1º COLOCADO
CATEGORIA III – SISTEM OCB: DESENVOLVIMENTO E COOPERATIVISMO DE CRÉDITO

The Impact of Credit Unions on the Development of Brazilian Municipalities

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1. Introduction[1]

The credit unions, mobilizing savings and offering credit, play a relevant role in promoting social capital and increasing local economic dynamism (Usai, Vannini, 2005; Lang, Signore, Gvetadze, 2016; Sfar, Ben Ouda, 2016; Minetti, Murro, Peruzzi, 2019).

According to the Central Bank of Brazil-Bacen (2024), over 300 cities have credit unions as the only financial option. At the same time, data from Bacen (2024) show that financial cooperativism grows faster than the other entities of the National Financial System, both in credit volume and the number of accounts.

Given this context, Brazilian credit unions could be a promising resource for the financial inclusion of the population, especially those living in small towns (Souza, Bressan; Carrieri, 2022). Apart from being a driving force behind financial inclusion and presenting promising facts, one question remains without due scrutiny for the Brazilian case: After all, do credit unions act as promoters of local development in Brazilian municipalities?

To begin with, and to delve deeper into the issue, we should point out that economic development is a multidimensional process. Thus, the Sebrae Index of Local Economic Development - ISDEL[2] fosters this understanding and seeks to group the multidimensionality of the development process into five dimensions: Entrepreneurial Capital, Business Linkage, Governance for Development, Productive Organization and Competitive Insertion.

The search for the effects of these types of financial institutions on local development is nothing new. However, many works are less comprehensive than ours, focusing on specific regions or communities (Cruz, Quintero; Hernández, 2018; Lal, 2019; Souza; Bressan, Carrieri, 2023). Some works do not specifically deal with possible biases since credit unions do not arise randomly in communities (McCarthy, 2021; Lal, 2019). Other works are extensive in their coverage of the Brazilian reality. However, even trying to deal with possible selection

1 The authors thank the Brazilian Micro and Small Business Support Service (SEBRAE) and the Coordination for the Improvement of Higher Education Personnel (CAPES). Opinions and mistakes are the sole responsibility of the authors.

2 More information on the Sebrae Index of Local Economic Development - ISDEL can be obtained at https://www.isdel-sebrae.com. SDEL explains more than 70% of the variance in GDP per capita and about 73% of the municipal variance in HDI, which reinforces the validity of this indicator.

biases, they are interested in analyzing specific niches, such as rural solidarity financial cooperatives, or they only consider one dimension of financial development – measured by GDP per capita (Schuntzemberger *et al.*, 2015; Jacques; Gonçalves, 2016).

Our study evaluates the impact of credit unions on local development, as measured by ISDEL, comprising a longitudinal analysis of Brazil between 2016[3] and 2019. We achieved this goal by employing descriptive spatial analysis and spatial econometrics and obtaining the average treatment effect among municipalities comparable to each other, calculated via Propensity Score Matching.

Considering non-profit institutions (credit unions) and banking institutions (state-owned or for-profit) do financial intermediation, it is essential to assess the impact on ISDEL by categorizing: *i)* municipalities that have only credit unions (including those with a Cooperative Service Center – PAC[4]); *ii)* municipalities that have only bank branches; *iii)* municipalities with both Financial Institutions (FIs) and; *iv)* municipalities with no financial intermediation institution (control group).

2. Sebrae Index of Local Economic Development (ISDEL) and the Brazilian Credit Unions: a preliminary analysis

In order to better understand the objects analyzed in this article, this section presents some information about the credit union and the Sebrae Index of Local Economic Development – ISDEL in Brazilian municipalities. The analyses focus on the period from 2015, the first year ISDEL was calculated using the current methodology, to 2019, the last year before the COVID-19 pandemic.

The five dimensions of the Sebrae Index of Local Economic Development – ISDEL are organized so that their order indicates the rank of importance according to the level of development of the regions, from lowest to highest. The ISDEL's *Entrepreneurial Capital* dimension corresponds to the municipality's stock of entrepreneurial capacities, characterized by the density of compa-

3 The analysis of this section begins in 2016 due to the availability of data from the Central Bank of Brazil about the Cooperative Service Centers (PACs).

4 A Cooperative Service Center (PAC) is a physical space that, like bank branches, offers financial services to members. PACs can be created in municipalities in the area of operation of a given credit union.

nies and professional training. *Business Linkage* represents the networks that connect entrepreneurs and companies, considering social responsibility, such as solidary values. *Governance for Development* refers to the association between public administration and society through urban planning, control of accounts, and strategies that develop a vision for the future. *Productive Organization* identifies the local productive characteristics and structural conditions that contribute to attracting/fixing companies in the municipality. Finally, *Competitive Insertion* captures each municipality's relations with the exterior, weighing up more complex and technological production and exports. In this way, we understand that the focus on each dimension should change along with the development process.

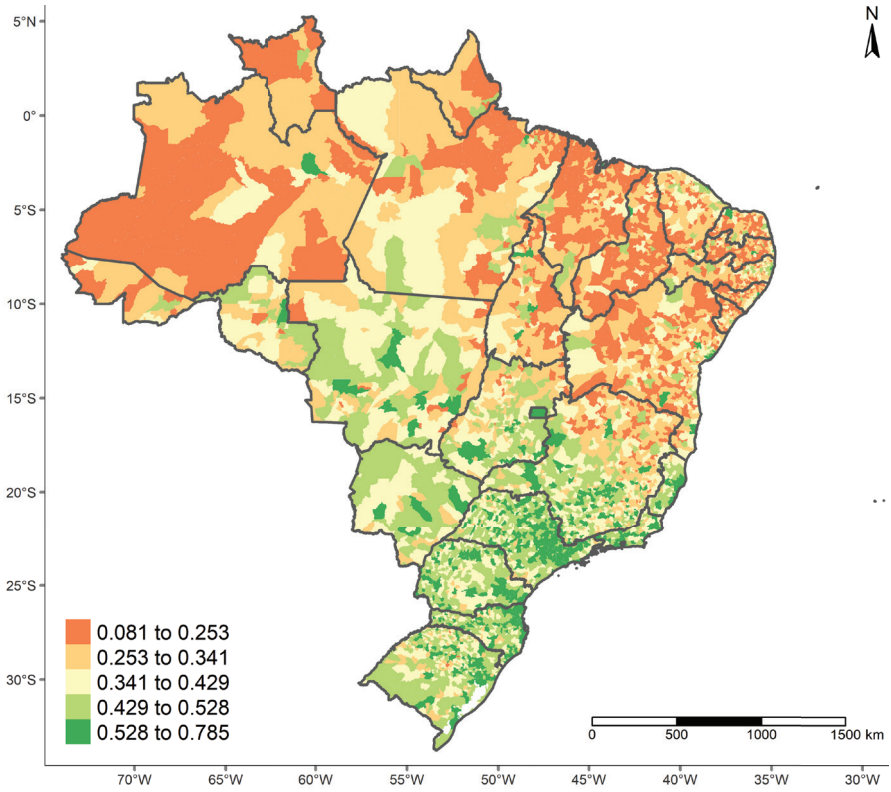
Figure 1 shows the distribution of ISDEL in the 5,568 Brazilian municipalities in 2019 (and Fernando de Noronha and Distrito Federal), using natural breaks *(jenks)* to divide[5] intervals in the ISDEL score. The dark green color represents higher values and indicates that the municipality has a higher level of development. Given that the level of development is still lower, the colors on the map change to cream color, representing medium development, until they reach the dark orange that represents the municipalities with a low level of development.

