Financial Cooperatives and Commercial Banks´ differences before and after the 2014-2016 Brazilian economic crisis

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Resumo/Abstract

The present research aims to evaluate the performance of cooperatives and commercial banks, emphasizing the before and after the Brazilian economic crisis of 2015 and 2016. The worsening of the fiscal and monetary situation led to the impeachment of the Brazilian President of the Republic on May 12, 2016, which generated even more uncertainty and instability in the financial market, creating an effect like a 2008 global financial crisis. In this context, the objective of this work is to evaluate changes in the performance of cooperatives and commercial banks and presenting the consequence of the Brazilian crisis to these financial institutions. The main scope of the study was how cooperatives and banks fared in the face of the situation, especially on the indicators of net loans and derivatives. The methodology will identify the difference between this type of institution using panel data methods with fixed and random effect models, tested using the Hausmann test to see which one best fits the data scenario. The results point out the worse performance of cooperatives than commercial banks in the crisis period of 2015/2016 and over 2011-2020. The cooperatives usually established to provide financial support to small businesses and farmers have suffered significantly more than commercial banks; nevertheless, all suffer.

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Abstract

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Keywords: cooperative banks; commercial banks; economic crisis; financial indicators.

1 Introduction

The economic, financial, and political scenario, starting with the 2014 financial crisis that led to the ouster of President Dilma Rousseff, the country entered a severe economic recession. As a result, the real GDP registered negative growth rates, in the order of -3.53% in 2015 and -3.26% in 2016 (Ipeadata, 2021). This exposed situation led institutions to change their business management strategies. On the other hand, the economic projections before the recession for the banking industry and financial cooperatives were increasing in *spreads*, customer capturing, and total assets (Special Study No. 91/2020. BACEN, 2021a). Therefore, both the cooperatives and the commercial banks reacted to face this economic crisis. Given this, the theme of this research will address the main differences between financial cooperatives and banks in the period before and after the economic crisis of 2014.

Another critical point for economic development is its relationship with the credit market. It is notorious that the cooperatives and the banking sector become fundamental within their specificities to enable their growth and development. Access to credit allows families to increase their consumption of durable goods and invest, especially in housing and education (Sant'ana, 2009). Therefore, a market where the flow of financial resources is intense characterizes a lively and booming market. Thus, in the economic/financial crisis, these institutions lose their credit capacity and further aggravate the recession situation.

According to Resolution 2.624, of 1999, of the National Monetary Council, the primary active operations of banks are the financing of fixed and working capital, subscription or acquisition of securities, inter-financial deposits, and the lending of foreign loans. Investment banks mobilize billions, and as they are profit-oriented companies, they are constantly incorporating new institutions into their portfolio (BACEN, 2021).

On the other hand, a financial cooperative (or credit cooperative) is a nonprofit association of people, with its legal nature, a member of the National Financial System, and designed to provide credit and financial products exclusively to its members.

Financial institutions constituted as credit cooperatives are subject to Complementary Law 130/2009 and the legislation of the National Financial System - SFN and of the cooperative societies. Their purpose is to foster the activities of the cooperative members via credit assistance, making loans to the members, and making financial investments in the market. However, only members can make use of these services. Therefore, cooperatives aim to offer financial assistance to their members more personalized according to their needs (Nascimento et al. 2020).

Thus, credit unions are financial institutions authorized to operate by the Central Bank of Brazil and offer the same products and services as commercial banks. Although they have points in common, banks and cooperatives have essential differences. The main one is corporate control. While banks are capital companies, in which the vote is proportional to the equity interest, cooperatives are partnerships. Each cooperative member is entitled to only one vote at the meetings, regardless of the value of his interest in the institution's capital. According to Lewgoy (2018), in 2017, there were 967 credit unions and 6,037 service points in Brazil. In the United States, 30% of the population is associated with a cooperative, 22% Germany. In a more recent study by Confebras (2020), Credit Unions already total 11.5 million members in all country regions and 916 credit unions, thus counting 6,400 service points. According to Lewgoy (2018), credit unions are essential for financial inclusion and to democratize credit.

Currently, cooperatives are one of the primary sources of credit for micro, small, and medium enterprises because of their easy access and lower rates, since the cooperative is not focused on profit (Jacques & Gonçalves, 2016).

With this, the objective of this work is to evaluate the performance of financial cooperatives and banking institutions, especially commercial banks, during the period from 2011 to 2020. In 2014, the worsening of the fiscal and economic crisis led to the Impeachment of the President of the Republic on May 12, 2016, which generated uncertainty and instability in the financial market, creating an effect similar to a 2008 global financial crisis. Another point, which deserves to be highlighted, concerns the international health crisis, started in Dec/2019, caused by Covid-19, which also impacted the dynamics of the national financial market.

