Economic Benefits of Credit Unions: Expansion of Banking Coverage

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Agenda

1. Introduction;
2. Importance of Banking Presence;
3. Methodology and data;
4. Results;
5. Assessment of results;
6. Robustness check;
7. Conclusions

Works: Economic Benefits of Credit Unions

The principle of credit unions — **of keeping member resources within their region** — makes credit unions and cooperatives concentrate their credit portfolios where they are most needed. These resources **not only help the local economic dynamics, but also have a critical impact on the Brazilian economy**:

- 48.9% of the credit union portfolio is **in municipalities with up to 50,000 inhabitants**;
- Credit unions focus their resources on smaller businesses, **with over 50% of its legal entity portfolio in micro and small enterprises**;
- They also feature **less restriction when it comes to granting credit**, while sustaining its financial health;
- With this model, they **have a strong impact on GDP, employment, wages and local entrepreneurship**;
- We estimate that, based on Fipe results, between 2007 and 2016, **credit unions added more than BRL 40 billion*/year to the economy**;
- This impact is reflected in almost **BRL 14 billion*/year in government revenue** according to our calculations;

FIPE, 2019. ***Economic Benefits of Credit Unions in Brazil. *At 2018 values***

Works: Economic Benefits of Credit Unions

- **A paper by Assunção (2020) showed that credit unions have the ability to operate in municipalities smaller than those usually covered by traditional banks**.

- Main characteristics of Sicredi's "branches network" in relation to conventional banks:
  - Operates in municipalities with **smaller populations**;
  - Operates in **more remote** municipalities;
  - Operates in **less urbanized** municipalities;
  - Operates in municipalities with the highest per capita income;
  - Operates in municipalities with lower overall income;

- The study showed that the minimum population threshold for installing branches in municipalities is much lower for Sicredi (2,300 inhabitants) than for the traditional banking network (8,000 inhabitants).
- Due to this difference, Sicredi would have the potential to serve **1,900 municipalities (or 9.5 million people) which the traditional banking network is not able to serve.**

Assunção, J., 2020. ***Benefícios do Cooperativismo de Crédito: impacto sobre a bancarização.***

Humaitá/RS Branch
Aprox. 4800, inhab.

1. Introduction

Sicredi

Introduction

In view of **need to include more Brazilians in the national financial system,** in line with the inclusion initiatives of the Central Bank of Brazil - **BCB through BC#, we present a working paper aiming at quantifying and comparing the effort of Credit Unions in Brazil to include locations that are less served by conventional banking networks.**

It is known that the **Brazilian municipalities differ widely in their social, economic and territorial characteristics**, with some presenting **more attractive characteristics for the opening of physical branches of a financial institution.** However, **making this distinction between municipalities** regarding the difficulty they impose for the opening of a banking branch **is not a trivial task.** If asked to distinguish between a rich municipality in the Northeast region and a poor one in the Southeast, which would you say is more difficult for a financial institution to operate?

In order to facilitate this comparison between the wide range of Brazilian municipalities, **we developed a model that, based on socioeconomic characteristics, provides us the probability of not finding a bank branch in that municipality.** Therefore, we use this information to develop a **Banking Presence Index (BPI)**.

Thus, knowing the municipalities in which each type of banking service network operates, we may verify the average difficulty that each service network has **(Relative Municipal Banking Index - MBI-R)** and the total contribution of the network, adding the estimated difficulty of municipalities covered by that network **(Absolute Municipal Banking Index – MBI-A).**

The results show that **state-owned banks have a greater contribution than private banks in opening offices in more remote locations. Despite that, due to the high number of branches being shut down, a relevant part of less attractive municipalities are being left aside** by state-owned federal institutions, reducing the contribution of this group.

Furthermore, it was possible to assess **the profile of municipalities served by the network of credit unions concerning the underserved places by bank branches**. The results show **high complementarity potential**, as they operate in locations that would be difficult for conventional banks to operate in. Even having a lower number of branches than the traditional banking network, the absolute contributions are higher than traditional service networks.

2. The importance of a banking presence

The importance of a banking presence

Several works find positive relationships between credit, financing and other types of loan with economic growth. To name a few who bring empirical evidence of this relationship, **King and Levine (1993)**, **Rajan and Zingales (1998), Beck et al (2000)** and **Arcand et al (2012)** are among the most commonly cited sources. In Brazil, this relationship can be seen in the work of **Silva, Tabak and Laiz (2019) and Schmitsz and Silva (2020)**, for financial institutions in the broadest sense, and in **FIPE (2019)**, for the more specific purposes of cooperative systems.

Despite these characteristics, although credit availability has improved, it remains inaccessible to a significant number of individuals (**Financial Citizenship Report, 2018**) and communities. That is either due to the high cost imposed by financial institutions with little competition in a given territory or due to the difficulty in collecting information about the community in which they intend to operate. As evidenced in the literature, both problems could be mitigated by increasing the physical presence of financial institutions in these communities.

Looking at M&A events in Brazil, **Joaquim, Ornelas and Van Doornik (2020)** show that a reduction in bank competition increased loan spreads and decreased the volume of credit after mergers or acquisitions between financial institutions. However, as the author notes, it is important to highlight that the effects of these operations were felt only in places where both financial institutions involved in the operation had a physical presence. Thus, the results suggest that the effects of reducing the spread, increasing the volume of credit and increasing accessibility would only be observed in the community if the increase in competition derived from the increase in the branches of one or more financial institutions in that location.

On that front, **Ergungor (2006)**, when looking at the mortgage market in the United States, provides evidence that the physical presence of a financial institution in low-income neighborhoods improves their access to mortgage loans. As the author explained, physical presence would not only be positively correlated with loan origination, but also negatively with the spreads charged on the operation. The reason behind this would be the interactions between the borrower and the bank that would reveal private information about the borrower to the bank, which would be important to improve the conditions of access to credit for small businesses. **Petersen and Rajan (2002)** and **Agarwal and Hauswald (2007)** point out that the distance from the bank branch to the borrower is important to increase the supply of credit, by reducing information asymmetry.

Based on this literature and aware of the importance of physical presence of financial institutions, we decided to quantitatively assess the effort made by banks and credit unions in expanding the Brazilian banking frontier, i.e., the presence of each network in municipalities that would otherwise be unlikely covered by a physical branch.

3. Methodology and Data

Sicredi

sicredi.com.br

Data from Municipalities

Aiming at **identifying the socioeconomic factors that explain the presence of bank branches** in different Brazilian municipalities and characterize the analysis, we resorted to surveys and estimates from IBGE, IpeaData, the Federal Government and the study *Benefícios do Cooperativismo de Crédito: impacto sobre a bancarização* (2020) (Economic Benefits of Credit Unions: impact on banking inclusion), by Juliano Assunção, between the years 2010 and 2018. Which are:

IBGE:

- Population Estimates: Municipal Population;
- 2010 Census[1]: HDI, Percentage of Urban Population;
- Gross Domestic Product of Municipalities: Municipal GDP, Municipal GVA, Municipal Agricultural GVA, Municipal Industrial GVA, Municipal Services GVA (exc. public);
- Municipal Livestock Research: Herd of cattle.

IPEAData:

- Distance between the Municipality and the State Capital.

Ministry of Citizenship - Federal Government:

- Bolsa Familia beneficiaries.

Economic Benefits of Credit Unions: impact on banking inclusion (2020) by Juliano Assunção:

- Entry threshold for banking institutions (population).

Also, we used the data above to construct the following variables: GDP per inhabitant, Percentage of Bolsa Família Beneficiaries by Municipal Population, Percentage of Municipal Agricultural GVA by Municipal GVA, Percentage of Municipal Industrial GVA by Municipal GVA, Percentage of Municipal Service GVA by Municipal GVA, binary variables for each Brazilian region (North, Northeast, Central-West, Southeast and South) and a binary variable for municipalities below the entry threshold estimated for 2010 (7,168 inhabitants, according to Assunção (2020)).

[1] We kept the 2010 Census data static for the entire period.

Financial System Data

To determine and assess the service networks of each FI, we used open data made available by the Central Bank of Brazil, through two main channels:

Monthly Bank Statistics - ESTBAN:

- For the construction of the binary matrix that determines the presence of **Bank branches** from a given institution in each Brazilian municipality, we used data referring to the month of December of each year, between 2010 and 2018. For this purpose, the variable "processed branch" (AGEN_PROCESSADAS) was used.

List of Branches and Service Points - RELINST

- For the construction of the binary matrix that determines the presence of branches of a certain **cooperative system** in each Brazilian municipality, we used data referring to the month of December of each year, between 2016 and 2018. To this end, we filter the cooperative service stations by the name of the system to which they belong. **We used a shorter series due to the absence of public data prior to 2016 in this database.**

In this work, the data will be presented in an aggregated form, since the service models of the different types of institutions below are usually similar. Thus, the results are presented for:

- Federal Banks: Banco do Brasil and Caixa Econômica Federal;
- Regional Banks: Banrisul, Banpará, Banese, BASA[2], Banestes and BNB[2];
- Cooperative Systems: Sicredi and Sicoob;
- Private Banks: all private banks in the ESTBAN base;
- Major Private Banks: Itaú, Bradesco and Santander.

[2]BASA and BNB are regional federal financial institutions pursuant to Law 7.827/79 and art. 159, I, c, of the Federal Constitution.

Methodology - Banking Presence Index (BPI)

Initially, we sought to assess the banking presence in different Brazilian municipalities to determine the socioeconomic characteristics of these municipalities that make them attractive to financial institutions. In order to achieve that, we inserted in a **PROBIT econometric model** data from the year 2010, with bank presence as the binary endogenous variable, **assuming 1 when there is no bank branch and zero when there is bank presence**. Thus, using the socioeconomic data mentioned in the previous section, we estimate values between zero and 1, which express the probability of that municipality not being covered by a branch — with 1 being the maximum probability of not finding a branch in the municipality and Zero being the opposite.

Therefore, each municipality, given its characteristics, will have a probability of not having a bank branch, which **we interpret as an index of difficulty in opening a bank branch, which we call Banking Presence Index (BPI).** From the parameters obtained by the model for the year 2010, we assessed the probability of the BPI of the municipalities for the period between 2010-2018 – subject to changes in the characteristics of municipalities.

We chose the year 2010 for the analysis because we were able to ascertain the determinants of bank presence at a time when expansion was still taking place, prior to the impacts caused by the 2015-16 Brazilian crisis and the process of digitization of banking services. Accordingly, we have more freedom to observe the dynamic process of this frontier of action, with a few years of expansion and, later, its widespread decline.