At first glance, the Brazilian regions with more credit unions have the highest ISDEL values (Figure 1). This pattern is predominantly observed in the Midwest, Southeast and South regions. Another pattern that stands out is that of municipalities with low ISDEL values, especially in the North and Northeast regions. This association highlights the municipalities with low ISDEL values and the absence of credit unions.

5 The classes of natural breaks are based on natural clusters inherent in the data. Class breaks that best combine similar values and maximize the differences between classes are identified.

FIGURE 1

ISDEL DISTRIBUTION OF BRAZILIAN MUNICIPALITIES (2019)



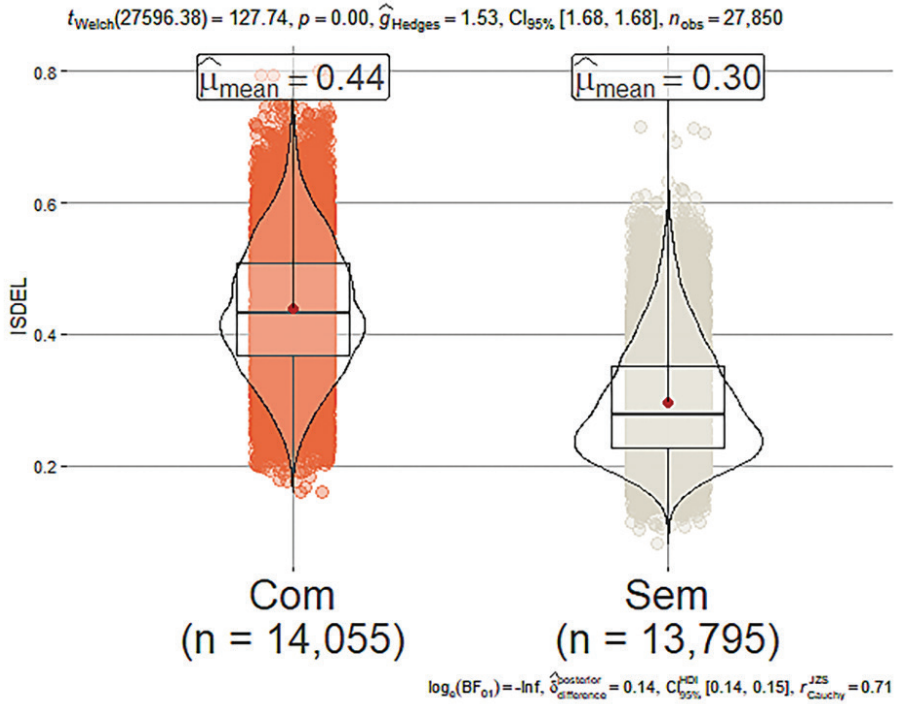
Source: Own elaboration.

Figure 2, in turn, shows the ISDEL averages differentiating the two types of municipalities, with and without credit unions, from 2015 to 2019. We chose to analyze all years since the ISDEL averages for each year did not show significant variations. In addition, few municipalities have changed between groups with and without credit unions. It is also worth noting that the number of municipalities in each group seems well distributed between the two groups, with few outliers.

It is possible to verify a higher ISDEL average for cities with credit unions, with a value of 0.44. In contrast, cities without credit unions had an average ISDEL of 0.30.

FIGURE 2

AVERAGE ISDEL OF BRAZILIAN MUNICIPALITIES
WITH AND **WITHOUT** CREDIT UNION (AVERAGE VALUE 2015-2019)



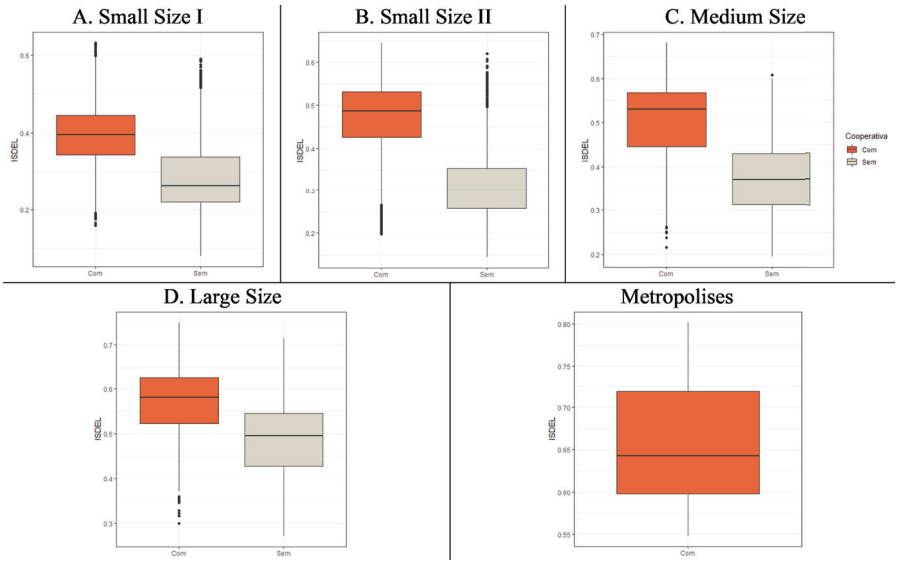
Source: Own elaboration.

Even though it is possible to identify the difference in the ISDEL averages between the two groups, it is necessary to check whether the distributions show statistically significant differences. The parametric difference of averages tests results in rejecting H_0, which is the equality of the averages of the two groups. In other words, the test shows that the difference of 0.14 between the average ISDEL values of the two groups is significant. So, there is evidence of some effect on the ISDEL components in municipalities with credit unions. In another way, the results suggest a possibly causal effect on the ISDEL components in municipalities with credit unions. However, to obtain a more solid analysis, it is necessary to use impact analysis methods, which remove or reduce components that may affect the ISDEL average for municipalities with credit unions but are unrelated to the effect that the study seeks to look at.

To understand how the observations are distributed among the different size levels of the municipalities, the municipalities were then divided according to their size, classifying them as Small Size I (up to 20,000 inhabitants); Small Size II (20,000 to 50,000 inhabitants); Medium Size (50,000 to 100,000 inhabitants); Large Size (100,000 to 900,000 inhabitants) and Metropolises (more than 900,000 inhabitants), according to the classification of the National Secretariat of Social Assistance - SNAS (2015)[6].

FIGURE 3

BOXPLOT OF ISDEL BY THE SIZE OF BRAZILIAN MUNICIPALITIES **WITH** AND **WITHOUT** CREDIT UNIONS (AVERAGE VALUE 2015-2019)



Source: Own elaboration.

So, Figure 3 shows the data of the ISDEL distribution among municipalities with and without credit unions between 2015 and 2019, subdivided by municipality size.

We can see that the ISDEL median, regardless of the two groups, is higher in the larger municipalities. The highest values in the ISDEL data come from cities classified as Metropolises or Large Cities. In addition, the pattern of municipalities with credit unions have higher ISDEL values compared to those that do not have credit unions, even considering the different sizes of cities.

6 https://www.mds.gov.br/webarquivos/arquivo/assistencia_social/Suas10Anos_2015.pdf.

The fact that the median line of one boxplot is beyond the boundaries of the box of the other provides additional evidence of a probable difference between the two groups. Finally, it should be noted that there is always at least one credit union for cities considered metropolises.

3. Empirical strategy

This section presents the empirical strategy. Subsequently, we briefly present the methods (Spatial Econometrics and Propensity Score Matching) used to estimate the impact of Financial Institutions (FIs) on the ISDEL of Brazilian municipalities.

The analyses were carried out separately for 2016, 2017, 2018 and 2019. These years will be analyzed because the data from the Cooperative Service Centers (PAC) became available in 2016 by the Central Bank of Brazil (Bacen). During these years, there have been no changes to the boundaries of the municipalities. Hence, 5,570 municipalities were considered for Brazil during all years.