The research data will address only Brazilian institutions from 2011 to 2020. The scope of the database will have as main variables to assess whether cooperative banks are different from banking institutions, the percentage of net loans concerning assets, and derivatives as a proportion of total assets.

It is notorious that the Brazilian financial market presents a technological vocation for the expansion and maintenance of business; with this, the primary motivation of this study refers to the analysis of the relationship between financial cooperatives and commercial banks. Furthermore, in the last decade, both, from the same sector but with different characteristics, have gone through moments of instabilities in the national and global scenario.

The contribution of this research is of great value to society and especially to decision-makers since they will have the opportunity to make the necessary comparisons for the proper functioning of their business. For example, one result observed in this research concerns which financial agents behave better, based on the proposed Methodology, to help them in the business decision-making process, from minor to prominent entrepreneurs.

The research, besides this introduction, is composed as follows: Section 2 presents the theoretical framework of cooperative, financial cooperatives, financial banks, digital banks, and the crisis effect in these relations; Section 3 reports the Methodology, in which the methodological procedures used in the collection and treatment of data were described; while Section 4 brings the results obtained through the analysis of the data using statistical tools; and, finally, Section 5 the final considerations of the research.

2 Theoretical framework

The National Financial System (SFN) is composed, among others, of two important markets, the credit market and the capital market. The capital market is restricted to a few large companies that can raise funds by issuing debentures. In turn, the credit market is one of the most important sources of financing for companies in various sectors (Matias *et al.*, 2014).

The annual report of the *European Association of Cooperative Banks* shows that cooperative banks on the European continent reach some 224 million customers, 68 million members, with a market share of around 20% of the deposit market. Furthermore, the World Council of Credit Unions (Woccu) survey shows the different degrees of importance of credit unionism, measured by the percentage of members about the economically active population, in the world's most important regions.

The predominance of private banks was not shaken in the crisis years, unlike public banks, which were overtaken by the credit union segment in the years 2008-2009 and 2012 (Matias et al. 2014).

Thus, this theoretical framework will bring concepts and evidence about cooperativism as a whole, financial cooperatives, and banking institutions.

2.1 Cooperativism

Cooperativism can be classified as a set of ideas and notions such as mutuality, unity of effort, solidarity, the association between people for common goals, the non-exploitation of man by man, social justice, democracy, and self-management (Silva, 2011).

Article 4 of Law No. 5.764/71 defines a cooperative as "[...] partnerships, with their legal form and nature, of a civil nature, not subject to bankruptcy, formed to provide services to members, distinguished from other companies" by the following characteristics listed in Chart 1 below.

The cooperativism has significant importance in the Brazilian economy to align human development with sustainable development (MATOS and NINAUT, 2007).

I - Voluntary adhesion, with a limited number of associates, balance technical impossibility of providing services;	VII - the return of the year's net surplus, proportionally to the operations carried out by the associate unless otherwise deliberated by the General Assembly;
II - variability of the capital stock represented by quota shares;	VIII - indivisibility of the Reserve and Technical Educational and Social Assistance funds;
III - limitation of the number of capital shares for each member, with the establishment of proportionality criteria, however, is allowed, if this is more appropriate for the fulfillment of the social objectives;	IX - political neutrality and religious, racial, and social indiscrimination;
IV - the inaccessibility of the capital shares to third parties, strangers to the company;	X - assisting members and, when foreseen in the bylaws, to employees of the cooperative;
V - a single vote, and the central cooperatives, federations, and confederations of cooperatives may choose the proportionality criterion, except for those engaged in credit activities;	XI - area for the admission of associates limited to the possibilities of meeting, control, operations, and service provision.
VI - quorum for the operation and deliberation of the General Assembly based on the number of members and not on the capital;	

Box 1 - Characteristics of cooperatives
Source: Own elaboration. Adapted from Law nº 5.764, 1971.

According to Santos (2009), a significant problem for small entrepreneurs is to obtain credit at rates and terms that are feasible for their realities. Given this need, credit cooperatives emerge as a good alternative.

Cooperative Banks reflect on the importance of cooperatives because these banks brought more operational autonomy to credit unions eliminating the need to establish agreements with private institutions (Silva, 2011).

2.2 Financial Cooperatives

Credit unions in Brazil began between the second half of the 19th century and the 20th century. In the literature, it is possible to find different dates of their emergence. According to Hafemann and Floriano (2010) and Santos (2009), credit unions in Brazil began in 1902, founded by Father Teodoro Amstad, who made the first deposit of 100 thousand reais in the city Nova Petrópolis, Rio Grande do Sul.

In Brazil, Credit Unions are divided as follows, according to Confebras (2020):

1st level cooperatives: provide direct services to their members. They are made up of at least twenty cooperative members, linked to a central office, and classified by resolution no. 4434/2015 and are Capital & Loan, Classic and Full.