Our results can also be interpreted as an **estimate of the limits of the activity of public and private banks in the country.**

Methodology - PROBIT Model

The main model was selected excluding statistically non-significant and highly correlated variables – which were prone to multicollinearity and inverting the sign of the parameters by what is expected by the theory, resulting in the equation:

$$\text{No branches} = constante + VAB + per\_vab\_agro + perc\_vab\_ind + per\_vab\_serv + pib\_per\_capita + mun\_abaixo\_limiar + se + s$$

Variables	Estimate	Standard Deviation	Statistics	P-Value
Constante	3,12	0,13	23,41	>0,005
VAB	-0,000044	-0,0000036	-12,01	>0,005
perc_vab_agro	-2,60	0,2380	-10,92	>0,005
perc_vab_ind	-1,88	0,2993	-6,27	>0,005
perc_vab_serv	-8,52	0,3792	-22,47	>0,005
pib_per_capita	0,000018	0,000026	7,12	>0,005
mun_abaixo_limiar	0,91	0,07	12,32	>0,005
se	-0,57	0,07	-8,23	>0,005
s	-0,42	0,08	-4,95	>0,005

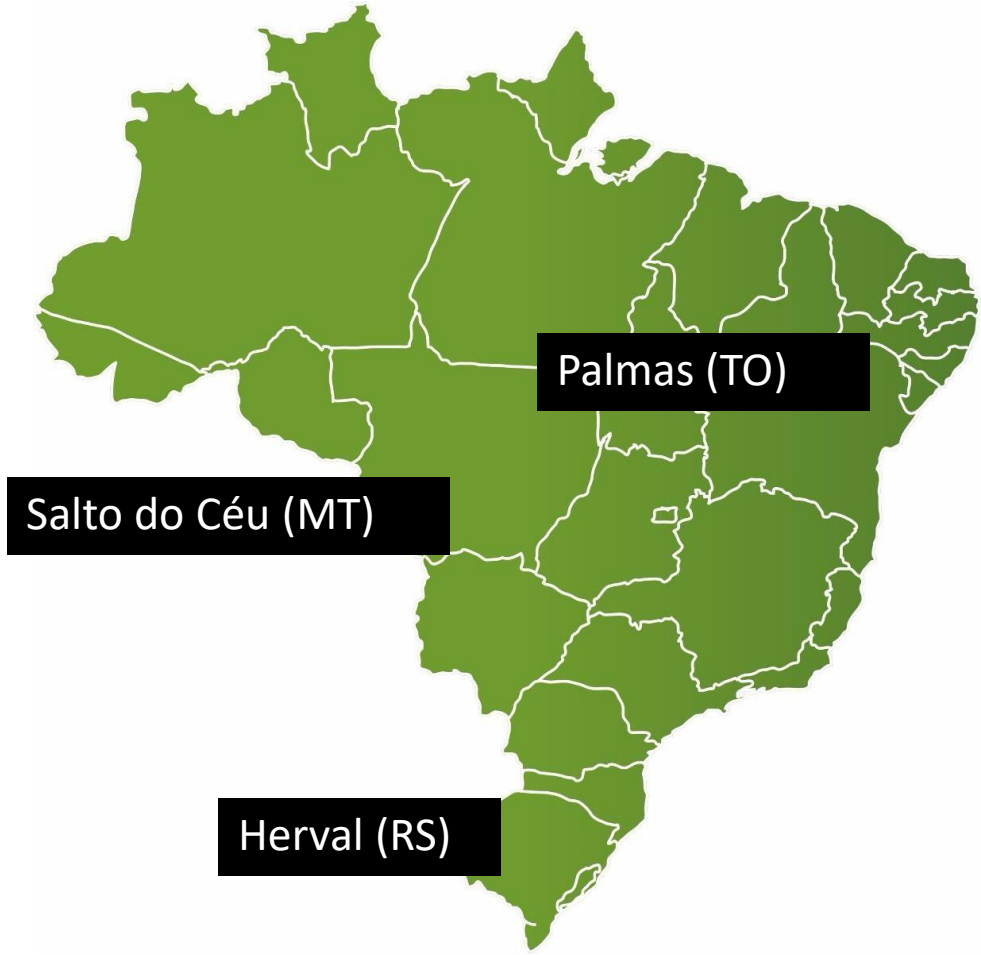
The estimation results indicate that the **highest bank exclusion factor in the country is the number of inhabitants below the threshold, as expected**. We also notice that **a greater relative importance of the service sector, followed by the agribusiness, reduces the probability of the municipality being excluded.** The relative GVA variables omit the participation of the public sector, thus, the role of the set of variables tells us that a greater relative participation of the private sector in the local economy also reduces the probability of the absence. Finally, there is a **regional composition** that indicates greater banking penetration in the South and Southeast regions, in line with descriptive statistics for these regions.

To verify the degree of accuracy of this model in determining the absence of a bank branch in a municipality, we have built a variable that assigns 1 to probabilities > 0.5, and 0 to the others. When comparing with verified data, the model results are true positives on **85.5% of the municipalities,** indicating the high predictive power of the variables used. **We chose this as our primary model due to the greater capacity for economic interpretation of the parameters, as well as due to the construction of robustness checks.**

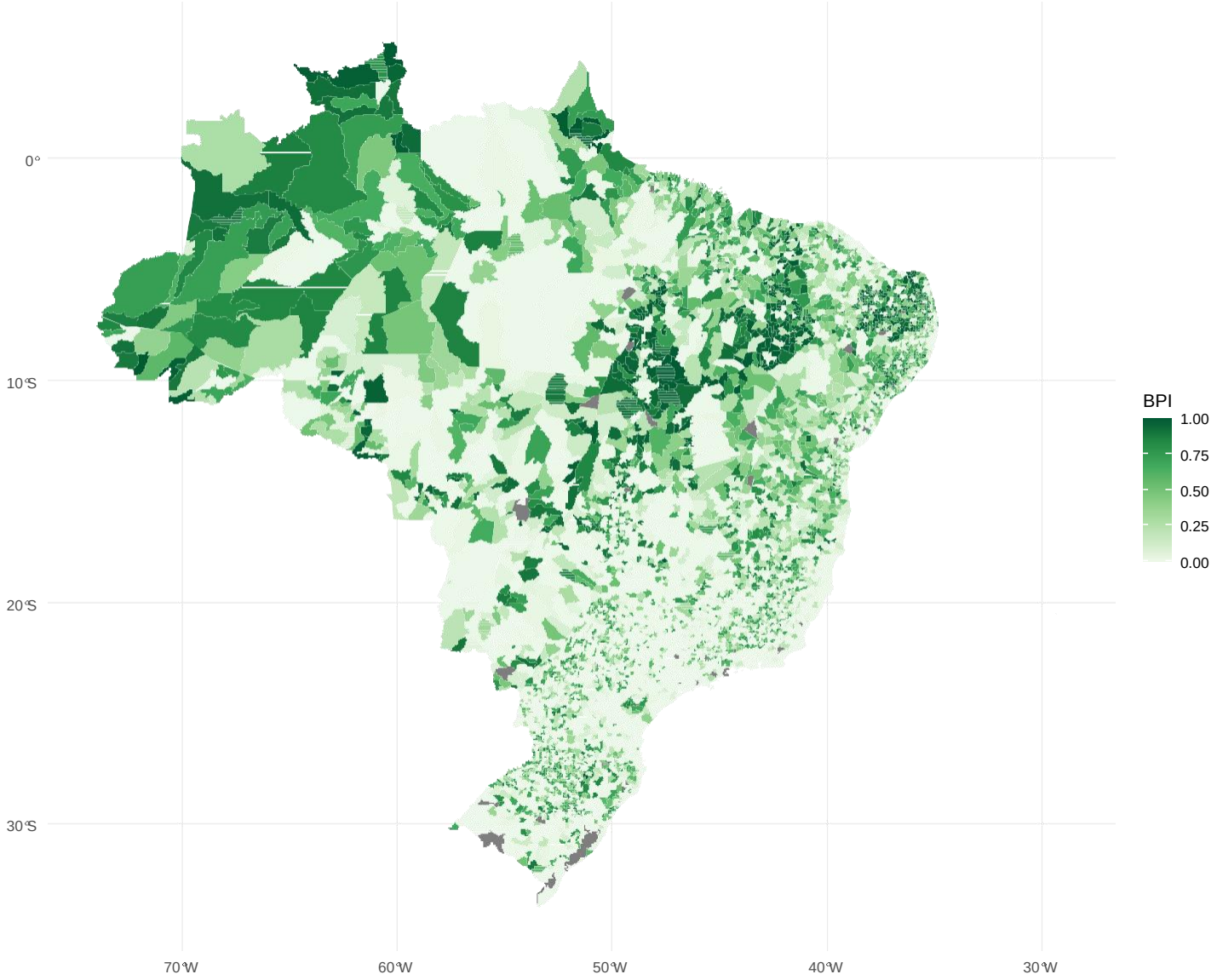
Banking Presence Index (BPI)

With the model parameters in hand, we were able to build the **Banking Presence Index (BPI)** which, by assigning a value between 0-1 to each Brazilian municipality, offers us a **proxy for the difficulty of maintaining a bank branch in that locality,** according to their socioeconomic characteristics. **Higher BPIs indicate more difficult locations for maintaining a bank branch.**

Variables	Palmas (TO)	Herval (RS)	Salto do Céu (MT)
GDP (million)	R$ 6.079,20	R$ 94,50	R$ 55,50
Agribusiness GDP (%)	0,05%	35,70%	35,70%
GDP - Industry (%)	23,90%	4,30%	2,24%
GDP - Services (%)	52,20%	25,20%	20,40%
GDP - per capita (thousands)	R$ 30,70	R$ 14,50	R$ 15,20
Bordering cities	No	Yes	Yes
Southeast	No	No	No
South	No	Yes	No
Difficulty Level (BPI)	0	0,6	0,9



Brazilian municipalities according to BPI



- In the graph we can see, **in darker green, the municipalities where it is more difficult to maintain a bank branch.**
- According to our model, **all municipalities with BPI > 0.5 are classified as unserved**, so even the **intermediate shades of green are of relevant difficulty.**
- We can notice a **greater concentration of municipalities with high BPI in the North and Northeast**, although they can be found throughout the national territory.

