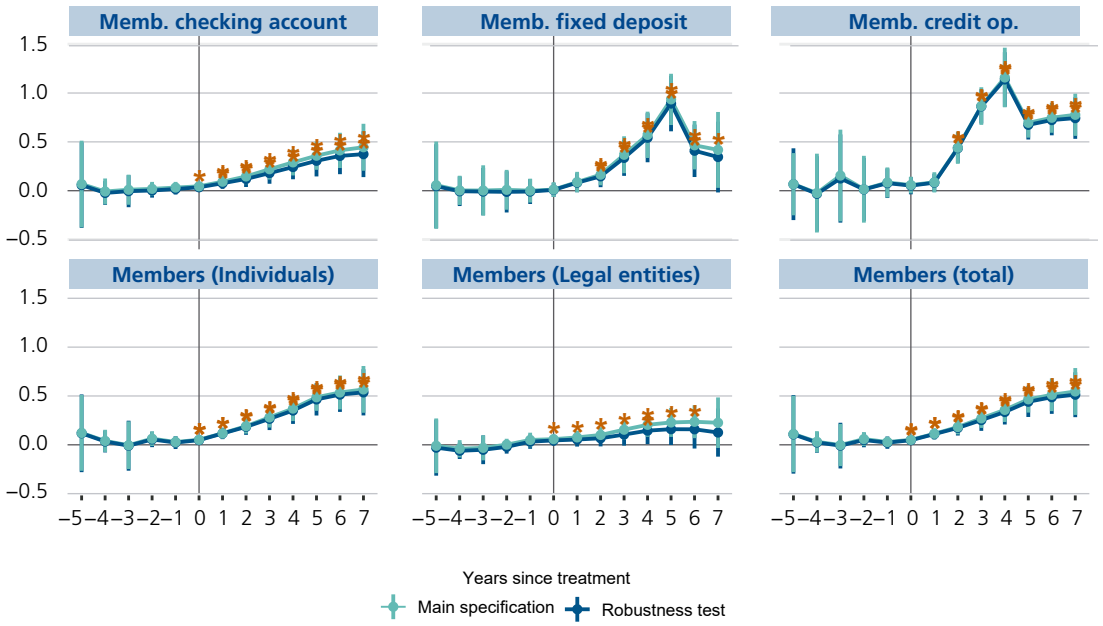
7.3. Robustness

Robustness analysis is a procedure that verifies whether the estimates of a given econometric study are consistent under different model specifications or datasets, with the aim of testing the reliability and stability of the conclusions.

7.3.1. Never-treated controls

The first robustness analysis developed by this study seeks to measure the impacts of the BNDES Procapcred program when the control group is restricted to municipalities never before treated. To obtain a cleaner estimate, in this robustness test exercise, municipalities that had cooperatives supported by the program between 2007 and 2014 were also excluded from the control group (Graph 12). Regarding the average treatment effects, the results were very similar to those obtained in the main specification, that is, in the estimations where the control group included municipalities not yet treated and those treated before 2015. With the exception of the number of legal entity cooperative members, all coefficient signs and levels of statistical significance were preserved. The effects on the number of cooperative members with current accounts become significant starting in the first year after treatment. The average effects calculated for all variables were slightly smaller in this approach compared to those presented in the results section.