2nd level cooperatives: they are central and bring together at least three 1st level cooperatives as part of the guidelines, from which they receive operational and governance services.

3rd level cooperatives: they are confederations, gather at least three cooperative centrals, which represent them in politics and defend their interests; they also have their legal personality, standardize services from operational, financial, normative, and technological integration.

In a survey by Sebrae (2017), credit unions were the best rated by micro and small businesses for their services. In the survey, the Sicoob Credit Union obtained a score of 8.6, while Banco Bradesco obtained a score of 6.9.

In 2018 there were 973 singular cooperatives authorized to operate in the country, most of them linked to one of the following systems: Sistema de Cooperativas de Crédito do Brasil (Sicoob), Sistema de Crédito Cooperativo (Sicredi), Confederação Nacional das Cooperativas Centrais (Unicred), Sistema Cooperativo de Crédito Urbano (Cecred), Sistema das Cooperativas de Crédito Rural com Interação Solidária (Cresol) and Uniprime. In the year 2017, these institutions held approximately 90% of the service network and total members in the country. (Confebras, 2020).

However, the activities of these financial institutions are not risk-free, and around the world, there are cases of bankruptcy, as was the case of the American bank Lehman Brothers (Melo & Lima, 2015). Among the possible risks are credit, liquidity, operational, and market risks.

2.3 Banking Institutions

Financial institutions have specific structures: i) incorporated as S.A.; ii) execute short-term credit operations; iii) capacity to create money; iv) tendency to concentrate and merge; v) render services such as payment of checks, collections, transfers, payment orders, safe deposit boxes rental, custody of values and exchange operations.

As for the classification, we have a) retail banks - very clients; b) business banks - focused on large operations; c) private bank - for high-income/wealthy individuals; d) personal bank - for high-income individuals and small and medium-sized companies; and e) corporate bank - for large-sized companies.

The primary purpose of commercial banks is to supply resources needed to finance, in the short and medium-term, trade, industry, the service sector, and individuals (BACEN, 2021).

2.4 Differences between cooperatives and commercial banks

First, for the International Cooperative Alliance (ICA, 2007), a cooperative bank is an autonomous association of people united voluntarily to meet their economic, social, and cultural needs through a jointly-owned and managed enterprise.

According to Christensen, Hansen, and Lando (2004) and Ayadi, Arbak, and Carbó (2009), cooperative banks are attributed a double financial result: institutions that aim to generate profits to survive and expand without gain their sole objective. In the same vein, Hesse and Cihák (2007) state that cooperative banks, instead of profits, maximize the financial surplus of their members.

As the objective of this work is to contrast cooperatives - which do not aim at a profit - with banks - whose principal is to work for profit, a comparative table between the two modalities is relevant. Below is a relative chart.

Cooperatives Banks	Commercial Banks
A simple, not-for-profit partnership.	Corporate, capital company prioritizes profit for the shareholders.
Unlimited number of members.	Limited number of shares.
Each member has one vote.	Voting is proportional to the common shares.
The shares are inaccessible to strangers to the cooperative, even if by inheritance	The shares are freely traded and/or transferred.
The financial results arising from cooperative acts are tax exempt.	Positive results are taxable.
The surplus (positive result between income and expenditures) is returned to the members, proportionally to their operations with the cooperative during the fiscal year.	The net income is available to shareholders in proportion to the number of shares or stakes in the bank's capital.
It develops through collaboration.	Advance through the competition.

Box 2 - Main differences between a credit union and a commercial institution
Source: Own elaboration. Adapted from Santos (2009).

One can see that the level of complexity of each is well defined. While cooperatives have a simplified structure because they do not aim at a profit, banks have a series of regulatory norms, and their main focus is their shareholders and not their clients.

The shares are also limited within the banks, i.e., the number of people linked is limited. However, there is no such limit in a cooperative since it does not operate with individual purchases and sales.

Another issue that differs between the two is that the cooperative is not taxed, while banks are highly taxed proportionally to their profits. Finally, the unlimited number of people attached to the cooperative allows it to develop, while in banks, there is a struggle for a highly competitive market.

For Bechetti, Ciciretti, and Paolantonio (2016), at least from the theoretical perspective, financial cooperative businesses may have pros and cons in terms of credit quality due to the different objectives than banking institutions. On the one hand, being smaller in size and focusing on local business can produce a distance relationship that reduces informational asymmetries between lenders and borrowers, thus improving credit quality.

On the other hand, for Wheelock and Wilson (2010), local banks may suffer more from the scale of financial flows due to their smaller size and may be more exposed to the risk of local policy capture, suffering more leniency toward local businesses. In addition, cooperative banks are more likely to end up with insufficiently diversified loan portfolios if they are small and work in geographically bounded areas (Gobbi, 2005). These latter effects may conversely reduce credit quality.