Sicredi

Methodology – Municipal Banking Indicator

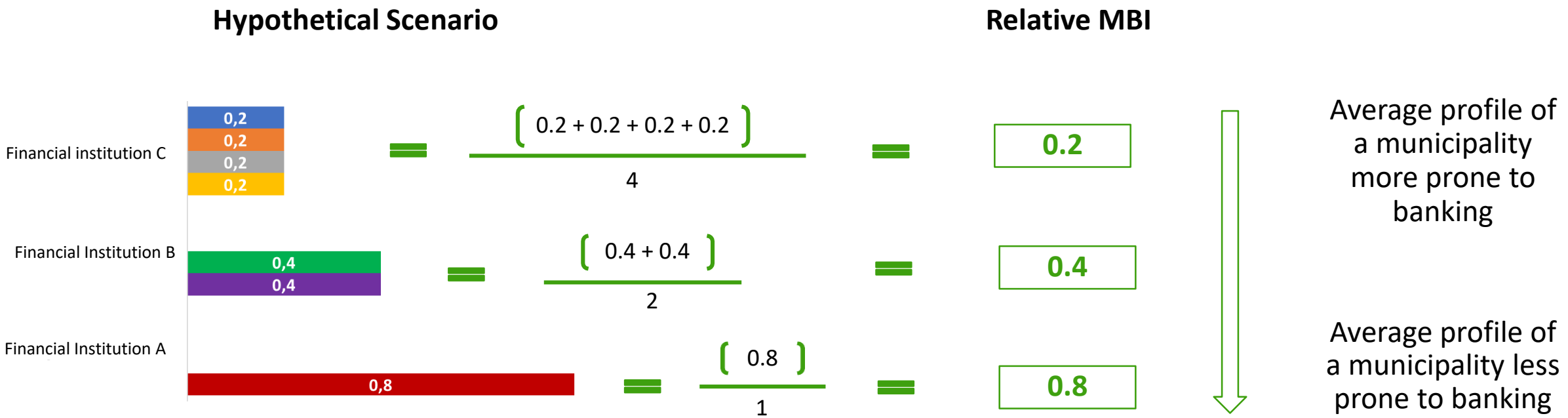
Through the Banking Presence Index (BPI), we developed two analytical indicators to assess the role of business models used by private banks, federal banks, regional banks and cooperative systems in order to investigate the role of each of these models in covering municipalities with greater difficulty through its service branches network. We call these indicators **Municipal Banking Index** as **Relative (MBI-R)** or **Absolute (MBI-A).**

- **Relative Municipal Banking Index (MBI-R):** Aims at **investigating the average difficulty of the municipalities in which each category of financial institution operates**. For that purpose, **we weight the service network of each institution or category by the BPI of the respective municipalities covered, dividing by the total number of municipalities** where that institution or category is present. Hence, **we were able to measure whether the institution's service is more or less concentrated in places that are easy to maintain**. With MBI-R we managed to **assess the banking role of that model regardless of the size of the financial institution**, identifying more inclusive business models. **Higher MBI-Rs indicate a more concentrated service network in municipalities that are difficult to maintain branches.**
- **Absolute Municipal Banking Index (MBI-A):** Aims at **measuring the total difficulty faced by a banking category.** To this end, we assessed the entire network extension of a given institution weighted by the BPI of each municipality served. Therefore, the MBI-A responds both to the size of the analyzed FI and to the profile of the municipalities covered by it. **Elevated MBI-As indicate a strong performance of that category of FIs in the expansion of the frontier of Brazilian financial services through its branches.**

Municipal Banking Index - Relative (MBI-R)

The **Relative Municipal Banking Index (MBI-R)** takes into account the BPI and the number of municipalities served by each institution. It **reflects the average profile of the municipalities served by the FI, in terms of difficulty.**

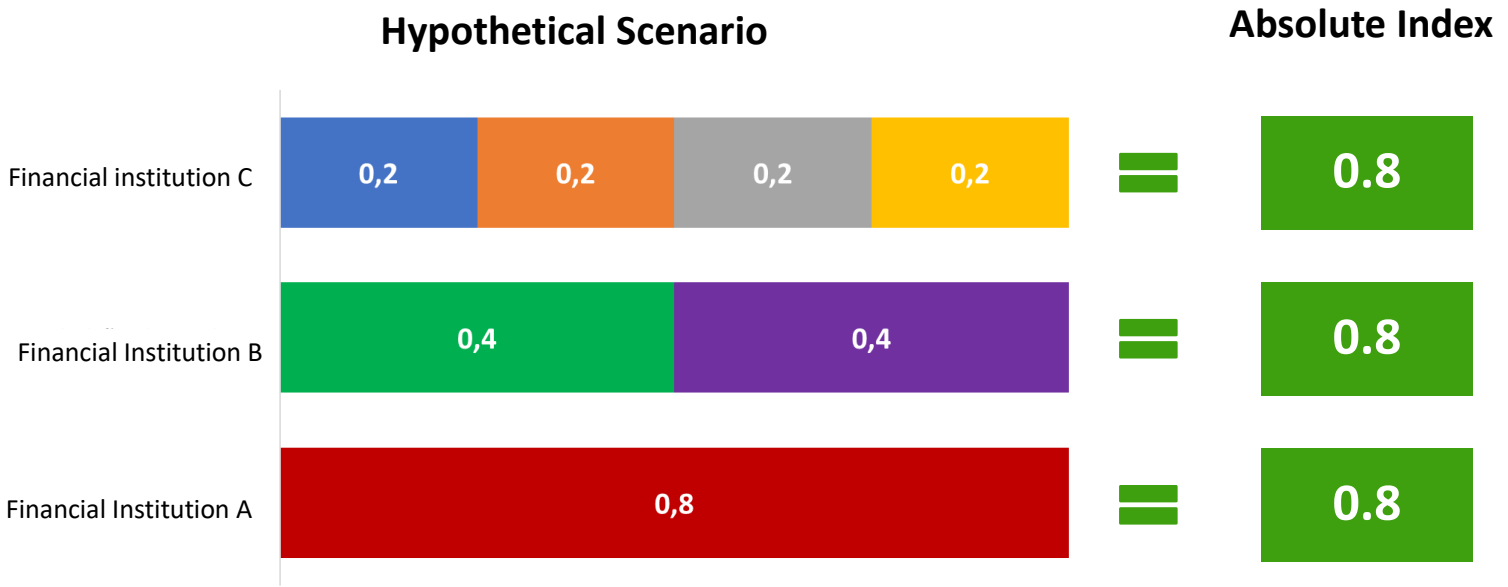
A FI with **higher MBI-R is the one that concentrates its presence in municipalities where the financial services are more difficult to access**. Therefore, it helps us to determine which FIs have a network that is **more equipped to act in more places.**



Municipal Banking Index - Absolute (MBI-A)

Our absolute index **aggregates the degrees of difficulty of all municipalities served by a Financial institution** in order to form an impact indicator of that FI.

The index seeks to identify which banking categories most contribute to the coverage of municipalities less prone to banking.

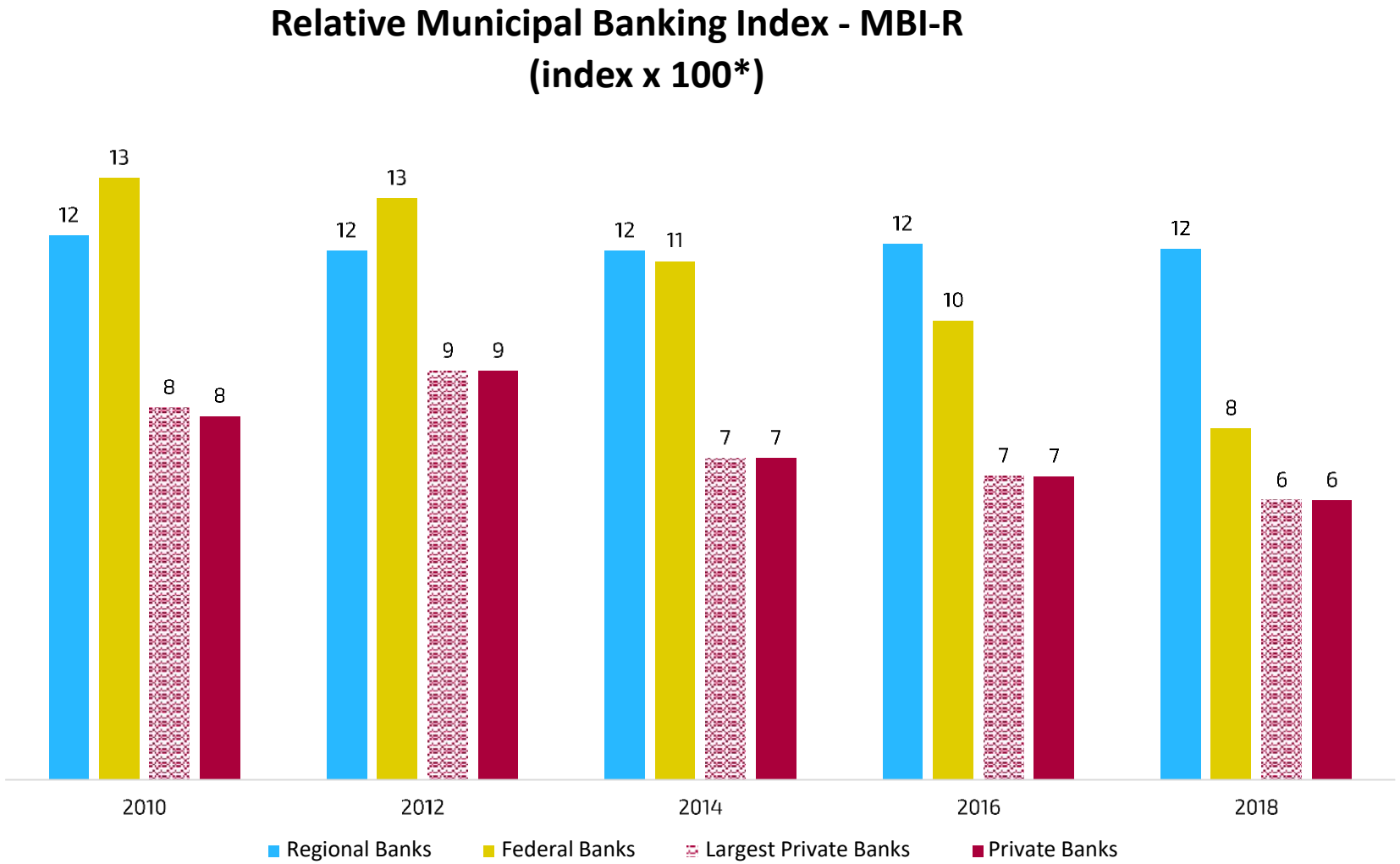


Note that the indicator is impacted both by **coverage and** the **municipality profile** covered by the FI.

- **Coverage:** presence in many municipalities raises the indicator.
- **Municipality profile:** the presence in less viable municipalities has a greater contribution.