In order to make the spatial analysis more comprehensible among those 5,570 municipalities, this research used a Spatial Autoregressive Econometric Model (SAR). The SAR is justified because Brazilian municipalities are known for their free mobility of people and capital. That is to say, the characteristics of one municipality can influence other municipalities, whether they are contiguous or not. For example, individuals may have more than one residence in different municipalities, where financial intermediation may be recorded in one residence but expenditure in another. The same can happen with the agents of production (legal entities) since there are no explicit rules, so the expenses are not limited to the municipality's borders.

We evaluated three[7] of spatial correlations among municipalities to make the spatial analysis more robust. We performed these analyses in two stage In the first stage, the effects of credit unions on ISDEL were generally con-

7 i) *First-order Autoregression AR (1)* – considers that spatial correlation occurs only among neighbors with direct boundaries (first-order spatial differentiation); ii) *Second-order Autoregression AR (2)* – assumes that the spatial correlation reaches not only the contiguous neighbors but also the neighboring municipalities of the neighbors (spatial differentiation of first and second order); and iii) *Inverse Distance (IDAR)* – disregards contiguity and starts considering the inverse distance between all municipalities as a spatial correlation factor. For description of the three types of spatial correlations, see Baum and Hurn (2021).

sidered. The term "generally" means we do not consider the municipalities' characteristics when calculating the average. All municipalities will have the same weight, disregarding their population, industrial size, and salary mass, among other factors.

We expect the results of this first stage of the analysis to help indicate whether a more detailed analysis is promising in the search for the impact of credit unions on ISDEL. Still, at this stage, it is also possible to evaluate the existence or absence of direct effects (inside the municipality) and indirect effects (which go beyond the boundaries of the municipalities).

The second stage considers the effect of credit unions' existence on the ISDEL, using the weighted average to compare similar municipalities. This means the municipalities will have different weights, considering the following dimensions: employment or employability, financial relations, geographical distances, demographics and spatial correlations.

The identification strategy for this second stage lies in the literature about the regional economy[8]. As such, municipalities are "classified" by their location characteristics, labor force (supply and demand) and population characteristics, such as size, income distribution and the relation of individuals and companies with financial institutions. Based on these characteristics, the following subsection presents the econometric models we employed to obtain the results.

3.1. Autoregressive Spatial Econometric Model

We estimated the following functional form for the SARAR model – *Simultaneous and Spatial Autoregressive Models:*

$$ISDEL = \beta_0 + \beta_1 Trat_1 + \beta_2 Trat_2 + \beta_3 Trat_3 + \lambda W_i[ISDEL] + u \quad (1)$$

$$\text{where: } u = \rho W_i u + e; i = [1,\ 2, d]$$

The term W_i[ISDEL] represents the spatial lag of ISDEL. The term *i* refers to the spatial weight matrix, where *1* represents a first-degree matrix, *2* represents a second-degree matrix, and *d* represents a matrix with the inverse distance.

8 See the theoretical discussion of regional economic development and spatial heterogeneities from Perroux (1955), Isard (1956), Myrdal (1957) and Krugman (1997).

Whenever the parameter $\rho \neq 0$, the error term u will indicate the presence of spatial correlation in the errors, being necessary to include the matrix W_i, to mitigate this problem. In this case, the estimates are considered to be spatial autoregressive.

The parameter β_0 represents the model constant.

The parameter β_1 represents the difference in percentage points between the ISDEL in municipalities without bank branches and credit unions (control group) and municipalities with only credit unions (including PACs) (treatment group 1).

The parameter β_2 represents the difference in percentage points between the ISDEL in the control group and the ISDEL in municipalities with only bank branches (treatment group 2).

Finally, the parameter β_3 represents the difference between the ISDEL of the control group and the ISDEL in the municipalities with services provided by both financial institutions (treatment group 3).

We estimated six versions of Equation (1) for Brazil. The difference between the estimates refers to the spatial weight matrix W_i (i = 1, 2 and d), estimated for $\rho = 0$ and $\rho \neq 0$. All these equations were estimated with the correction of heteroscedastic errors.

For reasons of parsimony and given the objective of estimating the SARAR model, the only control used in the model was the spatial lag of the ISDEL, measured by the parameter λ. The term $W_i[ISDEL]$ represents the average of the ISDEL depending on which spatial weight i is used.

3.2. Propensity Score Matching

SARAR is an unweighted analysis, so the level of development is not only compared between territories that are comparable to each other. For this, it is necessary to use econometric techniques to pair the territories by their characteristics, making the treatment groups (which have some Financial Institutions – FIs) and control (which do not have any FIs) comparable.

Thus, the use of the Propensity Score Matching (PSM) method seeks to find weighting scores, considering the characteristics of the pre-defined territories,

in order to verify the average difference between the treatment group (with FIs[9]) and the control group (without FIs).

This evaluation shows the variation in ISDEL when comparing a municipality in the treatment group with a control municipality with similar characteristics. So, it is possible to state that any average difference (positive or negative) in the ISDEL value between the territories of these groups refers mainly to the impact of the financial intermediation institution on local development.

Formally, according to Rosenbaum and Rubin (1983), a score adjustment $b(x)$ is a function of a group of variables, such that the distribution of x given $b(x)$ is the same for the treatment ($z = 1$) and control ($z = 0$). Mathematically, we have:

$$x \perp z \mid b(x), \text{ where adjustment occurs by } e(x) = pr(z = 1|x), \text{ in which} \quad (2)$$

$$pr(z_1, \dots, z_n|x_1, \dots, x_n) = \prod_{i=1}^{N} e(x_1)^{z_1}\{1 - e(x_1)\}^{1-z_1}$$

In Equation (2), $e(x)$ is known as "propensity score", which is the "propensity to treatment exposure considering the x observed covariates" (Rosenbaum; Rubin, 1983). In this study, we obtained the propensity scores using logistic regression (which gives the odds ratios of a municipality being treated, i.e., having FI). In addition, we employed the scores with the closest correspondence (Nearest Neighbors).

In the literature, PSM is mainly recommended when the treatment is not naturally random. This is the case here, as the likelihood of a credit union or bank branch in a given location is linked to human, locational, economic and social factors (Dawid, 1979; Heinrich; Maffioli; Vazquez, 2010; McKillop; Wilson, 2011).

We first considered assessing the probability of examining a municipality and its being in the control group or being in treatment group 1 (only credit unions) in the first estimate, treatment group 2 (only banks) in the second estimate, or treatment group 3 (credit unions and banks) in the third estimate.

Econometrically, the values were estimated by the Logit model, where the following functional forms were tested:

9 We reiterate that, in this work, the "treatment group" is considered to be those territories that have at least: i) a credit union; ii) a bank branch; iii) a credit union and a bank branch. The control group is composed of territories that do not have financial institutions.

$$Treated_1 = \sum_{j=1}^{J} \alpha_j DIM_j \quad (3)$$

$$Treated_2 = \sum_{j=1}^{J} \alpha_j DIM_j \quad (4)$$

$$Treated_3 = \sum_{j=1}^{J} \alpha_j DIM_j \quad (5)$$

where: $Treated_t$=[0,1]; t = [1, 2, 3]; e j = [1, 2, 3, ..., 12].

The term DIM_j, which abbreviates the term DIMENSION, represents the set of variables (which are the different characteristics - *dimensions* - of the municipalities) presented in Table 1.

When j is equal to 1, the only covariate that explains the probability in the Logit model of the first stage of the PSM is W_i [ISDEL]. Therefore, it should be noted that all estimated models include the in the first stage of the PSM, take into account the regional development that will be measured according to the spatial lag matrix to be used.