Finally, according to Chaddad and Cook (2004) and Hansmann (1996), cooperative banks tend to have a lower propensity to take risks than commercial banks. According to CEPS (2010), this characteristic is associated with (i) the use of customer surplus as a cushion (risk protection), (ii) the affinity with a network that provides member support, and (iii) reduced dependence on global credit markets, reduces earnings volatility and yet allows for a higher intertemporal risk management performance.

Many papers have researched the empirical evidence of the difference between financial cooperatives and banking institutions. The following table summarizes the main international works cited by Bechetti, Ciciretti, and Paolantonio (2016) on this subject.

Authors	Contribution	Country
Altunbas et al. (2001)	inefficiency measures indicate that public and cooperative banks have small cost and profit advantages over private banking institutions.	Germany
Hansmann (1996); Chaddad and Cook (2004)	have observed that financial cooperatives in the United States tend to adopt less risky strategies than banking institutions	United States
Hesse and Cihák (2007)	show that cooperative banks have relatively more excellent financial stability with somewhat less volatile returns	OECD Countries
Groeneveld and de Vries (2009)	cooperative banks have lower earnings volatility (i.e., lower return on a standard deviation of assets) over the period 2002-2007 relative to private banks.	Europe
Brunetti et al. (2014)	after the global financial crisis (2008), the probability of customers switching from cooperative banks to commercial banks was lower than customers switching from commercial banks to cooperatives	Italy
Brunner et al. (2004)	found no evidence that cooperative banks are less effective at managing revenues and costs than commercial banks	France, Germany, Italy, and Spain
Barth, Caprio, and Levine (1999)	A higher degree of government ownership of banks tends to be associated with the greater fragility of financial systems.	60 countries
Goodhart (2004)	Interprets this finding as perhaps indicating that the presence of any maximizing nonprofit banking entities may make financial systems more fragile.	Switzerland

Box 3 - Main empirical contributions of the difference between cooperatives and banking institutions.
Source: own elaboration. Adapted from Bechetti *et al.* (2016).

Within the academic study, and in the crisis definitions of H2 and H4, the period between the years 2015 to 2016 is considered, a period in which the President elected in 2014 is in office until her impeachment, the Federal Senate approved the impeachment process by 55 votes to 22, and Dilma Rousseff was removed for 180 days for trial by the senators (Veiga *et al*. 2019).

During this process, there was economic decline: the unemployment rate rose, reaching 12.8% in the year 2018, public accounts were practically frozen. Moreover, according to IBGE data, 32 million Brazilians were in informality, and 4.8 million people were without job prospects (Santana and Neto, 2018).

In this context, with all sectors suffering the impacts of such intense changes, the cooperative and banking sector also suffer their problems. The discussion in this paper will point out that perhaps this crisis has been a setback for both, or whether the differences between cooperatives and banks have increased or decreased.

The motivation for H1 and H2 cited below are that both over time and pre-and post-crisis 2014, financial cooperatives resort less to interbank market lending than commercial banks. Hypotheses 3 and 4, on the other hand, show that during the years under analysis and also at the time of the crisis, cooperatives resort less to derivative instruments than banking institutions.

Credit unions have higher liquidity risks. According to Freitas et al. (2018), this risk is associated with the fact that the member and the client are the same people, leading to a lack of control from a financial point of view. Therefore, over time, having credit becomes a complex task. Because of this, one of the hypotheses is:

H1 – Cooperatives perform worse than commercial institutions in net lending over 2011 - 2020;

The following hypothesis follows the same parameters as before. Still, it adds a financial crisis where everyone ends up being hurt financially, and the distance between cooperatives and banking institutions follows.

H2 – Cooperatives perform worse than commercial institutions in terms of net lending in times of crisis;

Cooperatives are inserted in an environment in which uncertainty is present and, with it, risk, highlighting the oscillations of production and prices of agricultural commodities (Toesca, 2018). Given this, the hypothesis formulated is:

H3 – Cooperatives perform worse than commercial institutions on derivatives over 2011 - 2020;

The results of Toesca's (2018) research show an increase in the perception of risk and use of derivatives by financial managers of agricultural cooperatives. In a period of crisis, this situation is aggravated, and the following hypothesis is justified.

H4 – Cooperatives banks perform worse than institutions regarding derivatives in times of crisis.

3 Methodology

3.1 Data

The construction of the data sample of cooperatives and banking institutions will be based on the data available on the statistical time series platform of the institutional website of the Central Bank of Brazil (BACENb, 2021).

The variables used to quantitatively measure the difference between cooperatives and non-cooperative are described in the following table.