GRAPH 12 ● RESULTS OF THE BNDES PROCAPCRED EVALUATION: NEVER-TREATED CONTROLS

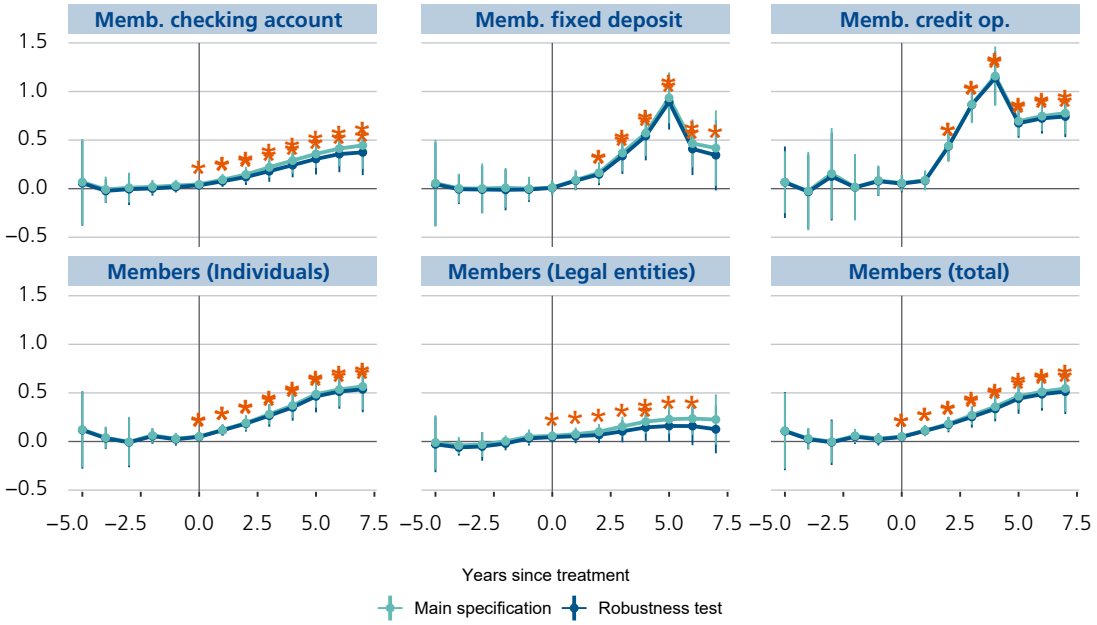


Source: The authors, based on data from BNDES, IBGE, and BCB.
Note: Dependent variables in log.

7.3.2. Controls not yet treated or treated up to 2014

This robustness analysis seeks to measure the impacts of BNDES Procapcred when the control group is restricted to municipalities whose individual credit cooperatives received support from the program at some point. This includes those not yet treated in the period from 2015 onwards, as well as those that received support in the period 2007 to 2014, but not after 2015 (Graph 13). Regarding the average effects of the treatment, the results were practically identical to those obtained in the estimations that included in the control group the never-treated municipalities (main specification). All signs and levels of statistical significance were preserved. Here, some pre-treatment trends were observed in the total number of cooperative members and individuals.

GRAPH 13 ● RESULTS OF THE BNDES PROCAPCRED EVALUATION: CONTROLS NOT YET TREATED AND TREATED UP TO 2014



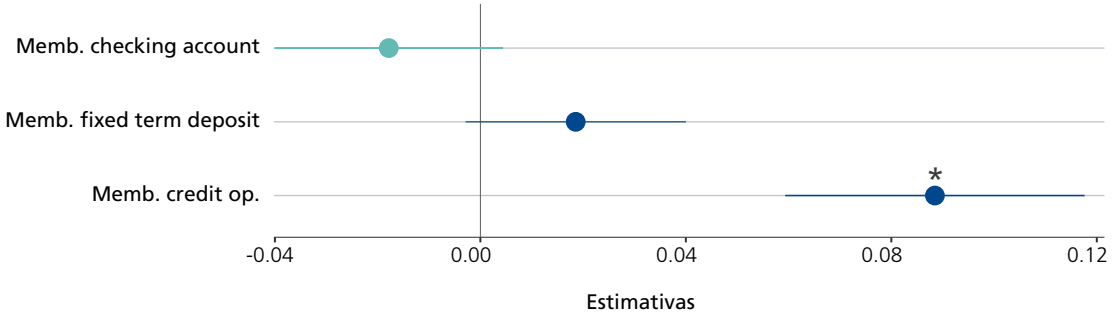
Source: The authors, based on data from BNDES, IBGE, and BCB.

Note: Dependent variables in log.