4. Results

State banks serve municipalities with more difficult access to banking services

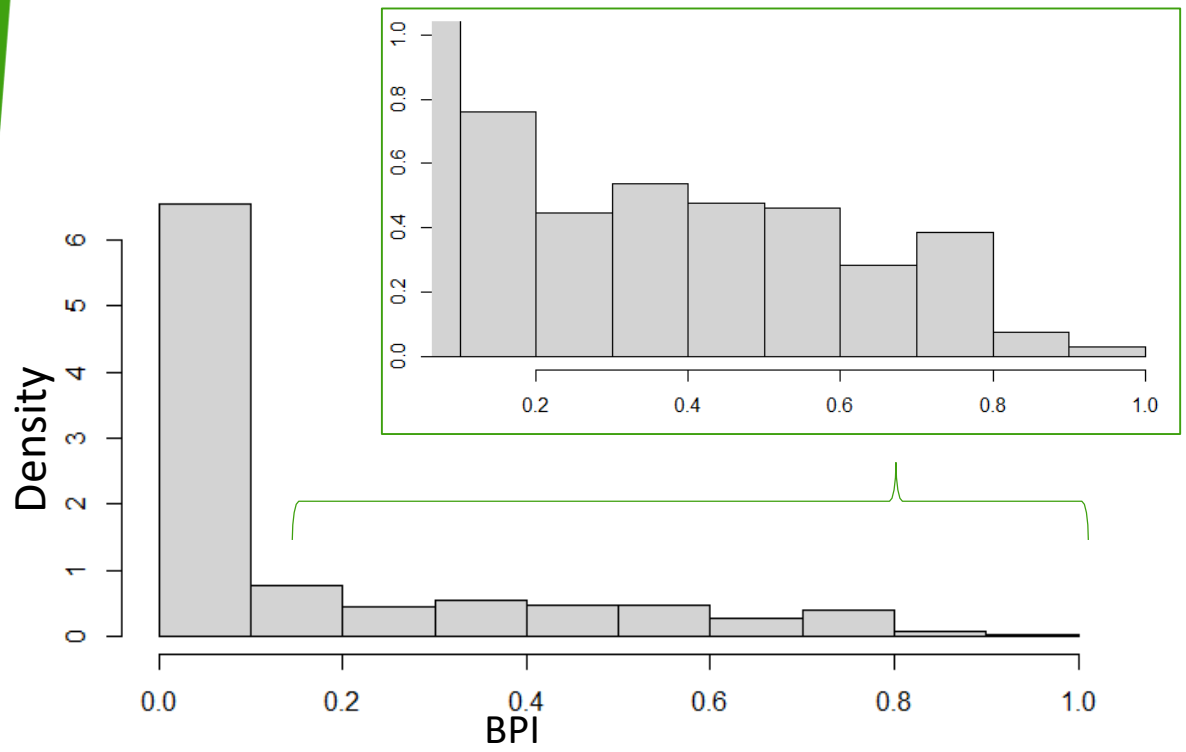


- The higher the MBI-R, the greater the concentration in hard-to-bank areas
- Regional state-owned banks have an average presence in municipalities with more challenging inclusion
- Federal state-owned banks also have an inclusive network; however, over the last few years, they have become closer to a private service network.

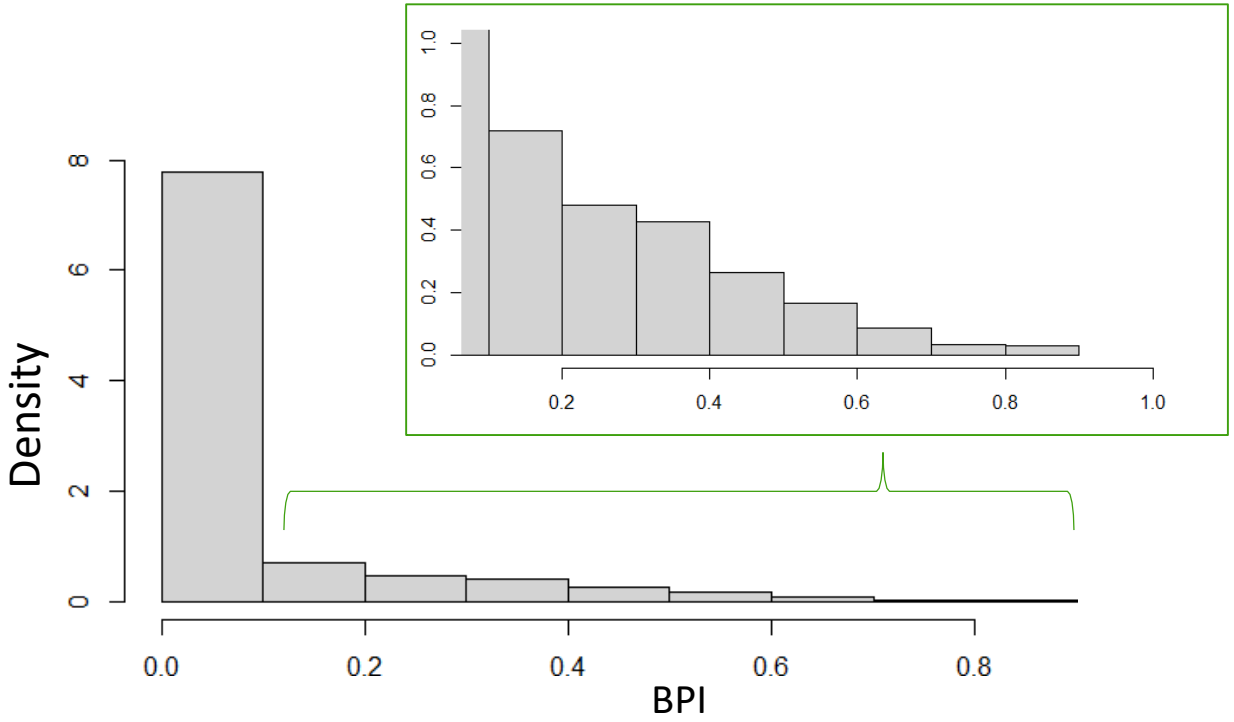
Source: BCB and Sicredi.

Distribution of municipalities covered - Public Banks (2018)