Variable	Definition
NL	Net loans / total assets (%)
DER	Derivatives / total assets (%)
SHARE_T	Share of revenue from traditional (operational) activities
SHARE_NT	Share of revenue from non-traditional (non-operating) activities
CAP_R	Capital ratio
I.L.	Impaired loans/gross loans
RES	Reserves for losses / non-performing loans
SISE	Revenues (in logarithm)
DCOOP	Dummy for financial cooperative (1=yes, 0 = no)
CRISIS	Dummy par fiscal and economic crisis (1= for 2015, 0 - otherwise)
ROA	Return on assets (%) (net income/total assets)
ROE	Return on Equity (%) (Equity/Total Assets)
CL	Current Assets/Total Liabilities
GL	(Assets + long-term receivables)/total liabilities
NCA	Non-Current Assets / Net Equity (%)
GDP	Gross Domestic Product
D/E	(Current Liabilities + Long-term Liabilities) / Equity (%)

Box 4 - Variables used
Note: Net Profit = Total Revenue - Total Cost
Source: Own elaboration.

From the original sample, considering the years from 2010 to 2020, the banking institutions that represent less than 1% of the assets were removed. For the cooperatives, only those that are not selected by professional activity were left in the sample, such as, for example, the Cooperatives of the Araraquara-SP state servers and the Cooperatives of UFMG workers.

3.2 Empirical Strategy

Considering the objective of this paper is to evaluate the performance of financial cooperatives and financial banks during the period from 2011 to 2020, with the focus between pre and post-crisis of 2015-2016. The econometric regression model will seek to answer the difference between cooperatives and non-cooperative on net loans and derivatives; it will answer the research hypotheses.

All financial cooperatives and financial banks in Brazil with the variables listed in table 3 available for consultation and analysis will be evaluated. The model mentioned below was adapted from Becchetti et al. (2016):

(1)

$$NL_{it} = \alpha_0 + \theta DCOOP + \varphi DCRISIS + \alpha_1 \ln(SIZE)_{it} + \sum_{j=1}^{n} \theta_j CONTROLS_{it} + \pi_t + \varepsilon_{it}$$

$$DER_{it} = \alpha_0 + \theta DCOOP + \varphi DCRISIS + \alpha_1 \ln (SIZE)_{it} + \sum_{j=1}^{n} \theta_j CONTROLS_{it} + \pi_t + \varepsilon_{it} \qquad (2)$$

Where $\sum_{j=1}^{n} \theta_j CONTROLS_{it}$ are the controls; π_t, ε_{it} are the time controls and the model error term, respectively. The other variables have already been listed. Thus, the estimated parameter θ in both equations will reflect the average effect of being a cooperative on net loans and derivatives.

Since the data is panel data since the same information is collected from the same institutions over time, advanced panel data methods will be used: fixed and random effect models will be tested using the Hausmann test to see which one best fits the data scenario.

4. Results

This section presents the results of the descriptive statistics and regressions. According to Table 1, banks make up 65.31% of the sample; this reflects well the reality because, on average, cooperatives are regionalized and with a scope of clients with different profiles from retail banks.

Table 1- Frequency and percentage (cooperatives and banks)

	Fi	Fi(%)
Commercial Banks	1815	65,31
Cooperatives	964	34,69

Source: Own preparation based on Bacen (2021).

Table 2 shows the descriptive statistics of the data and the test of difference of means for cooperatives and banks. It can be seen that the variable N.L. (net loans), on average, is higher for cooperatives than for banks, considering the entire period (2010-2020). The test of difference of means for this variable was also statistically significant.

Cooperatives, on average, have a derivative's value (DER) of 0.08, while banks have 0.069, also showing statistical significance for the difference of means test.

The variable SIZE, which captures the size of the institutions, was higher for banks than for cooperatives. On average, the SIZE for cooperatives was 15.8 and for banks 19.8, emphasizing that the cooperatives are smaller and more regionalized than the banks.

The ROA and ROE indicators were also statistically significant for the mean difference test and averaged 0.125 and 0.123 for the cooperatives. For banks, on average, ROA and ROE were 0.144 and 0.112, respectively.

The current liquidity (CL) and general liquidity (G.L.) ratios were also higher, on average, for the cooperatives: 0.398 and 1.398 versus 0.268 and 1.268 for the banks, respectively. The variables NCA and D/E were, on average higher for banks.