7.3.3. Result variables in proportion to the total number of cooperative members

This robustness analysis assesses the impacts of BNDES Procapcred by considering the number of members with financial operations in a municipality as a proportion of the total number of cooperative members in that municipality (Graph 14). A positive and statistically significant average effect was observed for the number of members with credit operations (+8.6%). This result reinforces the role of BNDES Procapcred in alleviating credit constraints at the local level, in order to capitalise credit cooperatives, allowing them to offer more favourable conditions to their members, which encourages credit operations in new investments.

GRAPH 14 ● RESULTS OF THE BNDES PROCAPCRED EVALUATION: CONTROLS NOT YET TREATED AND TREATED UP TO 2014



Source: The authors, based on data from BNDES, IBGE and BCB.

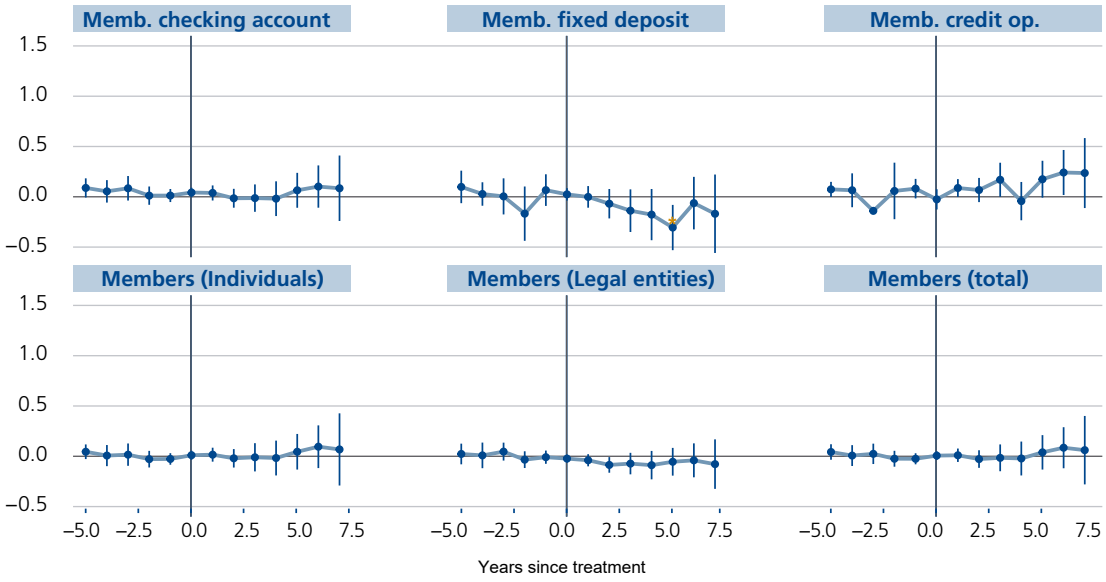
Note: Variables in proportion to the total number of cooperative members.

7.4. Placebo Tests

Difference-in-differences models assume parallel trends in the absence of treatment, so that any changes in these trends after treatment can be associated with a causal effect of the intervention. However, this hypothesis is difficult to prove, since it depends on a counterfactual component that is not observed, that is, the trajectory of the result variable if there were no treatment. The placebo test is a validation technique in which the same causal identification method is applied to a situation where there should be no causal effect to verify whether the method is correctly capturing a causal relationship or only detecting spurious associations.

To verify the hypothesis that this study has a selection bias towards treatment even with the methodological procedures adopted, the treated municipalities were replaced by others that originally belonged to the control group, but with characteristics similar to those treated. This replacement was made by calculating the propensity score for treatment for each municipality and matching using the nearest neighbour matching method (Rosenbaum; Rubin, 1983; Heckman; Ichimura; Todd, 1997; Caliendo; Kopeinig, 2008). The propensity score was estimated using a logistic model in which treatment is explained by the municipality's population, the 2010 HDI, per capita health expenditure, and regional dummies in Brazil, using 2014 as the reference year. It was assumed that each of the substitute municipalities would have been treated in the same year as the substituted municipalities. This process resembles administering a placebo, since no effects are expected on the substitute municipalities, as they did not have cooperatives actually receiving support from BNDES Procapcred. Graph 15 presents the effects calculated by the method. As expected, on average, no statistically significant effect was observed for any result variable.