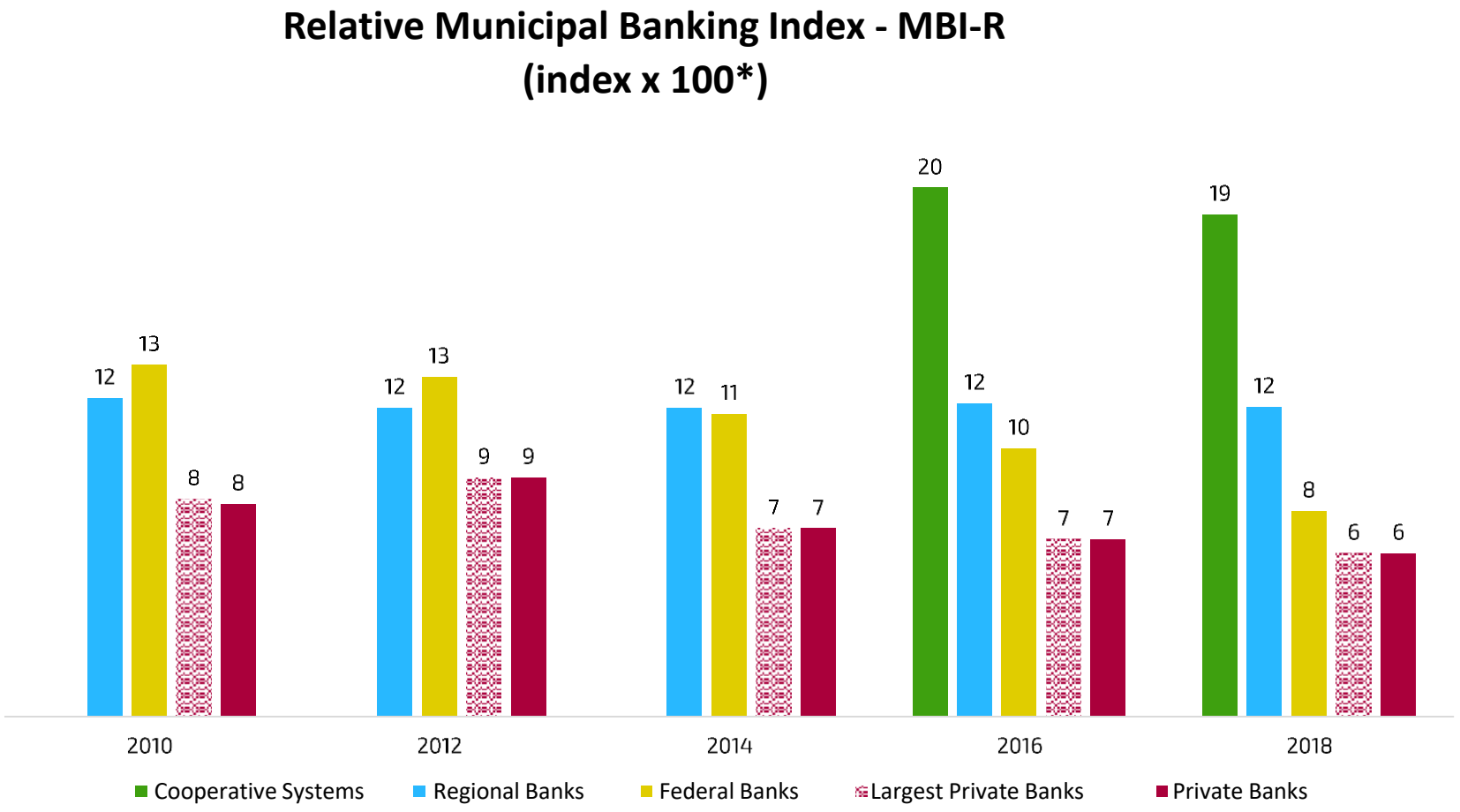
Commercial State Banks



Commercial Federal Banks



Cooperatives include more remote locations than banks

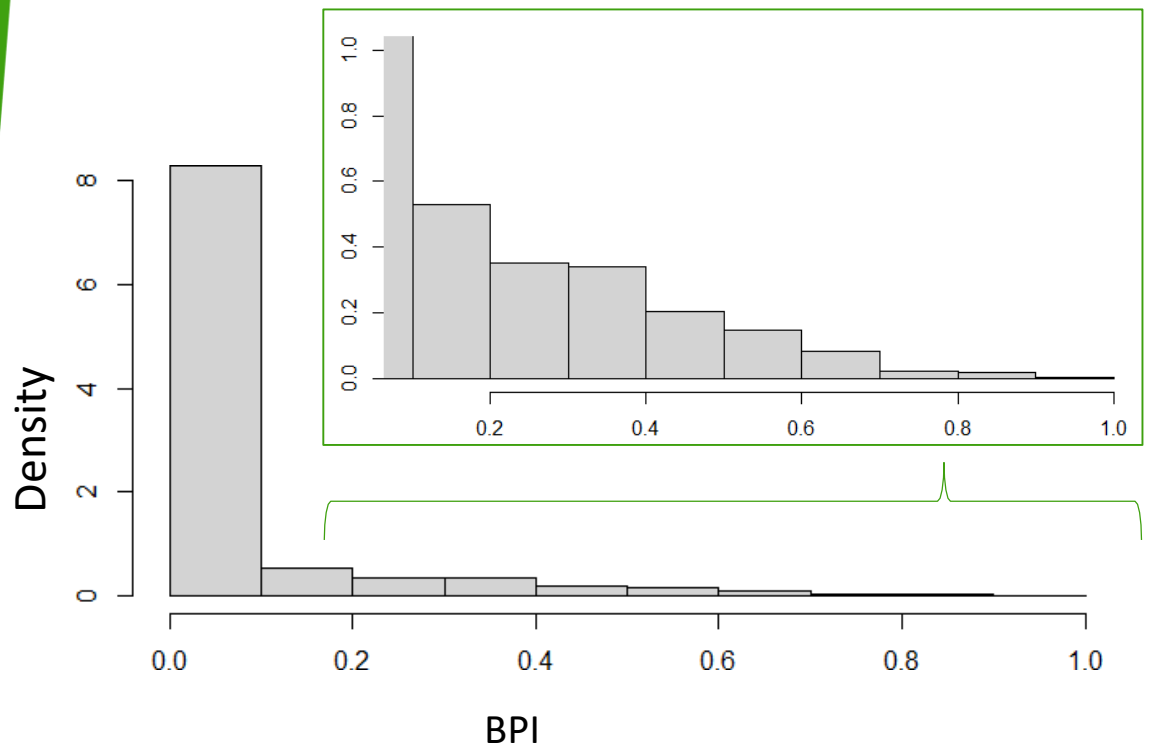


- When observing the operation of cooperatives in municipalities, weighted by the difficulty for banks to operate in each municipality, we found that cooperatives stand out for operating in locations that are, on average, more remote in relation to the banking network.
- We can say that cooperatives cross the frontier of banking operations, going further.

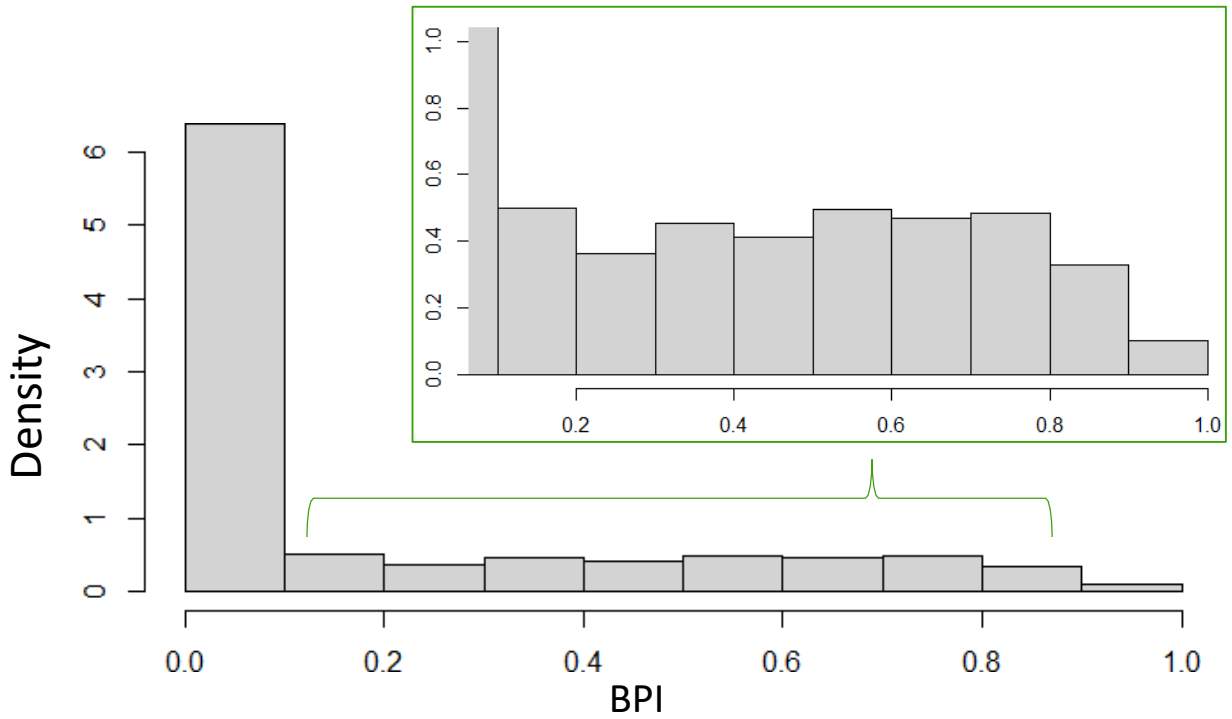
Source: BCB and Sicredi.

Distribution of municipalities covered - Public Banks (2018)

Major Private Banks



Cooperative systems



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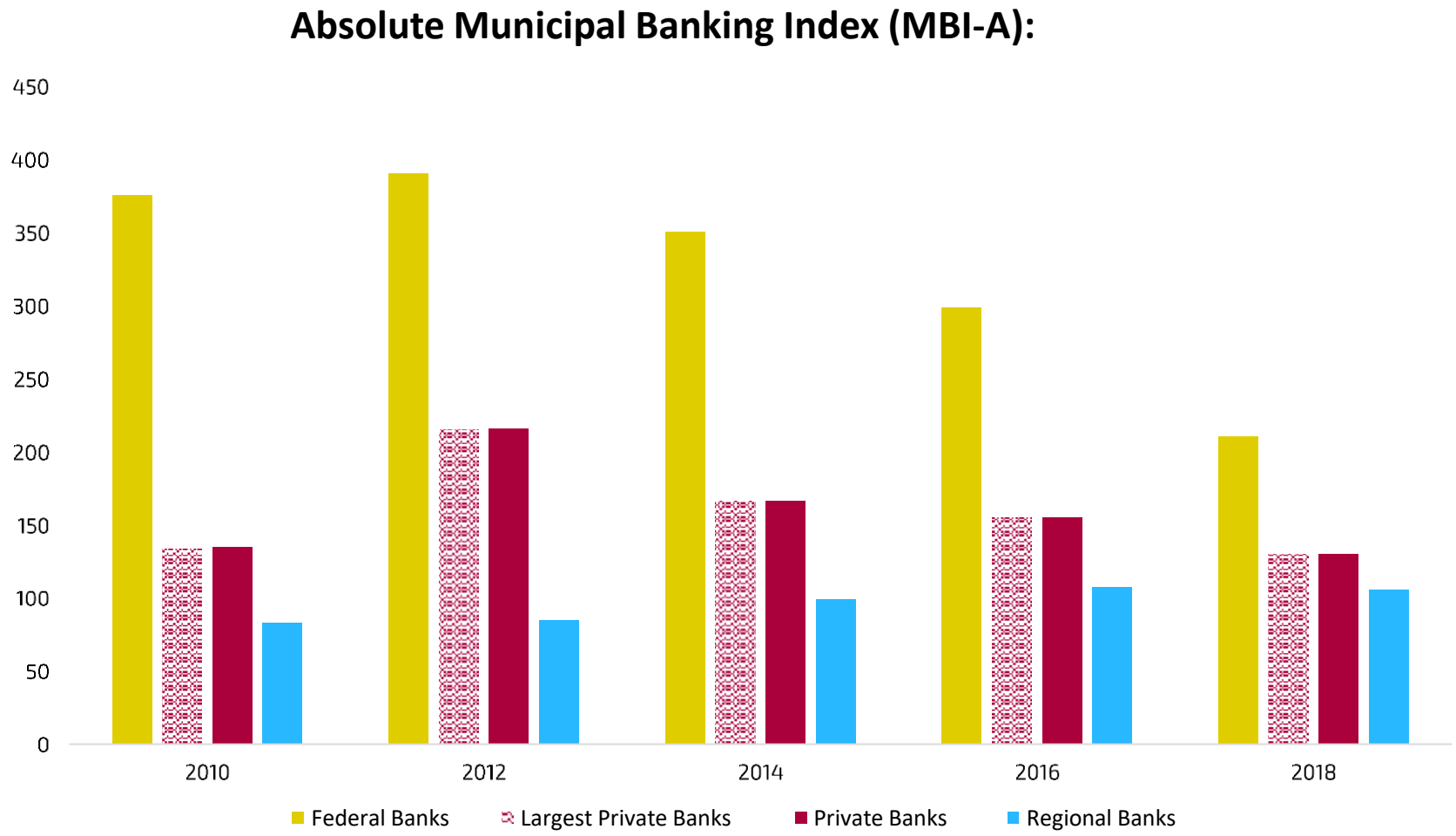
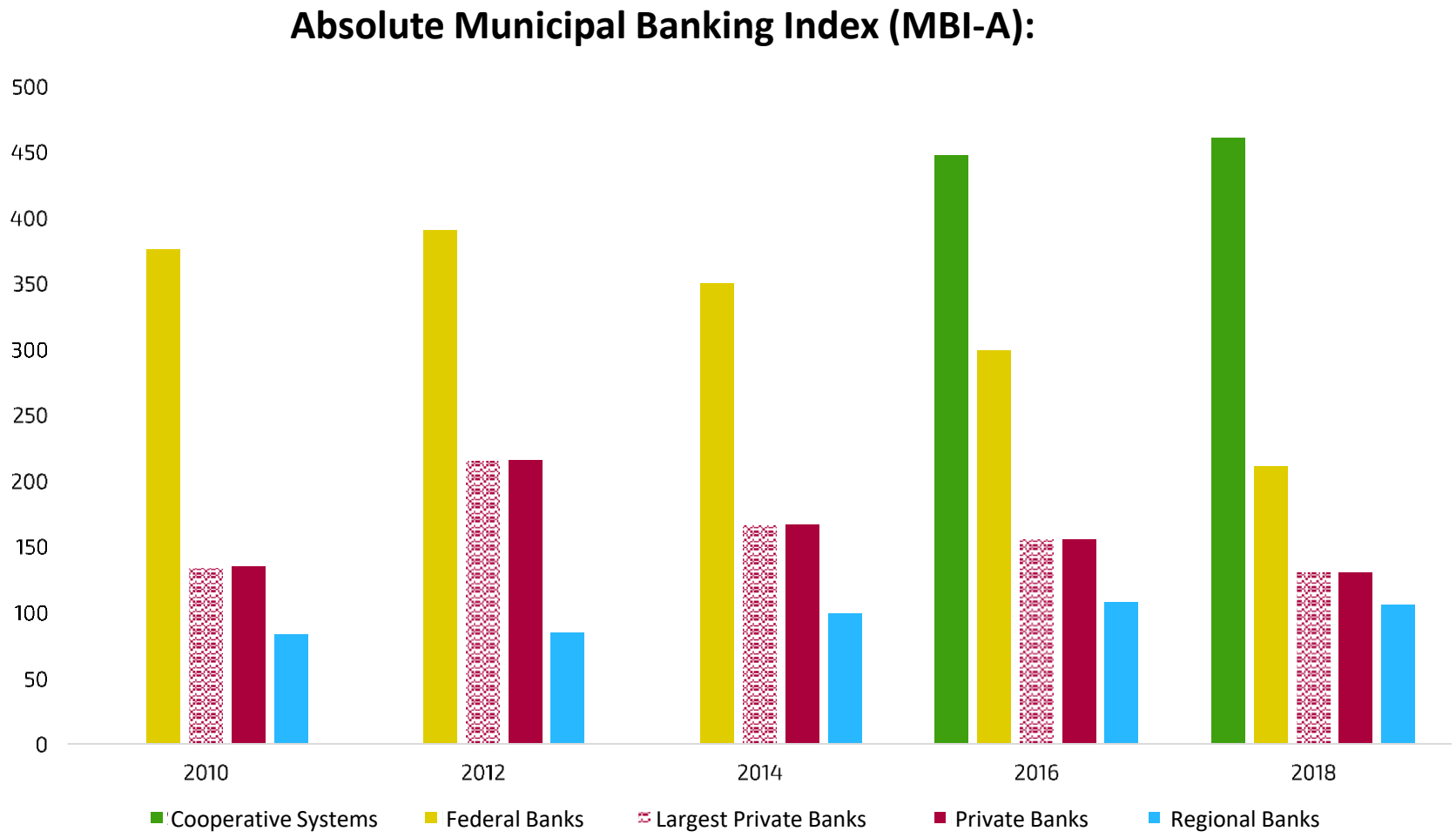
State-owned banks have a large contribution, but decline over time