Table 2- Descriptive statistics (banks and cooperatives)

			Cooperatives					Commercial Banks				
Variable	N	mean	sd	Min	max	N	mean	sd	min	Max	t-stat*
NL	964	0,141	0,158	0,000	1,021	1815	0,0644	0,090	0,000	0,837	-0,0762*
											(0,000)
DER	964	0,0868	0,196	0,000	1,008	1815	0,0698	0,099	0,000	1,003	-0,0169*
											(0,002)
SHARE_T	964	2,920e+07	6,210e+07	9208	9,090e+08	1815	6,670e+09	2,500e+10	0,0200	3,380e+11	6,6e+09*
											(0,000)
SHARE_NT	964	117343	461930	0,000	6,173e+06	1815	2,950e+07	1,840e+08	0,000	4,230e+09	2,94e+07*
											(0,000)
CAP_R	964	0,105	0,149	0,00382	3,193	1815	0,103	0,189	0,000335	4,1920	-0,0018
											(0,7927)
IL	764	6,06e-08	3,24e-07	0,000	8,21e-06	1283	5,99e-10	2,85e-09	0,000	7,14e-08	-6,00e-08*
											(0,000)
RES	764	31,110	580,6	0,000	15627	1283	702,6	16074	0,000	505136	671,485
											(0,2486)
SISE	964	15,800	1,831	9,128	20,63	1815	19,82	2,600	-3,912	26,550	4,022*
											(0,000)
ROA	964	0,125	0,0715	0,00196	0,572	1815	0,144	0,445	4,00e-09	16,960	0,0189
											(0,1887)
ROE	964	0,123	0,125	-0,763	0,593	1815	0,112	0,177	0,000607	1,000	-0,0107*
											(0,094)
CL	964	0,398	0,194	0,0327	0,994	1815	0,268	0,155	0,00149	1,000	-0,1295*
											(0,000)
GL	964	1,398	0,194	1,033	1,994	1815	1,268	0,155	1,001	2,000	-0,1295*
											(0,000)
NCA	637	0,0142	0,0497	0,000	0,859	399	0,0279	0,0645	2,90e-09	0,630	-0,0137*
											(0,000)
D/E	813	5,134	8,891	0,0124	173,179	1814	6,196	6,510	0,0006	59,511	1,0619*
											(0,000)

Notes: EL - Net loans / total assets (%); DER - Derivatives / total assets (%); SHARE_T - Revenue share from traditional (operating) activities; SHARE_NT - Revenue share from non-traditional (non-operating) activities; CAP_R - Capital ratio; IL - Impaired loans / gross loans; RES - Loss reserves / impaired loans; SIZE - Revenues (in logarithm); ROA - Return on assets (%) (net income/total assets); ROE - Return on equity (%) (PL/total assets); CL - Current assets/passive; GL - (Assets + long-term receivables)/total liabilities; NCA - Permanent assets/PL (%); D/E - (Current liabilities + Long-term liabilities) / Equity (%).

Source: Elaborated by the authors

The historical series of the Brazilian GDP is highlighted in Table 3. Notably, the years 2015 and 2016 marked a sharp decline in economic activity.

Table 3- Historical series of the GDP.

Year	GDP (% var.)	Year	GDP (% var.)
2010	7,5	2016	-3,6
2011	4,0	2017	1,25
2012	1,9	2018	1,27
2013	3,0	2019	1,08
2014	0,5	2020	-4,1
2015	-3,8		

Source: Own preparation with data from Ipea (IPEADATA, 2021).

Relating the 2015/2016 crisis and its effects on financial institutions' net lending (N.L.), one can see that 2015 was marked by a severe drop, especially for cooperatives. Figure 1 relates this finding.
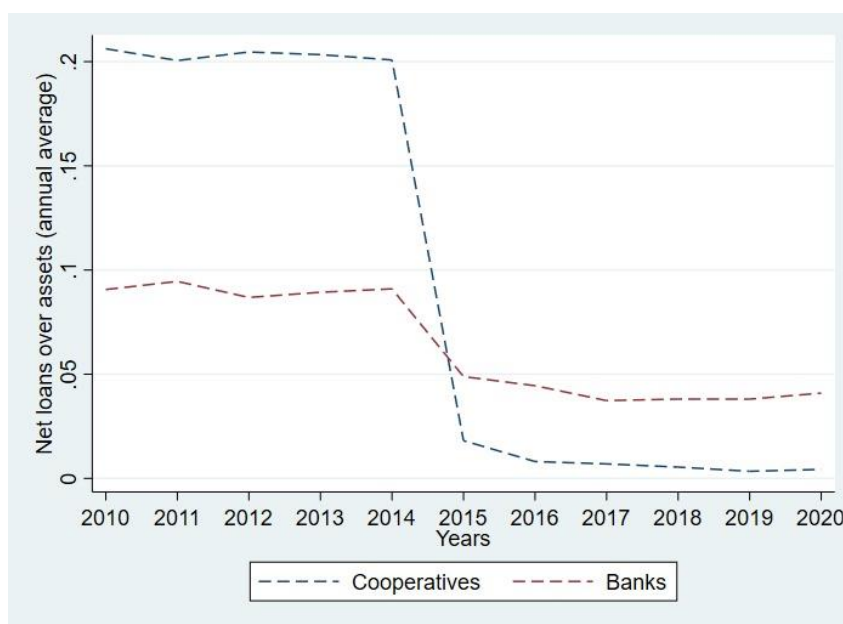

Figure 1- Time dynamics of net loans/total assets ratio (banks and cooperatives).