GRAPH 15 ● RESULTS OF THE BNDES PROCAPCRED EVALUATION: PLACEBO TREATMENT GROUP



Source: The authors, based on data from BNDES, IBGE, and BCB.

Note: Dependent variables in log.

8. AP/DEAP FINAL CONSIDERATIONS

The Department of Analysis and Evaluation of Public Policies (AP/DEAP) is the organisational unit that manages the macro-process of monitoring and evaluating the BNDES's effectiveness. Linked to the Planning and Economic Research Area, the department is responsible for conducting the BNDES's effectiveness evaluations, including this one.

The objective of this study is to evaluate the effectiveness of BNDES Procapcred in achieving its main goal of strengthening credit cooperatives. Stronger cooperatives are able to offer more favourable credit conditions – in the form of resources, interest rates, and services – to their members, which plays an important role in mitigating credit restriction issues employed by information asymmetries, in order to enable new investments by cooperative members. In this way, the program's effects are measured in terms of the number of cooperative members of the supported cooperatives and in terms of cooperative members with financial operations, such as credit operations and term deposits. As credit restriction in Brazil is strongly influenced by location, since 44.6% of municipalities did not have a bank branch in 2023, this study made the assessment based on municipal data.

The assessment sought to consider that the support from BNDES Procapcred is staggered over time in the municipalities. In other words, municipalities may receive support for their individual credit cooperatives in any year of the period covered by the data (2015 to 2023). The assessment also sought to consider that the effects of the program may be dynamic from the first support. It is important to emphasise that, even though there is already an assessment of

the countercyclical effects of BNDES Procapcred (Martini et al., 2023), this is the first study on the long-term effects of a policy to strengthen credit cooperatives in Brazil.

The assessment verified positive, significant, and robust effects on the observed variables. Compared to municipalities that had cooperatives, located in states where there was at least one BNDES Procapcred operation during the analysis period, but without credit cooperatives capitalised with resources from the program, the support promoted growth in the total number of cooperative members of +30.1%, with emphasis on individuals (+31.7%). Regarding financial operations with cooperatives, the increase in credit operations (+66.5%) stands out, although the growth in the number of cooperative members with checking accounts (+23.7%) and term deposits (+38.8%) is also significant.

The estimated effects of the program are heterogeneous in relation to the intensity of support and the characteristics of the benefited municipalities. Greater effects were observed for the support with the highest total value disbursed as a percentage of municipal GDP, and for municipalities with smaller populations, lower levels of urban hierarchy (i.e., less centrality and greater dependence on services provided in other locations), lower HDI, and lower depth of the banking credit market. In other words, the municipalities most benefited by the program are precisely those that are less developed and more prone to suffering from a scarcity of banking services and credit restrictions. This last point reinforces the role of BNDES Procapcred in strengthening credit cooperatives capable of mitigating problems of information asymmetry, as predicted by economic theory (Banerjee; Besley; Guinnane, 1994).

There is evidence supporting the continuation and/or expansion of BNDES Procapcred. Given the observed evidence, it is important to further increase the program's coverage throughout Brazil, in order to serve more municipalities whose characteristics are associated with greater credit restrictions from sources other than cooperatives. This recommendation represents a challenge for the Bank, since BNDES Procapcred is based on indirect operations, dependent on a network of partner financial agents. Therefore, it is recommended to work alongside these agents to promote service to more cooperatives present in the most credit-deprived areas of the country, as well as to seek to expand the partner network in order to increase coverage across the territory, especially in less developed regions. It is worth highlighting that the recent initiatives implemented by BNDES, according to Circular Letter SUP/ADIG 4/2024, by providing better conditions for cooperative members located in the North and Northeast regions, represent a promising step in this direction.