- We can observe that state banking networks, due to being regionalized and smaller than the other categories, ultimately have a lower overall contribution.
- Federal Multipurpose Banks, on the other hand, have a historically high contribution, but have been declining sharply.
- Private banks have also been experiencing a decline since 2012 due to the process of closing branches.

Source: BCB and Sicredi.

Cooperatives make a great contribution



- Upon observing the index, we see that even though cooperatives have a substantially smaller service network compared to the groups in the study, their aggregated contribution remains significant.
- Therefore, we show that cooperatives have the greatest contribution to the inclusion of municipalities, weighted by the difficulty of banking operations.

Source: BCB and Sicredi.

Sicredi

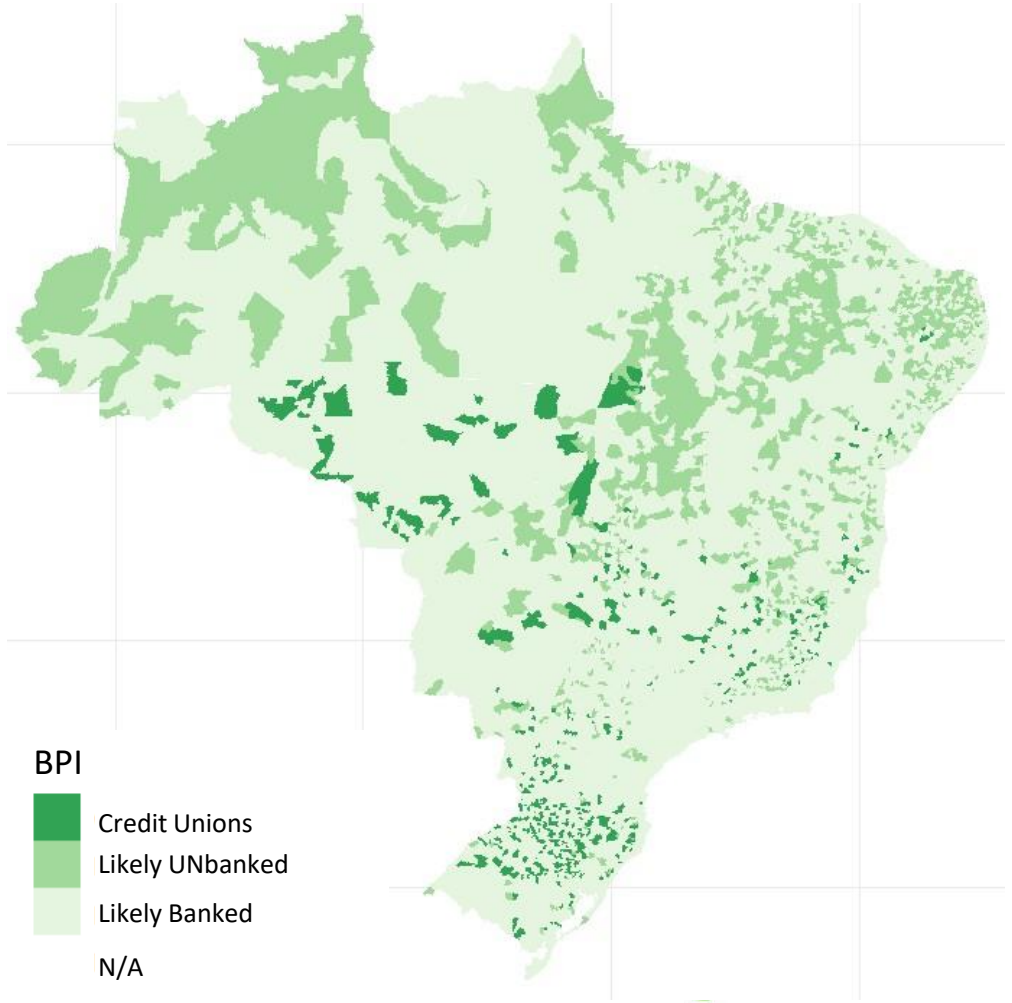
Without cooperatives, 398 Brazilian municipalities would not have a bank branch

- Under the BPI metric, the latest available data (2018), shows that **among the 1876 municipalities with <u>high probability of not having</u> a physical branch:**

  - **486** were **covered by credit unions**;
    - **1.85 million** of people
  - **398** were **covered <u>exclusively</u> by credit unions**;
    - **1.42 million** of people, exclusively
  - **249** had **a Sicredi branch**;
  - **243** were covered by public or private banks;

Despite having a smaller service network, **credit unions serve twice as many municipalities deemed difficult to access when compared to conventional banks** – highlighting the important role of this network in expanding banking coverage.

Presence of Credit Unions in Remote Locations - 2018



[1]Source: Sicredi, Benefícios Econômicos do Cooperativismo de Crédito: IPB e IMB, 2021.

Branch in the District of Bragantina/PR
Aprox. 2500, inhab.

5. Evaluation of Results

Sicredi

Cooperative systems expand access to credit

In the paper presented in our bibliographic review, **Ergungor (2006)** suggests that the greater presence of physical service structures of an FI in a given region, by generating customer relationship information, is capable of **increasing loan availability and reducing the spreads charged**. In this sense, the presence beyond the banking frontier of cooperative systems, quantified by our MBI indicators, suggests not only a **service model that seeks to impact the most underserved municipalities**, as well as a strong presence in parts of the Brazilian territory.

The **impact of this greater presence** had already been suggested by a previous study, **FIPE (2019)**, which found evidence of a **unique service profile of credit unions**, with a less restrictive nature of credit supply – keeping the portion of troubled assets at healthy levels. The study is in line with Ergungor's argument, showing that its results may also be valid for our analysis.

Also, the presence of cooperative systems at the banking frontier, where the banking presence, if any, is more likely to be monopolistic, **may also have impacts on competition and, consequently, on regional bank spreads**. In this sense, there is evidence found by **Joaquim, Ornelas and Van Doornik (2020)** in a sense that a reduction in bank competition increased loan spreads and decreased the volume of credit. The **FIPE (2019)** study found that credit unions offer rates that are compatible or lower for MSEs when compared to banking institutions, suggesting an important role not only in expanding the supply of credit in the regions, but also in terms of access to these instruments by more Brazilians.

Source: BCB and Sicredi.

6. Robustness Check and Criticism

Criticism

The construction of the Banking Presence Index based on the model we presented for 2010, when only banks are considered, due to the non-availability of public data on the presence of cooperatives, may undergo criticism regarding the validity of the results obtained.

We understand that the model presented is the most suitable for the proposed analysis, since the year 2016 – when cooperative data is included – reflects a deep economic crisis in the country, in addition to the beginning of the process of digitalization of financial services, both seen as incentives for closing branches. In fact, the data for the period show this trend to reduce the physical network. We also understand that the banking networks had their massive expansion in Brazil before cooperatives or credit unions, in addition to having the capital and technology occupying the entire Brazilian territory. At a certain point, the physical expansion ended, evidencing that the banks reached a limit.

Therefore, the results obtained show that the Cooperative Systems, as well as some Public Banks, operate beyond the estimated banking frontier – contributing to covering municipalities that would otherwise have a high probability of lacking a financial institution branch in their territory. Also, the continuous expansion of the physical network of cooperative systems in the analyzed period, when banks began a process of retraction, demonstrate the different behavior of this business model in relation to the others.

Understanding the validity of the criticisms, we performed two exercises to test the robustness of the results obtained so far. In the first exercise, we estimated models for the year 2016 without and with the presence of cooperatives in the endogenous variable. By using them, we seek evidence that the presence of cooperative systems in fact expands the frontier of banking activities in the country, making more municipalities eligible to be served. In the second, we run the model omitting a large banking institution whose service network is similar in size to that of cooperative systems. With this exercise, we seek evidence that the vector for expansion of the frontier of service is not the size of the cooperative system, but its profile.

Exercise 01 – Models for 2016 with and without cooperatives

From the results of models 01 and 02 below, we can find strong evidence of the complementary role for banking networks of cooperative systems. The presence of cooperative systems in the analysis leads to a drop of more than two deviations in the constant of the equation. It is also noted that the population threshold loses a significant role in determining banking absence, while the participation of agribusiness gains prominence. Due to the regional concentration of cooperatives, the south and southeast regional variables gain importance in the estimates, evidencing the role of expanding the banking service frontier in places where cooperative systems are more consolidated.