When *j=2*, the variables of the *Work dimension* (employment or employability) are considered.

When *j=3*, the variables of the *Financial Relation* dimension are considered. These are the only non-public variables since Bacen made them available privately.

When *j=4*, only the variables of the *Location dimension* are considered.

When *j=5*, only the variables of the *Demography dimension* are considered.

From *j=6*, successive dimensions 3, 4 and 5 variables were included, making the model increasingly complete in terms of characterization of municipalities. Therefore,

$$DIM_6 = DIM_2 + DIM_3 \quad (6)$$
$$DIM_7 = DIM_6 + DIM_4 \quad (7)$$
$$DIM_8 = DIM_7 + DIM_5 \quad (8)$$

Dimensions 9 to 12 include the spatial effect in the first estimated models:

$$DIM_9 = DIM_2 + DIM_1 \quad (9)$$

$$DIM_{10} = DIM_6 + DIM_1 \quad (10)$$
$$DIM_{11} = DIM_7 + DIM_1 \quad (11)$$
$$DIM_{12} = DIM_8 + DIM_1 \quad (12)$$

For parsimony, equations 9 to 12 (dimensions 9 to 12) were estimated considering only first-order contiguity since adding more orders to the model reduces the probability of finding a pair from the control group to allow reliable statistical inferences.

The dimensions presented here are the result of successive tests, with an increasing degree of complexity and use of the different dimensions that characterize the municipalities, to check which model is the most appropriate in the best possible way.

We chose the variables that make up the characteristics — dimensions — of the taking into account that the variable of interest, ISDEL, already has a series of characteristics of the municipalities that could not be used again in the estimation of the *Logit* model in the first stage of the PSM[10]. In addition, all equations in the first stage of the PSM were estimated with heteroscedastic error correction, considering eight nearest neighbors[11].

After estimating equations 3, 4 and 5, for each of the 12 combinations of dimensions used, the $e(x)$ was calculated as shown in Equation (2). Then, the average treatment effect on the treated (ATT) was estimated, assessing the impact of each set of treated – 1) those with credit unions; 2) those with banks; or 3) those with both - on the local development of the municipalities, as measured by the ISDEL:

$$ATTj = E(Treated_{t,1} - Control_{t,0} | DIM_j) \quad (13)$$

10 More methodological details on the construction of the ISDEL can be found at https://www.isdel-sebrae.com/acervo.

11 Abadie and Imbens (2006) point out that the number to be chosen should be low in order to avoid excluding observables when correcting heteroscedastic errors. In their example, the authors use at least 4 nearest neighbors to perform the correction. The matter is objective, and depends on the knowledge of the database.

To choose the best adjustment to DIM_j, Akaike (AIC) and Bayesian (BIC) criteria were evaluated, considering the adjustment of the first stage[12].

As a rule, the estimated models with the lowest values are those with the best adjustments because:

$$AIC = 2k - \ln(L) \tag{14}$$

$$BIC = 2ln(N)k - \ln(L) \tag{15}$$

where L is the likelihood value, N are the first-stage observations, and k is the number of estimated parameters.

Once we found the weightings, and before evaluating the differences, we predicted the probabilities of the municipalities being treated or being in the control group. From these predictions, we performed statistical inference, indicating which municipalities of the control group have characteristics very similar to those of the treatment group.

3.3. Data and descriptive statistics

In our paper, we considered the characteristics of the municipalities, which are categorized according to the following *dimensions*: Work; Inter-financial Relation; Location; Demographic; and Spatial. The covariates of each of these dimensions, obtained from 2016 to 2019, are presented in Table 1.

The aim was for all the variables to cover all 5,570 Brazilian municipalities. Those that did not present observations for any of the municipalities had their values set to zero. This procedure was applied, for instance, to the variable of statutory links[13], which initially consisted of between 5,494 and 5,535 municipalities over the years analyzed.

The variables of the financial relation[14] were also only obtained for 5,568 municipalities originally. Regarding the variables distance from the capital[15]

12 The higher the likelihood, the lower the AIC or BIC and the better the models will fit. We do not consider absolute values when calculating both tests, and AIC and BIC can be negative. The more negative, if this is the case, the better the adjustment of the model.

13 They are the Public Servants that occupy Public Positions.

14 Data from the Central Bank of Brazil that indicates the number of Individuals or Legal Entities that have relations with institutions in the Brazilian financial system.

15 Distance from the nearest regional capital.

and distance from the subregional center[16], the municipalities considered close to the capital (metropolitan region) had their distances adjusted to zero. We also did this for the variable distance from the sub-regional center when the municipality is the sub-regional center itself[17]. The variables of the dimensions work[18] (except companies per capita), financial relation, location and demographic (except the Gini Index) are presented in their logarithmic forms.

The spatial dimension variables represent, respectively, the average of the values of the ISDEL weighted by the inverse distance of the municipalities (for the ISDEL - Inverse Distance), the average of the local development of the neighboring municipalities of the first order (for the ISDEL – 1st degree contiguity), and the average of the development of the neighboring municipalities of first and second order (for the ISDEL – 2nd degree contiguity).

The municipal sizes, according to SNAS classification (2015), are: Small Size I refers to municipalities with up to 20,000 inhabitants; Small Size II refers to municipalities with over 20,000 inhabitants and up to 50,000 inhabitants; Medium Size refers to municipalities with over 50,000 inhabitants and up to 100,000 inhabitants; Large Size refers to municipalities with over 100,000 inhabitants and up to 900,000 inhabitants, and Metropolises refer to municipalities with over 900,000 inhabitants.

TABLE 1

DIMENSIONS, COVARIATES AND THEIR DESCRIPTIVE STATISTICS, 2016 TO 2019 - BRAZIL.

Dimension	Covariate	Obs.	Avg.	SD	Obs.	Avg.	SD	Obs.	Avg.	SD	Obs.	Avg.	SD	Source
		2016			2017			2018			2019			
Work	Salary	5,570	14.97	1.61	5,570	15.06	1.57	5,570	15.12	1.56	5,570	15.12	1.56	RAIS
	Employers regulated by the Brazilian Consolidation of Labor Laws (CLT)	5,570	4.32	1.83	5,570	4.34	1.82	5,570	4.37	1.82	5,570	4.37	1.81	RAIS
	Statutory Links[1]	5,570	7.23	1.47	5,570	7.30	1.42	5,570	7.31	1.42	5,570	7.31	1.42	RAIS
	Active links[2]	5,570	3.61	1.37	5,570	3.80	1.19	5,570	3.81	1.17	5,570	3.81	1.17	RAIS
	Companies per capita	5,570	0.06	0.03	5,570	0.06	0.04	5,570	0.06	0.04	5,570	0.07	0.04	RAIS/ IBGE