9. ADIG FINAL CONSIDERATIONS

As described in this report, BNDES Procapcred has been in operation since 2006 and there is evidence of positive effects on strengthening the equity structure, expanding credit cooperatives,

and decentralising banking, resulting in an increase in the economic results of cooperative members and, consequently, in easing credit restrictions and increasing investment, as demonstrated by the effectiveness indicators.

Relevant changes to BNDES Procapcred were approved at the end of 2023 and implemented at the beginning of 2024. These changes aimed to improve the program, and increase its scope in order to enhance its objective, which is to strengthen the equity structure of credit cooperatives by offering financing to members for the acquisition of shares, especially in locations where there is less population participation in credit cooperatives, as is the case in the North and Northeast regions. Among the changes made, the following stand out: the expansion of the client base, the financial conditions incentivised for members in the North and Northeast regions, and the longer financing terms and limits.

The latest Self-Assessment Report on Program Results, which presents data on 2024 (not covered by this Effectiveness Assessment Report), indicated a significant increase in the participation of individuals and an expansion in the number of municipalities where supported clients are located, largely achieving the expected effect of the BNDES Procapcred change. Furthermore, it is noteworthy that there was a significant increase in operations in the North region. Regarding the effectiveness indicators, although the Self-Assessment Report presents a less robust methodology than this Effectiveness Assessment Report, there seems to be consistency between them. For example, it can be highlighted that the Self-Assessment Report identified that the cooperatives supported in 2024 by BNDES Procapcred maintained a higher average percentage variation in the value of assets (20.4%) compared to unsupported cooperatives (12.6%), as well as the cooperatives supported by BNDES Procapcred having a greater expansion in their loan portfolio (19.4%) compared to unsupported cooperatives (9.5%).

Finally, we can mention that in 2025 new financial costs were made available, such as LCD, the Fixed Compound Rate, and the Fixed Compound Rate for SMEs, expanding the range of support options in this program which, as demonstrated throughout the Effectiveness Assessment Report, contributes to the strengthening of credit cooperatives, important institutions for banking decentralisation in the country.

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APPENDIX

CHART 4 • BASIC INFORMATION ABOUT THE RAE

Year of publication	2025
Object under assessment	Credit Cooperative Capitalisation Program (BNDES Procapcred)
Beneficiary of the support	Cooperative members (individuals or legal entities)
Number of operations	162,807
Amount of financial support	BRL 1,745,265,486.00
Forms of support	Indirect
Financial instruments assessed	BNDES Procapcred, referring to the BNDES Automatic product
Description of the object of the assessed support	Support via the granting of financing directly to cooperative members, for the acquisition of shares in single credit cooperatives
Data	Data from the set of municipalities with cooperatives capitalised by BNDES Procapcred between 2015 and 2023, cross-referenced with databases from the Central Bank of Brazil (Cooperative Members by Municipality and Estban) and the IBGE
Assessment method	Difference-in-differences
Assessment execution	The assessment was conducted internally by the BNDES
Alignment with Strategic Planning	Guiding strategic theme: Social development, decent work and income Strategic business theme: MSMEs, cooperatives and access to credit
Gap	Although there are previous assessments of BNDES Procapcred, they did not advance in investigating its dynamic effects

Source: The authors.