Model 01 - Without Bank Branches = 1

Variables	Estimate	Standard Deviation	Statistics	P-Value
Constante	3,59	0,24	14,66	>0,005
Popu_Est	-0,00012	0,000007	-18,28	>0,005
perc_bolsafamilia	3,34	0,89	3,78	>0,005
perc_vab_agro	-2,80	0,25	-11,03	>0,005
perc_vab_ind	-2,98	0,26	-11,32	>0,005
perc_vab_serv	-6,95	0,40	-17,49	>0,005
mun_lower_lim	0,51	0,08	6,28	>0,005
ne	0,40	0,10	4,16	>0,005
se	-0,26	0,09	-3,06	>0,005
s	-0,35	0,09	-3,77	>0,005

Model 02 - Without Banking Branches or Sicredi or Sicoob = 1

Variables	Estimate	Standard Deviation	Statistics	P-Value
Constante	2,96	0,25	12,05	>0,005
Popu_Est	-0,00011	0,00001	-16,61	>0,005
perc_bolsafamilia	4,20	0,90	4,66	>0,005
perc_vab_agro	-3,02	0,26	-11,79	>0,005
perc_vab_ind	-2,34	0,27	-8,66	>0,005
perc_vab_serv	-6,40	0,43	-14,98	>0,005
mun_lower_lim	0,36	0,09	4,06	>0,005
ne	0,52	0,10	5,37	>0,005
se	-0,45	0,08	-5,30	>0,005
s	-1,25	0,10	-12,01	>0,005

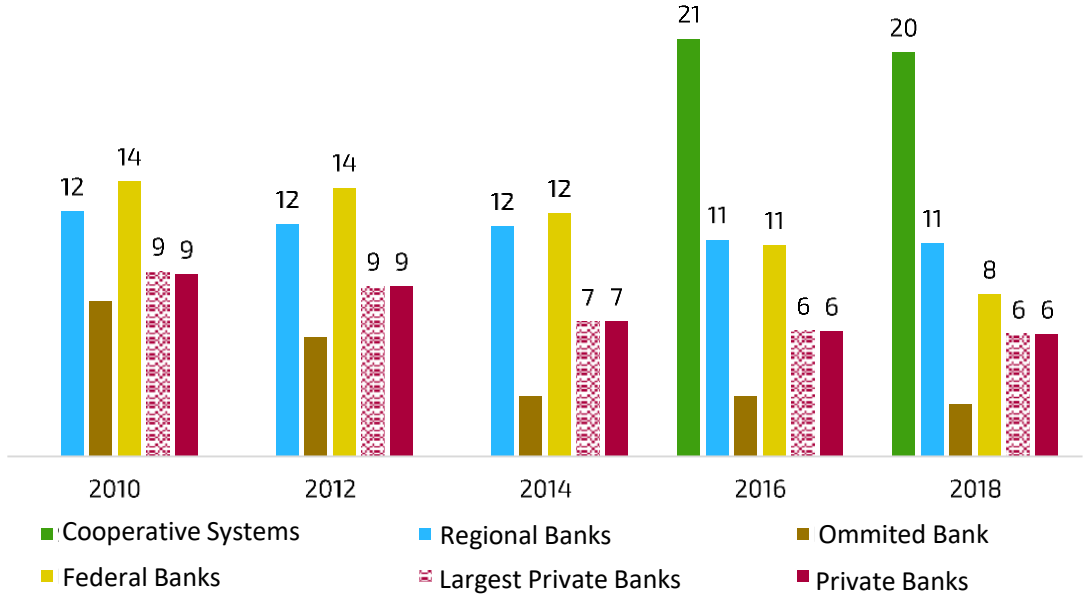
Source: BCB and Sicredi.

Exercise 01 - Relative Municipal Banking Index

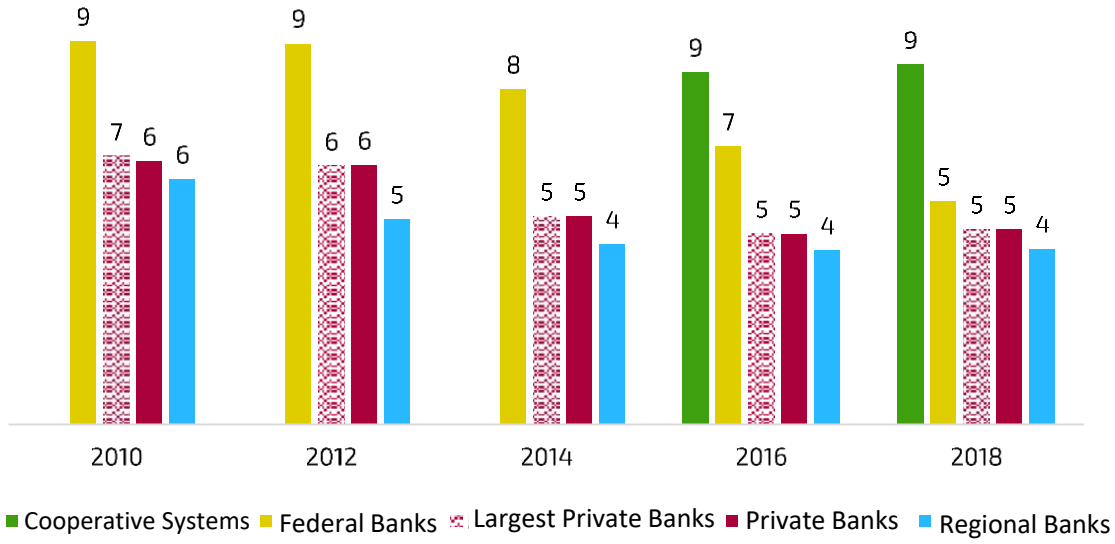
For statistical reasons, the results of model 02 attribute a lower probability to the absence of banks, since it considers the presence of cooperatives in more remote regions – thus there is a change in level for all institutions. Besides that, the greater weight of the parameter in the southern region means that municipalities in this part of the country, even in more remote socioeconomic conditions, receive lower BPIs – leading to a greater relative drop in networks concentrated in this region – such as cooperative systems.

Even so, it is possible to verify that the average profile of municipalities served by cooperative systems has higher BPIs than other categories of financial institutions, and remains at a high level over the period while other networks shrink.

Model 01 - Without Bank Branches = 1



Model 02 - Without Banking Branches or Sicredi or Sicoob = 1

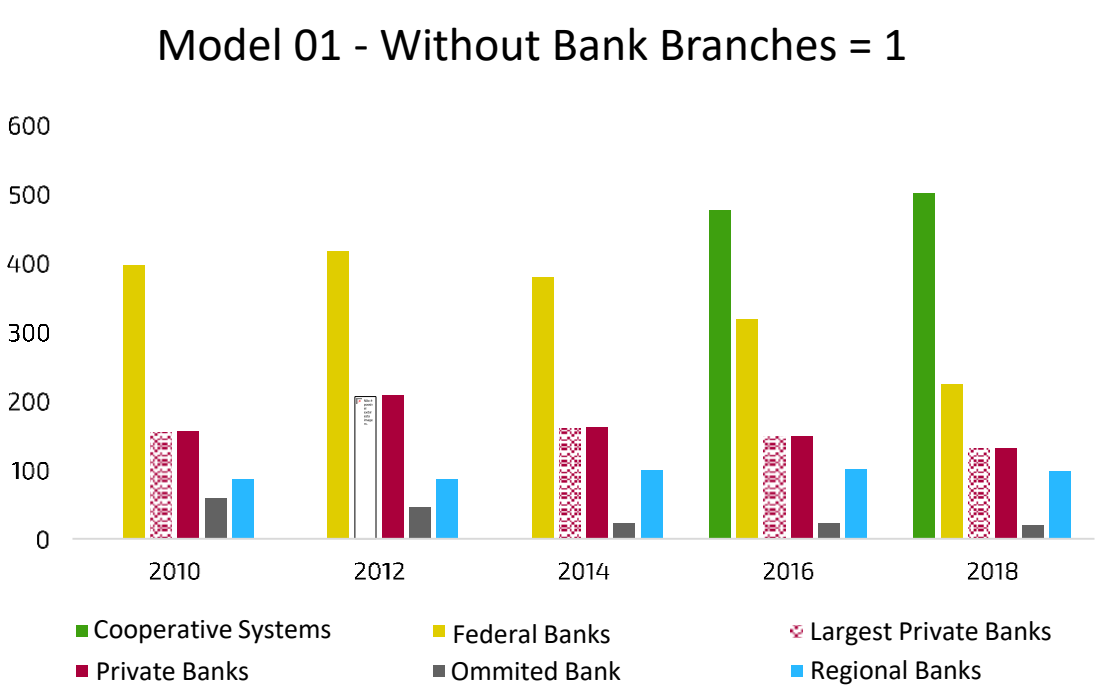


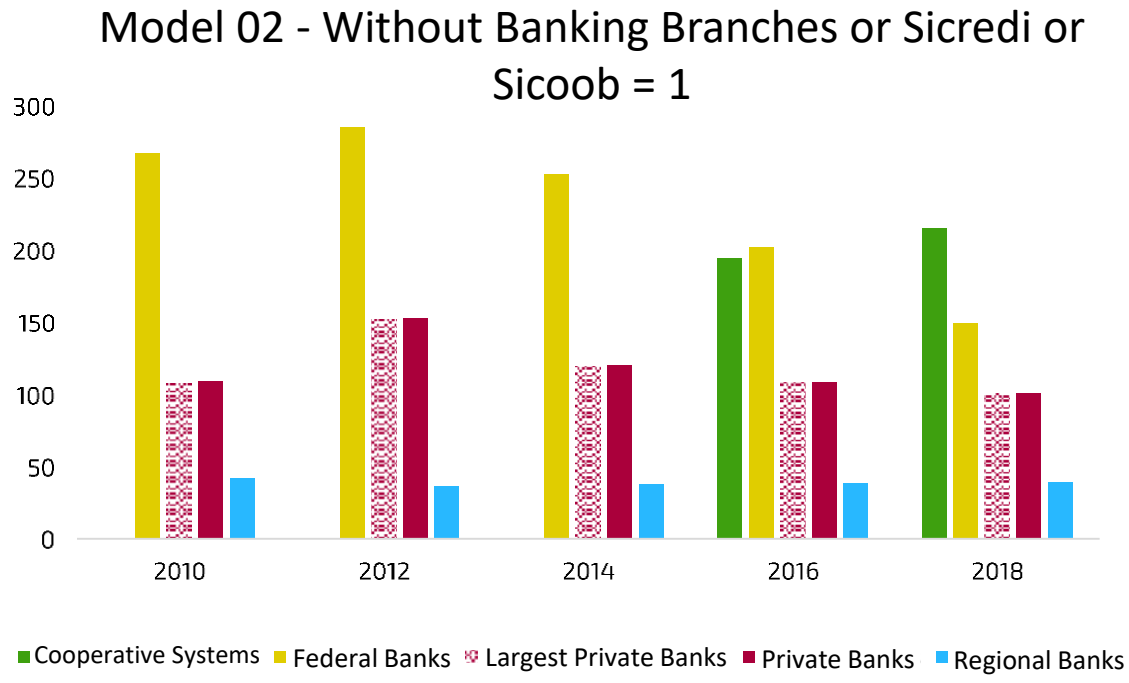
Source: BCB and Sicredi.

Exercise 01 - Absolute Municipal Banking Index

Similarly, the Absolute Municipal Banking Index shows a drop in level for all groups of financial institutions, with a greater penalty for Cooperative Systems due to greater regional concentration – as mentioned in the previous paragraph.