16 Distance from the nearest Sub-regional Center.

17 Such classifications are made by the Brazilian Institute of Geography and Statistics (IBGE) (IBGE, 2023).

18 Characteristics of formal workers according to Annual Report of Social Information (RAIS).

Dimension	Covariate	Obs.	Avg.	SD	Obs.	Avg.	SD	Obs.	Avg.	SD	Obs.	Avg.	SD	Source
		2016			2017			2018			2019			
Financial Relation[3]	Relations - Individuals	5,570	8.98	1.22	5,570	9.00	1.22	5,570	9.04	1.22	5,570	9.06	1.22	BACEN
	Relations - Legal Entities	5,570	5.96	1.38	5,570	5.98	1.40	5,570	6.02	1.41	5,570	6.08	1.42	BACEN
Location	Distance from the Capital[4]	5,570	4.52	1.05	5,570	4.52	1.05	5,570	4.52	1.05	5,570	4.52	1.05	IBGE
	Distance from the sub-regional center[5]	5,570	3.85	1.22	5,570	3.85	1.22	5,570	3.85	1.22	5,570	3.85	1.22	IBGE
	Proximity to the Hub city[6]	5,570	0.01	0.00	5,570	0.01	0.00	5,570	0.01	0.00	5,570	0.01	0.00	IBGE
Demography	Population	5,570	9.47	1.18	5,570	9.47	1.19	5,570	9.47	1.19	5,570	9.47	1.20	IBGE
	Gini index	5,570	0.50	0.07	5,570	0.50	0.07	5,570	0.50	0.07	5,570	0.50	0.07	IBGE
Spatial	ISDEL - Inverse Distance	5,570	0.35	0.11	5,570	0.36	0.11	5,570	0.35	0.11	5,570	0.35	0.11	SEBRAE[7]
	ISDEL - 1st degree contiguity	5,570	0.31	0.13	5,570	0.31	0.13	5,570	0.30	0.13	5,570	0.30	0.14	SEBRAE[7]
	ISDEL - 2nd degree contiguity	5,570	0.28	0.11	5,570	0.29	0.11	5,570	0.28	0.11	5,570	0.28	0.11	SEBRAE[7]

Source: Own elaboration.

Notes: [1]They are the Public Servants that hold Public Positions.

[2] This refers to the number, in logs, of workers at a given enterprise located in the municipality. This variable is the stock of active links (employed and working) in the municipality.

[3] Data from the Central Bank of Brazil indicates the number of individuals or legal entities that have a relationship with institutions in the Brazilian financial system.

[4] Distance from the nearest regional capital (zero when the municipality is the regional capital).

[5] Distance from the nearest Subregional Center (zero when the municipality is the Subregional Center).

[6] Distance from the nearest Hub city (zero when the municipality is the Hub).

[7] The spatial covariates are lags in space, considering *W1*, *W2*, and *Wi*, presented in the SARAR methodology.

Obs. = Number of observations (Brazilian municipalities).

SD = Standard Deviation.

Table 2 shows the descriptive statistics of Brazil's control and treatment groups. In addition, these statistics are presented for the years analyzed in this research, according to territorial size and type of treatment (among the three possible types of treatment).

TABLE 2

DESCRIPTIVE STATISTICS OF THE CONTROL AND TREATMENT GROUPS, 2016 TO 2019 - BRAZIL

Treatment group 1 – CREDIT UNIONS								
Year	**2016**		**2017**		**2018**		**2019**	
BRAZIL	**Control**	**Treated**	**Control**	**Treated**	**Control**	**Treated**	**Control**	**Treated**
Small Size I	1,356	583	1,412	648	1,461	702	1.455	695
Small Size II	39	3	43	4	52	4	51	4
Total	1,395	586	1,455	652	1,513	706	1.506	699
Treatment group 2 – BANK BRANCHES								
Year	**2016**		**2017**		**2018**		**2019**	
BRAZIL	**Control**	**Treated**	**Control**	**Treated**	**Control**	**Treated**	**Control**	**Treated**
Small Size I	1,356	805	1,412	745	1,461	702	1.455	703
Small Size II	39	496	43	494	52	480	51	485
Medium Size	0	110	0	110	0	108	0	109
Large Size	0	35	0	36	0	38	0	39
Total	1,395	1,446	1,455	1,385	1,513	1,328	1.506	1,336
Treatment group 3 – BOTH FINANCIAL INSTITUTIONS								
Year	**2016**		**2017**		**2018**		**2019**	
BRAZIL	**Control**	**Treated**	**Control**	**Treated**	**Control**	**Treated**	**Control**	**Treated**
Small Size I	1,356	1,069	1,412	999	1,461	945	1.455	945
Small Size II	39	562	43	562	52	560	51	561
Medium Size	0	240	0	245	0	241	0	240
Large Size	0	257	0	257	0	261	0	267
Metropolises	0	17	0	17	0	18	0	18
Total	1,395	2,145	1,455	2,080	1,513	2,025	1.506	2,031

Source: Own elaboration.

Note: Small Size I = up to 20,000 inhabitants; Small Size II = over 20,000 up to 50,000; Medium Size = over 50,000 up to 100,000; Large Size = over 100,000 up to 900,000; and Metropolises = over 900,000 inhabitants.

4. Results

4.1 Preliminary analysis of the effect of Financial Institutions on Local Development in Brazil – spatial aspects

Table 3 shows the spatial analysis results for the entire country in this section. Only the results containing autoregressive spatial relations (considering the influence of a municipality's characteristics on other municipalities, whether contiguous or not) were presented, as they are the most complete models.

We emphasize that the numerical values of these results should be analyzed with caution since the comparison between municipalities is made without any weighting. Consequently, one could compare small municipalities without Financial Institutions (FIs) with metropolises. Therefore, the

importance of the results in Table 3 refers to verifying the existence of direct effects (within the municipality itself) and indirect effects (on neighboring municipalities) of the presence of FIs in Brazilian municipalities.

In the Brazilian case, we can see that when, hypothetically, we go from a municipality without any financial institutions to another municipality where a credit union carries out financial intermediation, the effect on ISDEL: (i) is positive for the immediately surrounding municipalities (POA); (ii) not significant, in the years 2016 and 2018 for the neighbors of the neighbors (SOA); and (iii) negative as the distance traveled increases (IDA), also in the years 2016 and 2018.

TABLE 3

SPATIAL EFFECT OF THE PRESENCE OF FINANCIAL INSTITUTIONS ON ISDEL IN MUNICIPALITIES, 2016 TO 2019 - BRAZIL

	AR(1)		AR(2)		IDAR	
2016	**Direct**	**Indirect**	**Direct**	**Indirect**	**Direct**	**Indirect**
Coop	0,05***	0,02*	0,05***	*ns*	0,03***	-0,12***
Bank	0,07***	0,01*	0,07***	0,05***	0,06***	0,24***
Both	0,15***	0,07***	0,15***	0,09***	0,14***	0,38***
2017	**Direct**	**Indirect**	**Direct**	**Indirect**	**Direct**	**Indirect**
Coop	0,06***	0,03***	0,05***	0,02***	0,04***	*ns*
Bank	0,07***	0,01**	0,07***	0,04***	0,06***	0,24***
Both	0,16***	0,07***	0,15***	0,09***	0,14***	0,39***
2018	**Direct**	**Indirect**	**Direct**	**Indirect**	**Direct**	**Indirect**
Coop	0,06***	0,03***	0,05***	*ns*	0,04***	-0,11**
Bank	0,06***	0,01*	0,06***	0,031**	0,06***	0,20***
Both	0,15***	0,07***	0,14***	0,08***	0,13***	0,40***
2019	**Direct**	**Indirect**	**Direct**	**Indirect**	**Direct**	**Indirect**
Coop	0,07***	0,03***	0,06***	0,030**	0,04***	*ns*
Bank	0,08***	*ns*	0,07***	0,04***	0,07***	0,25***
Both	0,16***	0,07***	0,16***	0,10***	0,15***	0,40***

Source: Own elaboration.

Notes: * significant at 10%; ** significant at 5%; *** significant at 1%; ns non-significant. (1) – first-order autoregression: AR(2) – second-order autoregression; IDAR – inverse distance autoregressive.

These results demonstrate the regional aspect (i.e., within the municipality itself, with at most intermittent second-order spillovers) of the positive effect of credit unions on economic development.

In the context of impact analysis, it is crucial to know the spatial behavior of the effect of FIs on local development to indicate whether or not this possible causal relationship exists. Furthermore, understanding the spatial behavior

of the influence of financial intermediaries on local development makes it possible to comprehend whether some kind of spatial correction is necessary for Propensity Score Matching (PSM).