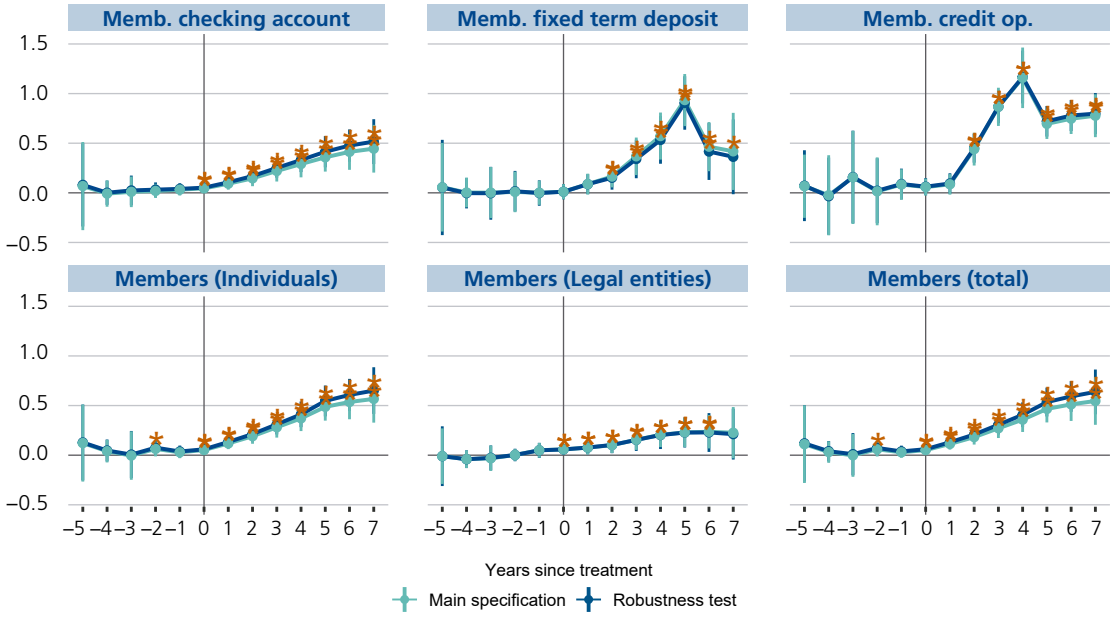
Note: The number of operations and amount of financial support refer to the evaluated period (2015-2023). Financial amount in Brazilian reais, exchange rate of 2024.

1. ROBUSTNESS

1.1. Controls without filtering states with operations

This robustness analysis seeks to measure the impacts of BNDES Procapcred using a control group that does not filter out municipalities in states that had BNDES Procapcred operations during the 2015–2023 period. The controls include municipalities never treated and not yet treated, maintaining the filter of municipalities with the presence of credit cooperatives (Graph 16). Regarding the average effects of the treatment, the results were very similar to those obtained in the estimations in which the control group excluded municipalities from states without operations. All signs and levels of statistical significance were preserved. The magnitudes were slightly higher in this specification. A pre-treatment trend was observed in the total number of cooperative members and individuals.