The estimation results for models (1) and (2) are presented in Table 4. The Pooled cross-section regression considers the stacked data sectioned by years (2010-2020), and the estimator is the Ordinary Least Squares. Thus, it can be seen that considering the institution is a cooperative, there was a reduction, on average, of 0.025 in net loans and a decrease of 0.011 in derivatives. The effect of the 2014/2015 crisis was also negative for cooperatives. On average, the financial crisis reduced loans by 0.0435.

Considering an unbalanced panel, Table 4 also presents the results of the random effects estimators (chosen according to the Hausman test). Note that the sign and significance were the same as in the Pooled cross-section regression. However, the magnitude was different for net loans. Considering the random effects estimator, the impact of being a cooperative on N.L. was, on average, -0.0241.

Table 4- Regression results.

Variables	Pooled cross-section		Pane Data	
	(1)	(2)	(1)	(2)
	NL	DER	NL	DER
DCOOP	-0,0259***	-0,0111**	-0,0241***	-0,0121**
	(0,00752)	(0,00504)	(0,00770)	(0,00505)
DCRISIS	-0,0435***	0,00799	-0,0400***	0,00379
	(0,00546)	(0,00629)	(0,00641)	(0,00420)
SHARE_T	2,09e-13***	-1,29e-13	2,61e-13**	-1,35e-13*
	(7,28e-14)	(4,84e-14)	(1,06e-13)	(6,96e-14)
SHARE_NT	-1,65e-11***	-1,07e-11	-1,17e-11	-1,14e-11
	(0,004)	(5,11e-12)	(1,22e-11)	(7,98e-12)
SIZE	-0,00603***	0,00701***	-0,00911***	0,00718***
	(0,00158)	(0,00116)	(0,00165)	(0,00108)
ROA	0,0592*	0,157***	0,0645***	0,155***
	(0,0328)	(0,0348)	(0,0173)	(0,0114)
ROE	0,334	-0,383***	0,333*	-0,382***
	(0,1423)	(0,0727)	(0,0901)	(0,0590)
CL	0,101***	0,165***	0,102***	0,165***
	(0,0247)	(0,0216)	(0,0207)	(0,0135)
NCA	-0,145***	-0,141***	-0,100**	-0,141***
	(0,0398)	(0,0246)	(0,0508)	(0,0333)
D/E	-0,00108***	0,000295	-0,000837*	0,000285
	(0,000403)	(0,000309)	(0,000439)	(0,000288)
Constant	0,0932**	-0,300***	0,245***	-0,138***
	(0,0447)	(0,0379)	(0,0336)	(0,0220)
Fixed effect for the year	YES	YES	-	-
Observations	1.390	1.390	1.390	1.390
Number of years			11	11
R-squared	0,356	0,348		

Source: Own elaboration. Note: The variable ind_liquidity_general was omitted because there is a high correlation. Robust standard errors in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$. to unbalanced panel data; Hausman test was performed (*Test:* H0: difference in coefficients not systematic = chi2 = -0.67; rejects H0) for best choice between fixed and random effect regressions; the best estimator, according to the test was the random effects one.

In the models for net lending (NL), ROE was not significant when the pooled model strategy was used (p = 0.1423). This was the only variable that failed to reach any of the three significance levels discussed in this paper. In terms of model prediction quality, the net lending (NL) model has an explanation power of 35.6% and the derivatives model has 34.8%. This means that this is the percentage of variation explained for the response variables when we use this set of independent variables. The rest of the variation in this case is explained by chance.

Table 5- Hypothesis x results

Hypotheses	Test of difference of means		
	Expected sign of the coefficient	MQO Estimator	Estimator Random Effects
H1 – Cooperatives banks perform worse than commercial institutions in net lending over 2011 - 2020**;**	Negative Confirmed the hypothesis	Negative	Negative
H2: Cooperatives banks perform worse than commercial institutions in terms of net lending in times of crisis;	Negative Confirmed the hypothesis	Negative	Negative

H3: Cooperatives banks perform worse than commercial institutions on derivatives over 2011 - 2020;	Negative Confirmed the hypothesis	Negative	Negative
H4: Cooperatives banks perform worse than commercial institutions regarding derivatives in times of crisis;	Negative Inconclusive for the confirmation of the hypothesis	Not significant	Not significant

In general, of the four hypotheses raised by this work, three of them were fully confirmed and only one was not validated through the results. It is possible to verify that the pooled and panel models had the same direction of results indicating that there is not a clear understanding of the need to separate the data by years once the selected companies do not have a pattern of behavior over time that justifies this grouping.