For this reason, to balance the comparisons between municipalities with and without FIs, we applied the PSM method, and the results can be seen in the following section. It should be noted that since there was a spatial correlation between first-order neighbors in all years, the PSM model only included the first-order lagged ISDEL among its control variables.

4.2. Analysis of the impact of Financial Institutions on Local Development in Brazil

In the first stage of running the Propensity Score Matching (PSM) model, a Logit regression was applied to the annual data, making it possible to identify the characteristics, among those analyzed in this work, increase or decrease the chances of a given municipality having a credit union, bank branch, or both types of FIs simultaneously. This step also permits the pairing of treated municipalities (with FIs) with untreated municipalities (in the control group), which are those with a high probability of having FIs but which do not.

In the second stage of implementation of the PSM, it was possible to determine the average effect of the treatment on those treated (ATT), i.e., whether there was an impact on local development, as measured by the ISDEL because the municipalities had FIs. It is essential to emphasize that this impact is derived from the comparison between municipalities with FIs and those without FIs, which are very similar in the characteristics we employed in this study (see Table 1).

We analyzed the impact of three different types of treatment on local development. Thus, it was verified: i) the existence of an impact of credit unions on ISDEL (**treatment group 1**); ii) of bank branches in ISDEL (**treatment group 2**) and; iii) of credit unions and bank branches in ISDEL (**treatment group 3**).

4.2.1. Analysis of the impact of credit unions on local development in Brazil

Table 4 shows the result of applying Logistic Regression to the annual data, which allows us to check the factors that explain the presence of credit unions, including PACs, in Brazilian municipalities. This is the first stage of the Propensity Score Matching model (PSM). Once again, the impact analysis results only consider Small Municipalities I and II since it was only possible to find municipalities to make up the control group (without FI).

TABLE 4

LOGISTIC REGRESSION RESULTS (CREDIT UNIONS), ODDS RATIO, 2016 TO 2019 - BRAZIL

Variables	2016	2017	2018	2019
Salary	4,190*** (1,083)	3,660*** (1,064)	2,767*** (0,852)	2,767*** (0,858)
Employers regulated by the Brazilian Consolidation of Labor Laws (CLT)	3,354*** (0,660)	3,546*** (0,704)	3,652*** (0,737)	3,289*** (0,663)
Active Links	0,039*** (0,015)	0,034*** (0,015)	0,048*** (0,022)	0,053*** (0,024)
Statutory Links	1,697*** (0,192)	1,666*** (0,214)	1,449*** (0,174)	1,411*** (0,168)
Companies per capita	0,000*** (0,000)	0,000*** (0,000)	0,000*** (0,000)	0,000*** (0,000)
Relations – Individuals	1,698 (0,570)	1,832* (0,630)	2,168** (0,774)	2,067** (0,743)
Relations – Legal Entities	9,622*** (2,455)	15,071*** (3,935)	19,492*** (5,072)	27,322*** (7,458)
Distance from the Capital	1,368*** (0,151)	1,408*** (0,150)	1,462*** (0,155)	1,483*** (0,158)
Distance from Sub-regional center	0,671*** (0,068)	0,688*** (0,068)	0,705*** (0,069)	0,706*** (0,070)
Proximity to the Hub City	0,334 (5,369)	2,533 (40,148)	0,004 (0,058)	0,000 (0,008)
Population	0,086*** (0,030)	0,062*** (0,023)	0,042*** (0,016)	0,033*** (0,013)
Gini	0,177 (0,196)	0,106** (0,112)	0,175* (0,178)	0,216 (0,225)
ISDEL_21	16,594*** (13,229)	14,795*** (11,130)	15,509*** (11,548)	19,770*** (14,886)
Constant	1,318 (3,380)	22,448 (62,535)	221,995* (663,853)	359,816* (1,083,409)
Observations	1,948	2,090	2,198	2,184

Source: Research results.

Note: Robust standard deviation in parentheses. ** p<0,01; ** p<0,05; * p<0,10S

So, taking 2019 as an example, it can be seen that only proximity to a regional center and the Gini index are not related to an increase in the odds ratio of a municipality having a credit union since their values were not statistically significant. The other variables used in the model are statistically significant, and due to their positive signs, it can be said that an increase in the value of these variables leads to an increase in the odds ratio of a municipality having a credit union.

In this sense, still considering 2019, it is possible to state that a given municipality's salary mass is related to an increase in the odds ratio[19] of that municipality having credit unions, including PACs. In addition, an increase in the number of formal jobs in the municipality is related to a greater chance of that municipality having credit unions. As for the number of public servants (statutory links), this variable is related to an increase in the odds ratio of having a credit union in the municipality.

Finally, it should be noted that the "ISDEL_21" variable represents the spatial control included in the model and is relevant in pairing municipalities according to their contiguous first-order relations analyzed in the previous subtopic (see Table 3). In Table 4, this control's positive and significant value confirms the relevance of including this variable in the PSM model.

Relations with financial institutions, represented here by those carried out by businesses and individuals, are also positively related to an increase in the chances of the municipality having a credit union, especially relations with legal entities, which strongly increase the odds ratio for the existence of a credit union in the municipality. However, the number of companies per capita does not influence the chances of credit unions in the municipality. While increasing the distance to the capital raises the odds of having a credit union, increasing the distance to a regional center lowers the odds. This may show that regional centers end up being the municipalities that concentrate the financial services of a given region.

Analyzing the statistically significant coefficients of the characteristics of the municipalities, we found that an increase in the population of the municipalities has the effect of decreasing (coefficients less than unity) the chance of

19 The term "odds ratio" is related to the fact that the number obtained is a quotient of the ratio of odds in favor divided by the opposite odds ratio. In other words, quotient values greater than 1 (one) indicate that increases in the value of the variable under analysis raise the chances of a certain event occurring. On the other hand, values of this quotient lower than 1 (one) decrease the chances of a certain event occurring.

finding a credit union, thus reinforcing the "interiorization" nature of credit unions (including PACs).

Having carried out the initial analysis, which allowed us to check which characteristics influence the chances of a municipality having credit unions (including PACs), we now proceed to analyze the results obtained by applying the second stage of the PSM, which allows us to check the impact of credit unions on the local development of the municipalities where these FIs are present. Table 5 shows the results of applying the second stage to Brazil. The twelfth model (equation 3) is the best fit for analyzing the impact of credit unions on the ISDEL of municipalities[20].

Model 12, whose results can be seen in Table 5, was statistically significant from 2017 to 2019. In addition, evaluating the annual comparisons of municipalities with credit unions (treatment group 1) with the control group (without FIs), it can be seen that, in 2017, the fact of having credit unions in the municipality caused an increase of 1 percentage point in the ISDEL, when compared with municipalities without FIs, and in 2019, the presence of credit unions already generates a positive impact of 2.5 percentage points on the ISDEL.

TABLE 5

AVERAGE EFFECT OF THE TREATMENT (CREDIT UNIONS) ON THE TREATED, PSM – BRAZIL

Year	2016	2017	2018	2019
ATT	0.523	0.905	1.796	2.501
T-stat	1.034	2.08	3.196	3.142
Significance	*ns*	**	***	***
Number of treated	580	648	701	694
Number of municipalities of control group	1368	1442	1497	1490
AIC	1633	1737	1789	1745
BIC	1711	1816	1868	1824
Sensibility	64.830	64.350	67.330	68.440
Specificity	87.720	87.450	86.840	87.180
Propability right	80.900	80.290	80.620	81.230
LROC	0.865	0.871	0.879	0.884

Source: Research results.

Note: *** p<0,01; ** p<0,05; * p<0,10; ns non-significant.