GRAPH 16 ● RESULTS OF THE BNDES PROCAPCRED EVALUATION: CONTROLS IN ALL STATES

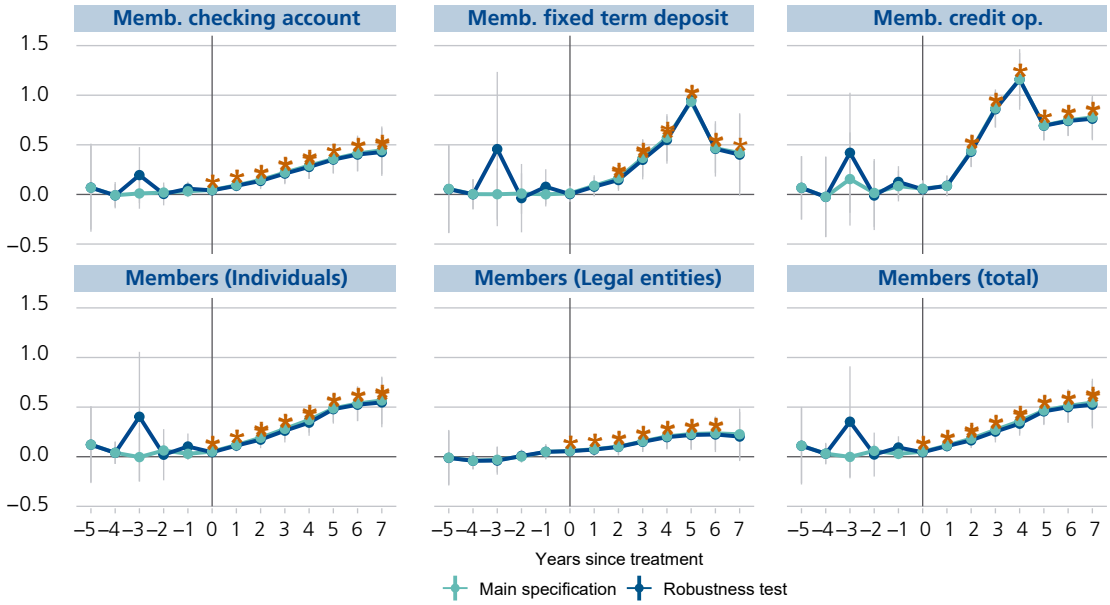


Source: The authors, based on data from BNDES, IBGE, and BCB.
Note: Dependent variables in log.

1.2. Controls with metropolitan filtering

This robustness analysis seeks to measure the impacts of BNDES Procapcred excluding from the control group the municipalities identified by Regic 2018 as metropolitan areas. It is based on the hypothesis that these municipalities, due to their greater urban centrality of goods and services, present a lower tendency towards credit restriction. The controls include municipalities never treated and those not yet treated, maintaining the filter of municipalities with the presence of credit cooperatives and located in states where there was at least one BNDES Procapcred operation between 2015 and 2023 (Graph 17). Regarding the average effects of the treatment, the results were very similar to those obtained in the estimations where the control group included metropolitan areas. All signs and levels of statistical significance were preserved. The magnitudes were slightly higher in this specification. There was a worsening in the pre-treatment adjustment in terms of standard deviations, especially in the number of cooperative members with other operations, but without a statistically significant identified trend.

GRAPH 17 ● RESULTS OF THE BNDES PROCAPCRED EVALUATION: CONTROLS IN ALL STATES



Source: The authors, based on data from BNDES, IBGE, and BCB.
Note: Dependent variables in log.

2. ESTIMATE TABLES

2.1. Average Treatment Effect and Event Study

TABLE 5 ● EFFECTS OF BNDES PROCAPCRED: AVERAGE ATT AND EVENT STUDY (2015-2023)

Event	Members (total)	Members (Legal Entities)	Members (Individuals)	Members Op. Credit	Members Term Deposits	Members Checking Account
Average ATT	0.263*	0.136*	0.275*	0.51*	0.328*	0.213*
	(0.05)	(0.041)	(0.055)	(0.093)	(0.083)	(0.039)
t-5	0.111	-0.01	0.122	0.067	0.056	0.068
	(0.149)	(0.109)	(0.148)	(0.121)	(0.168)	(0.165)
t-4	0.031	-0.04	0.04	-0.024	0.003	-0.008
	(0.041)	(0.034)	(0.043)	(0.154)	(0.056)	(0.049)
t-3	-0.002	-0.031	-0.004	0.155	0.002	0.01
	(0.082)	(0.05)	(0.093)	(0.179)	(0.097)	(0.057)
t-2	0.059	0.002	0.063	0.015	0.009	0.019
	(0.027)	(0.023)	(0.029)	(0.13)	(0.077)	(0.027)
t-1	0.029	0.05	0.029	0.084	0.001	0.032
	(0.021)	(0.029)	(0.022)	(0.059)	(0.046)	(0.022)