However, we see that these systems play an important role in covering more remote municipalities, especially in the face of a context of retraction of Federal Bank networks, of great historical role.





Source: BCB and Sicredi.

Exercise 02 – Models for 2016 with and without a major bank

A last exercise carried out to assess the robustness of the results obtained was to remove a major banking network, with a number of branches greater than 2000 in the year under analysis, in order to verify whether we would find significant differences in the results, as obtained in the previous exercise. As shown in the table below, none of the parameters obtained for the socioeconomic variables of the municipalities showed a variation greater than one standard deviation in the model without this banking network. The most significant difference occurred only in the southeast and northeast variables.

Thus, we did not find evidence that the absence of a service system or network in the construction of the initial model significantly alters the analysis of the results obtained for the BPI and MBI indexes, for the case in which the omitted network presents a similar municipal selection pattern when compared to others.

Model 01 - Without Bank Branches = 1

Variables	Estimate	Standard Deviation	Statistics	P-Value
Constante	3,59	0,24	14,66	>0,005
Popu_Est	-0,00012	0,000007	-18,28	>0,005
perc_bolsafamilia	3,34	0,89	3,78	>0,005
perc_vab_agro	-2,80	0,25	-11,03	>0,005
perc_vab_ind	-2,98	0,26	-11,32	>0,005
perc_vab_serv	-6,95	0,40	-17,49	>0,005
mun_lower_lim	0,51	0,08	6,28	>0,005
ne	0,40	0,10	4,16	>0,005
se	-0,26	0,09	-3,06	>0,005
s	-0,35	0,09	-3,77	>0,005

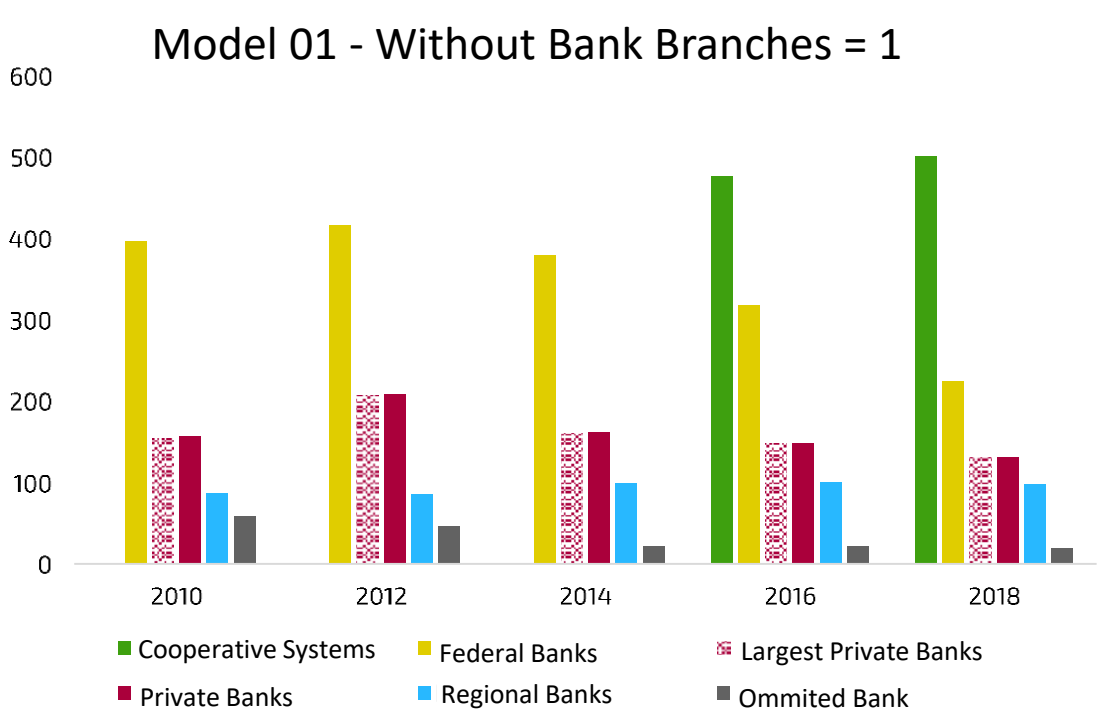
Model 02 - No Bank Branches except one Major Banks Network

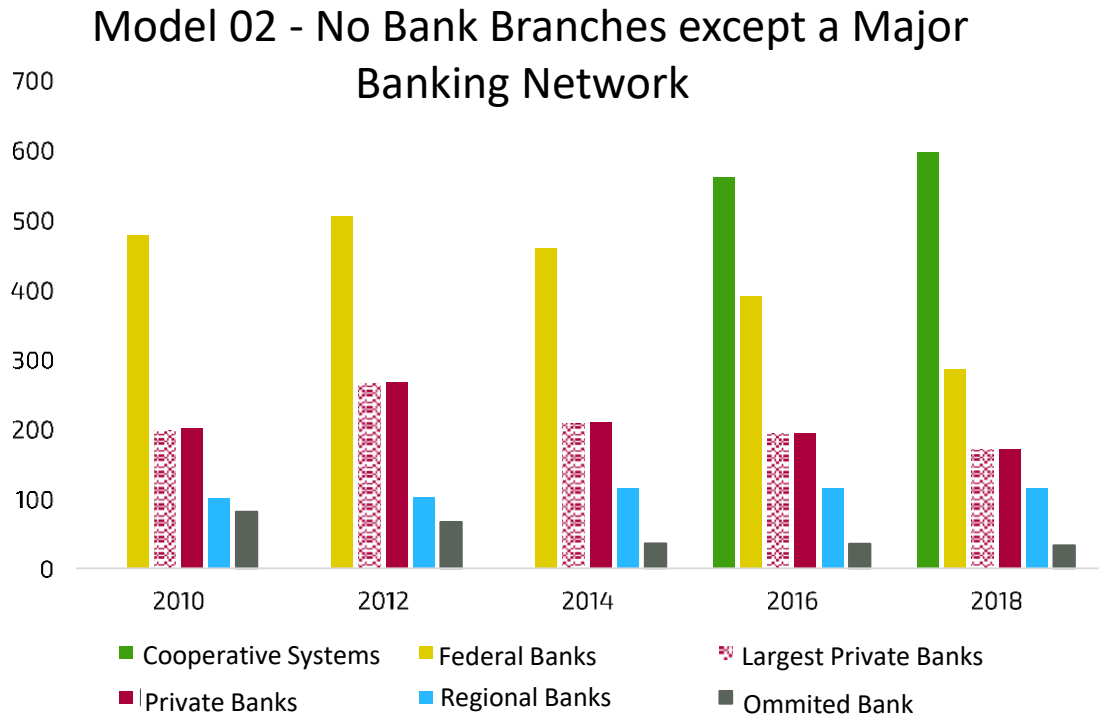
Variables	Estimate	Standard Deviation	Statistics	P-Value
Constante	3,60	0,24	14,86	>0,005
Popu_Est	-0,00013	0,00001	-19,48	>0,005
perc_bolsafamilia	3,61	0,89	4,08	>0,005
perc_vab_agro	-2,90	0,25	-11,42	>0,005
perc_vab_ind	-2,73	0,26	-10,57	>0,005
perc_vab_serv	-6,20	0,37	-16,55	>0,005
mun_lower_lim	0,46	0,08	5,86	>0,005
ne	0,20	0,10	2,11	>0,005
se	0,05	0,08	0,60	>0,005
s	-0,36	0,09	-4,01	>0,005

Source: BCB and Sicredi.

Exercise 02 - Absolute Municipal Banking Index

The omission of a major private bank leads to a small change in the level of the indicators, but does not change the relative positions nor does it impact the result of the indicator for the analyzed bank.





Source: BCB and Sicredi.

7. Conclusion

Conclusion

-> From the results of the model, we may infer that t**he role of cooperative systems in the financial inclusion of municipalities with a high BPI is of great relevance, as they have a high share of their activities and are located in places where access to traditional banking services is difficult.**

-> The fact that credit unions have their MBI-R high and higher than the other groups, shows that **the performance of credit unions, on average, is more focused in remote locations that are unviable** to traditional banking service networks. With this, credit unions go beyond the traditional banking network.

-> In aggregate terms, observing the MBI-A of the cooperatives, we can see that **the efforts of credit unions to include municipalities is the most comprehensive in the service network in Brazil**.

-> The role of **state-owned financial institutions (relative indicators) is also relevant**. However, they are **regionally restricted and subject to political and fiscal risks**.

-> We also observed that the **different financial institutions changed the profile of municipalities covered.** The indicators show us, in aggregate terms, that **major retail banks reduced their activities in less attractive municipalities**, while **credit unions maintained their expansion trend.**

-> Finally, we highlight that the **results found are in line** with the study Economic Benefits of Credit Unions (2020) by Juliano Assunção.

Bibliography

- **(King and Levine, 1993) Finance and growth Schumpeter might be right** (Finance_and_Growth_Schumpeter_Might_Be_Right.pdf)
- **(Rajan and Zingales, 1998) Financial dependence and growth** (https://www.nber.org/system/files/working_papers/w5758/w5758.pdf)
- **(Beck et al, 2000) Finance and the sources of growth** (https://papers.ssrn.com/sol3/papers.cfm?abstract_id=569227_)
- **(Arcand et al, 2012) Too much finance?** (https://www.imf.org/external/pubs/ft/wp/2012/wp12161.pdf)
- **(Silva, Tabak e Laiz, 2019) The finance-growth nexus: the role of banks** (https://www.bcb.gov.br/pec/wps/ingl/wps506.pdf)
- **(Schmitz and Silva, 2020) Financial Intermediation, Human Capital Development and Economic Growth** (https://www.bcb.gov.br/pec/wps/ingl/wps533.pdf)
- **(Fipe, 2019) Benefícios do Cooperativismo de Crédito** (Reports (sicredi.com.br))
- **(Banco Central, 2018) Relatório de Cidadania Financeira** (https://www.bcb.gov.br/nor/relcidfin/index.html)
- **(Joaquim, Ornelas e Van Doornik, 2020) Informational switching costs, bank competition and the cost of finance** (https://www.bcb.gov.br/pec/wps/ingl/wps512.pdf)
- **(Ergungor, 2006) Bank branch presence and access to credit in low-to-moderate income neighborhoods** (https://www.clevelandfed.org/newsroom-and-events/publications/working-papers/working-papers-archives/2006-working-papers/wp-0616-bank-branch-presence-and-access-to-credit.aspx)
- **(Petersen and Rajan, 2002) Does distance still matter? The information revolution in small business lending** (https://www.nber.org/papers/w7685)
- **(Agarwal and Hauswald, 2007) Distance and private information** (https://papers.ssrn.com/sol3/papers.cfm?abstract_id=996602)