20 As described in the methodological aspects of the study, the AIC and BIC criteria were used to measure the quality of the fit of the models. Therefore, the higher the likelihood, i.e. the quality of the models' fit to reality, the lower the AIC or BIC and the better the models will fit. The results of all the other 11 estimated models can be obtained from the authors.

This result is consistent with the spatial analysis initially carried out in Brazil (Table 3) and confirms that credit unions have the potential to impact local development positively, measured in this study by the Sebrae Index of Local Economic Development (ISDEL).

Although only analyzing the context of rural solidarity credit unions, Schuntzemberger *et al.* (2015) found an increase in per capita agricultural GDP in those locations that saw the creation of financial cooperatives. The authors highlight the importance of creating these institutions in small municipalities in the countryside. Similarly, by checking credit unions' effect on Brazil's GDP per capita, Jacques and Gonçalves (2016) also found gains in the municipalities where credit unions were set up between 2006 and 2010.

According to Reis and Neves (2020) and Souza, Bressan and Carrieri (2023), the importance of credit unions for local development can be explained by various reasons, from evidence that they offer financial services at lower costs than traditional banks to the fact that they are related to the possibility of including people who would not have access to relevant financial services if it were not for the presence of credit unions in their communities. In addition, the analysis carried out in section 2 already showed that Brazilian municipalities with credit unions were related to higher averages in the ISDEL.

According to Fairbairn, Ketilson and Krebs (1997) and McKillop *et al.* (2020), credit unions pursue social and economic development objectives rather than solely maximizing shareholder value, as commercial banks do. Credit unions' initiatives aimed at developing local businesses are not uncommon, such as initiatives intended to purchase local goods, enabling investments by organizing fairs, and granting credit to credit union members to purchase new inputs and productive goods, among other actions.

Furthermore, due to the nature of many credit union ventures, which are usually set up locally by a group of cooperative members interested in accessing financial services under better conditions, it can be said that a local focus is usually at the heart of their business. For example, when financial surpluses exist, they can be distributed to credit union members, allowing even the "profit" from the credit union's activity to remain confined to its area of operation.

We would like to emphasize that the analyses carried out here only consider Small Size I municipalities (up to 20,000 inhabitants) and Small Size II munic-

ipalities (over 20,000 and up to 50,000 inhabitants). Therefore, when looking at the positive impact of credit unions on the ISDEL of Brazilian municipalities, what is also being asserted is that small municipalities, often unassisted by financial institutions, have cooperativism as a possibility via financial intermediation and the offer of other services, to provide their citizens with access to the financial system and raise their levels of local development (Greatti; Farias, 2020, Greatti; Sela, 2021).

4.2.2. Analysis of the impact of bank branches on local development in Brazil

Table 6 shows the results of the first stage of the PSM, which sought to determine the factors that influenced the chance of having bank branches in the municipalities. When we consider the variables with valid results for analysis (statistically significant), we highlight the degree to which the increase in businesses per capita raises the chance of the existence of bank branches in a given municipality, confirming how banks can emphasize this characteristic in their strategies to open new branches.

For the last three years of the analysis, the increase in the municipality's salary mass also increased the chances of it having a bank branch. On the other hand, factors in the employment dimension, such as active employment with a formal contract or the number of public servants, were not positively related to the chance of having a bank branch in the municipality.

The number of checking accounts the municipal population opened seems more relevant to banking institutions. The value above the unity of these factors (Relations – Individuals and Relations – Legal Entities) indicates that the potential number of new accounts opened is also a factor banks consider when analyzing the opening and maintenance of branches in municipalities rather than their population size. Thus, more important than the size of the population would be having a high proportion of this population linked to financial services.

TABLE 6

LOGISTIC REGRESSION RESULTS (BANK BRANCHES), ODDS RATIO, 2016 TO 2019 - BRAZIL

Variables	2016	2017	2018	2019
Salary	1,386 (0,347)	1,894** (0,541)	2,619*** (0,755)	2,530*** (0,702)
Employers regulated by the Brazilian Consolidation of Labor Laws (CLT)	1,316** (0,165)	1,199 (0,154)	1.059 (0,141)	1,108 (0,148)
Active Links	0,617 (0,193)	0,471** (0,175)	0,413** (0,166)	0,415*** (0,163)
Statutory Links	0,988 (0,082)	0,866 (0,077)	0,750*** (0,077)	0,764*** (0,077)
Companies per capita	549,448,340*** (2368268,510)	22,631,191*** (79,566,335)	7,681,993*** (25,847,375)	15,630,368*** (53,278,815)
Relations – Individuals	43,880*** (16,498)	28,195*** (10,466)	19,895*** (7,278)	15,485*** (5,891)
Relations – Legal Entities	4,022*** (1,084)	5,837*** (1,500)	7,360*** (1,831)	7,421*** (1,882)
Distance from the Capital	1,213* (0,122)	1,207* (0,122)	1,282** (0,136)	1,307** (0,139)
Distance from Sub-regional center	1,294*** (0,118)	1,290*** (0,118)	1,215** (0,113)	1,196* (0,112)
Proximity to the Hub City	0,000 (0,000)	0,000 (0,000)	0,000 (0,000)	0,000* (0,000)
Population	0,194*** (0,069)	0,242*** (0,085)	0,308*** (0,104)	0,343*** (0,123)
Gini	0,339 (0,421)	0,173 (0,220)	0,129 (0,168)	0,242 (0,315)
ISDEL_21	216,671*** (189,488)	65,022*** (55,094)	32,440*** (28,985)	23,841*** (21,104)
Constant	0,000*** (0,000)	0,000*** (0,000)	0,000*** (0,000)	0,000*** (0,000)
Observations	2,756	2,793	2,792	2,793

Source: Research results.

Note: Robust standard deviation in parentheses. *** p<0,01; ** p<0,05; * p<0,10

In locational terms, the distance to the capital and sub-regional centers was positively related to the chances of opening new bank branches in Brazilian municipalities for the years of the analysis. Thus, increasing the distance from a given municipality to these key cities can increase the chance of that municipality having a bank. This shows that distance to the capital is not necessarily a limiting factor in opening and maintaining bank branches. However, there are several other factors, such as the number of relations with individuals and companies, which banks analyze when making these decisions.

It is essential to consider that the variable "ISDEL_21" represents the spatial control inserted into the model and is relevant in pairing municipalities

according to their contiguous first-order relations. This control was inserted based on the analysis of the results described in Table 3. In Table 6, this control's positive and significant value confirms the relevance of including this variable in the PSM model.

After carrying out the analysis that allowed us to check which characteristics influence the chances of a municipality having bank branches (Table 6), we analyzed the results obtained by applying the second stage of the PSM, which allowed us to check the impact of bank branches on the local development of the Brazilian municipalities where these FIs are located, for the years 2016 to 2019.

Table 7 shows the results of the second stage. Once again, the twelfth model was the best fit for analyzing the impact of bank branches on municipalities' ISDEL.

TABLE 7

AVERAGE EFFECT OF THE TREATMENT (BANK BRANCHES) ON THE TREATED, PSM - BRAZIL

Year	2016	2017	2018	2019
ATT	–2.303	–2.450	–2.127	-–2.800
T-stat	2.330	2.214	2.381	2.290
Significance	**	**	**	**
Number of treated	1388	1351	1295	1303
Number of municipalities of control group	1368	1442	1497	1490
AIC	1785	1791	1749	1764
BIC	1867	1874	1833	1847
Sensibility	85.090	85.120	84.860	84.960
Specificity	86.260	86.890	88.780	88.320
Propability right	85.670	86.040	86.960	86.750
LROC	0.937	0.938	0.941	0.940

Source: Research results.