Event	Members (total)	Members (Legal Entities)	Members (Individuals)	Members Op. Credit	Members Term Deposits	Members Checking Account
t	0.051*	0.058*	0.052*	0.058	0.011	0.045*
	(0.012)	(0.019)	(0.013)	(0.032)	(0.029)	(0.013)
t+1	0.113*	0.076*	0.118*	0.086	0.088	0.092*
	(0.021)	(0.026)	(0.022)	(0.039)	(0.04)	(0.022)
t+2	0.182*	0.101*	0.191*	0.44*	0.164*	0.146*
	(0.028)	(0.031)	(0.029)	(0.063)	(0.041)	(0.029)
t+3	0.271*	0.155*	0.281*	0.867*	0.368*	0.22*
	(0.037)	(0.04)	(0.04)	(0.073)	(0.071)	(0.04)
t+4	0.358*	0.205*	0.371*	1.159*	0.572*	0.29*
	(0.047)	(0.048)	(0.049)	(0.116)	(0.089)	(0.05)
t+5	0.466*	0.229*	0.487*	0.695*	0.935*	0.358*
	(0.051)	(0.058)	(0.053)	(0.058)	(0.099)	(0.054)
t+6	0.512*	0.236*	0.536*	0.747*	0.465*	0.413*
	(0.064)	(0.066)	(0.066)	(0.059)	(0.093)	(0.067)
t+7	0.546*	0.226	0.567*	0.777*	0.418*	0.445*
	(0.091)	(0.101)	(0.091)	(0.082)	(0.146)	(0.09)

Source: The authors, based on data from BNDES, BCB and IBGE.

Notes: Variables in log. Standard deviation in parentheses. Control variables: population and number of cooperatives in the municipality. Control group includes municipalities not yet treated.

* $p < 0.05$.

2.2. Heterogeneities

TABLE 6 • EFFECTS OF BNDES PROCAPCRED: AVERAGE ATT (2015-2023)

Heterogeneity	Category	Members (total)	Members (Legal Entities)	Members (Individuals)	Members Op. Credit	Members Term Deposits	Members Checking Account
Intensity of support	High dose	0.393*	0.283*	0.408*	0.759*	0.551*	0.338*
		(0.047)	(0.065)	(0.049)	(0.056)	(0.079)	(0.049)
	Low dose	0.225*	0.09*	0.236*	0.447*	0.246*	0.174*
		(0.05)	(0.039)	(0.054)	(0.08)	(0.076)	(0.039)
Population	More than 10,000 inhabitants	0.195*	0.08	0.2*	0.345*	0.175*	0.148*
		(0.057)	(0.042)	(0.063)	(0.081)	(0.085)	(0.049)
	Fewer than 10,000 inhabitants	0.401*	0.287*	0.417*	0.793*	0.622*	0.354*
		(0.043)	(0.051)	(0.044)	(0.051)	(0.059)	(0.038)

Heterogeneity	Category	Members (total)	Members (Legal Entities)	Members (Individuals)	Members Op. Credit	Members Term Deposits	Members Checking Account
HDI	High HDI	0.253*	0.119*	0.27*	0.462*	0.368*	0.205*
		(0.057)	(0.038)	(0.062)	(0.109)	(0.119)	(0.045)
	Low and Medium HDI	0.372*	0.293*	0.382*	0.668*	0.495*	0.361*
		(0.073)	(0.087)	(0.074)	(0.11)	(0.111)	(0.076)
Depth of credit market	High (25.1% or more)	0.238*	0.137*	0.248*	0.454*	0.307*	0.216*
		(0.048)	(0.039)	(0.048)	(0.113)	(0.152)	(0.052)
	Low (up to 25.1%)	0.36*	0.253*	0.377*	0.62*	0.431*	0.3*
		(0.054)	(0.052)	(0.056)	(0.076)	(0.082)	(0.052)
Regic Level	Other levels	-0.027	-0.029	-0.038	0.015	-0.233	-0.099
		(0.074)	(0.062)	(0.079)	(0.111)	(0.125)	(0.072)
	Local centre	0.318*	0.171*	0.334*	0.629*	0.464*	0.255*
		(0.033)	(0.041)	(0.035)	(0.056)	(0.055)	(0.032)

Source: The authors, based on data from BNDES, BCB, IBGE and UNDP.

Note: Variables in log. Standard deviation in parentheses. Control variables: population and number of cooperatives in the municipality. Control group includes municipalities not yet treated. No statistically significant pre-treatment trends were verified.

* $p < 0.05$.

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