Note: *** p<0,01; ** p<0,05; * p<0,10; ns non-significant.

There is a negative and valid (statistically significant) variation in the impact of only bank branches on the ISDEL of Brazilian municipalities, which is between approximately 2 and 3 percentage points, depending on the year evaluated. In other words, municipalities with only bank branches are related to lower local development indexes, measured here by ISDEL. In a study in Turkey, Onder and Ozyildirim (2009) found that local state banks end up reinforcing inequality by boosting regions that are already more developed. In the context analyzed in this paper, it is interesting to note that Usai and Vannini (2005) found that commercial banks, in contrast to credit unions, did not promote local economic development in Italy.

4.2.3. Analysis of the impact of credit unions and bank branches on local development in Brazil

Table 8 shows the results of the first stage of the PSM, which enabled the weighting scores to be generated to assess the treatment effect (to have FI). As with the other logistic models in the first stage, it can be seen that an increase in salaries in the municipalities increases the chances of finding a credit union and a bank branch in a given municipality simultaneously.

TABLE 8

LOGISTIC REGRESSION RESULTS (CREDIT UNIONS AND BANK BRANCHES), ODDS RATIO, 2016 TO 2019 - BRAZIL

Variables	2016	2017	2018	2019
Salary	6,156*** (2,379)	11,339*** (5,736)	14,798*** (7,812)	13,498*** (6,534)
Employers regulated by the Brazilian Consolidation of Labor Laws (CLT)	6,408*** (1,891)	7,536*** (2,740)	8,267*** (3,445)	8,606*** (3,683)
Active Links	0,014*** (0,008)	0,004*** (0,003)	0,002*** (0,002)	0,003*** (0,002)
Statutory Links	1,417*** (0,147)	1,448*** (0,165)	1,225 (0,164)	1,271* (0,167)
Companies per capita	732,559 (3,167,918)	0,803 (3,177)	0,098 (0,392)	0,040 (0,152)
Relations – Individuals	1,075,398*** (708,382)	821,532*** (567,901)	625,812*** (426,577)	352,837*** (240,664)
Relations – Legal Entities	13,460*** (5,005)	28,851*** (11,188)	49,481*** (19,459)	61,112*** (24,478)
Distance from the Capital	1,890*** (0,286)	2,000*** (0,309)	1,927*** (0,315)	1,939*** (0,318)
Distance from Sub-regional center	0,798 (0,112)	0,744** (0,109)	0,821 (0,127)	0,871 (0,135)
Proximity to the Hub City	0,000 (0,000)	0,000 (0,000)	0,000** (0,000)	0,000* (0,000)
Population	0,003*** (0,002)	0,003*** (0,002)	0,003*** (0,002)	0,004*** (0,002)
Gini	1,669 (2,460)	0,634 (0,955)	0,679 (1,043)	1,077 (1,699)
ISDEL_21	446,993*** (457,593)	211,302*** (214,706)	121,262*** (133,574)	195,811*** (203,587)
Constant	0,000*** (0,000)	0,000*** (0,000)	0,000*** (0,000)	0,000*** (0,000)
Observations	3,278	3,294	3,292	3,291

Source: Research results.

Note: Robust standard deviation in parentheses. *** p<0,01; ** p<0,05; * p<0,10

However, the most attractive factor for financial institutions is the number of individuals or companies based in the municipality that have a relationship with financial institutions.

Table 8 also shows that the size of the population is smaller than unity and does not contribute to increasing the chance of having credit unions and banks in a given municipality. However, the more significant the proportion of the population with a checking account, the greater the likelihood of finding a credit union and a bank branch in the municipality.

Table 9 shows the results for municipalities with both financial institutions compared to municipalities without FIs.

The results of the best-fit model by AIC and BIC ("criteria for choosing models") were not statistically significant. It should be noted that, regarding the method used, there is some difficulty in obtaining, among that group of municipalities without FIs, some of them that are comparable to those municipalities with credit unions and banks since these are larger municipalities and have higher values for the dimensions included in the model. This may also be one of the reasons why the results obtained in the Equation, shown in Table 9, were not statistically significant, i.e., invalid for analysis.

TABLE 9

AVERAGE EFFECT OF THE TREATMENT (CREDIT UNIONS AND BANK BRANCHES), ON THE TREATED, PSM - BRAZIL

Year	2016	2017	2018	2019
ATT	–1,084	–0,170	–1,232	–0,336
T-stat	0,332	0,054	0,276	0,067
Significance	*ns*	*ns*	*ns*	*ns*
Number of treated	1910	1852	1795	1801
Number of municipalities of control group	1368	1442	1497	1490
AIC	1048	986.5	950.4	946.2
BIC	1133	1072	1036	1032
Sensibility	94,610	94,920	95,150	95,220
Specificity	91,810	93,480	94,190	94,430
Propability right	93,440	94,290	94,710	94,860
LROC	0,985	0,987	0,988	0,988

Source: Research results.

Note: *** p<0,01; ** p<0,05; * p<0,10; ns not significant.

5. Concluding Remarks

The development of territories cannot be seen as a process that takes place in a given region only through government policies. Some agents may be invited to partner in community-centered development to help promote the foundations that will make the local economy more dynamic. Thus, credit unions and other financial institutions become vital in pursuing these goals as long as they understand and are willing to also deal with the challenges related to the most varied difficulties Brazilian municipalities face, especially the smaller ones.

Based on these premises, we assessed the impact of financial institutions on the local development of Brazilian municipalities. We chose the Sebrae Index of Local Economic Development (ISDEL) as an indicator of local development. This index encompasses various dimensions such as Entrepreneurial Capital, Business Linkage, Governance for Development, Competitive Insertion and Productive Organization. We employed some analysis methods, particularly the Propensity Score Matching method (PSM), through which it was possible to compare compatible municipalities that differed because they had or did not have financial institutions.

We should point out that the PSM was applied in small municipalities (up to 50,000 inhabitants), as obtaining a control group above this number of inhabitants was impossible. In other words, all Brazilian medium-sized or large municipalities or metropolitan areas had at least one financial institution.

At a national level, we verify that credit unions positively impacted local development (measured by ISDEL), showing that they significantly increased local development in municipalities with up to 50,000 inhabitants. On the other hand, bank branches led to a decrease in ISDEL, unrelated to promoting local development in small Brazilian towns. Nor can it be said that municipalities with financial institutions (credit unions and bank branches) had better development results.

In general, we should point out that the headquarters or PACs of credit unions in small towns are usually made up of people who are unassisted or dissatisfied with other types of FIs (e.g., commercial and state-owned banks). So, these credit unions become institutions linked to the demands and reality of the places they were created. Simply shutting down a branch due to the munic-

ipality's lack of attractiveness for financial activities is not usually an option for credit unions, which must adapt to the challenges to maintain their services.S This means that credit unions need to worry about their own "financial health" and that of their members.

Even so, in the face of so many positive factors related to the existence of credit unions in Brazilian municipalities, we highlight that credit unions face many challenges related to their management and the genuine engagement of their members in using their services and supporting their activities. Proper management to overcome these difficulties is undoubtedly behind the country's positive figures for credit unions. Success stories and significant results regarding the positive impact of credit unions on local development would certainly not be seen without concern for the good governance of these enterprises.

In this regard, it is worth mentioning the effective participation of the Central Bank of Brazil (Bacen) with credit unions, aiming to establish guidelines and encourage the use of instruments that have proven capable of making the Brazilian credit union system one of the most fruitful branches of national cooperativism. The role of Bacen in promoting the strength of the credit union system may be one of the reasons we can currently say that Brazilian credit unions are essential instruments for raising the levels of local development in small Brazilian municipalities.

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