5. Analysis of the results

The results point to a worse performance of cooperatives in relation to banks since in the model the coefficients have negative signs for both loans and derivatives. On the other hand, the crisis had a negative impact on loans, but a positive impact on derivatives. The size of the company had a negative effect on loans, that is, the smaller the company, the larger the loans. On derivatives, the effect was positive, the larger the company, the larger the derivatives. ROE was the only non-significant variable in the pooled model for loans. However, in the panel model, its sign was positive indicating that higher ROE is linked to higher borrowing. In the derivatives models, the sign was negative, pointing to an increase in ROE linked to a decrease in derivatives. The explanation level of the model below 40% is a point to be highlighted since many other variables, not covered in this paper, can have a direct effect on loans and derivatives.

The fact that the pooled and panel models have maintained the signs of the relations most of the time, changing only the magnitude, indicates that over time the companies researched have had quite oscillating behaviors since placing the data in panel or stacked did not present any real difference. According to Ferreira, Gonçalves and Braga (2007), in their study for the credit cooperatives of Minas Gerais, one of the reasons for this difference between the cooperatives and the banks was that these institutions were operating with technical inefficiency, due to the corporate model and the governance structure. Perhaps because of this the loans were also significantly higher in the cooperatives as indicated by the hypothesis test.

Another finding that goes along with the results, was the research of Bittencourt et. al (2017). Considering the performance indicators, for example ROA, the research emphasizes that there is profitability difference between multiple banks and credit unions. This difference reaches 1.39% more for banks. One of the causes for this difference, according to the authors, is the possible conflict of interests between the various cooperative members regarding the application of surplus, since cooperatives have a different social function than banks, and cooperatives will not always aim to maximize results.

In relation to the economic crisis of 2015 and 2016, Cordeiro, Bressan, Lamounier, and de Campos Barros (2018), also agree with the results of the present research by stating that the economic recession impacted the performance of credit unions. Groeneveld and Vries (2009), when studying the 2008 crisis and its effects on European cooperatives, emphasized that although cooperatives are more stable than banks, they also suffered strongly from the effects of the crisis.

Also in line with the results of this research, according to Trindade, Ferreira Filho and Bialoskorski Neto (2010), both private banks and financial cooperatives show similar behavior in periods of crisis (closing branches and reducing clients), even if the cooperatives have different conceptions from banks. However, the intensity is higher for cooperatives as well. The size of the companies (revenues) also has a negative effect on lending. The higher the revenue, the lower the lending and this may be linked to the fact that naturally the asset sizes of banks are larger than the assets of cooperatives. That said, the need for borrowing ends up being lower. Evaluating the assets, current assets are larger in the cooperatives and permanent assets are larger in the banks, all with significant differences between the two groups.

Another explanation for the performance of the cooperatives' indicators being lower than those of banks, according to Bittencourt (2015), is the inefficiency of cooperatives due to the inefficient use of some production factors, such as total deposits and funding expenses. Therefore, regardless of the economic crisis, cooperatives present, on average, a worse result than banks. During the crisis, this difference worsens even more.

6. Conclusion

This research aimed to investigate the impacts on the performance of financial cooperatives and banking institutions during the period from 2011 to 2020. A sample of 1815 banks and 964 cooperatives were used for this purpose (BACEN, 2021).

The main variables to capture the performance of these institutions were net loans and derivatives. The idea is to verify the dynamics between banks and cooperatives on these two variables in a period of economic crisis.

According to Bittencourt et al. (2017), Groeneveld and Vries (2009), and Cordeiro et al. (2018), the economic recession both nationally (2015-2016) and internationally (2008), negatively impacted the performance of cooperatives more intensely than private banks. Thus, from this perspective, the results of this research are in line with the literature regarding the impacts of economic crises on financial cooperatives.

Thus, the results pointed to a negative impact on both net loans and derivatives when the financial institution is a cooperative over the period from 2011 to 2020. Also, the findings emphasize a more intense effect on cooperatives than banks over the crisis period of 2015/2016.

Financial cooperatives play an important role in Brazil's economic systems. They act as an essential source of credit for families and small and medium enterprises. Their nonprofit orientation (in many cases) and a focus on maximizing member benefits have ensured their popularity; however financial crises can compromise their sustainability. This is particularly evident since the Brazilian financial crisis when Co-ops in relative terms have suffered significantly. Similarly, many profit-oriented commercial banks have restricted credit to households and businesses.

Finally, this work contributes to the literature on financial cooperatives, filling a gap in the literature on the subject, since, to date, there is no Brazilian literature research that compares the performance of cooperatives and banking institutions, using the *proxies* net loans and derivatives, both in the period of economic crisis and over the years 2011 to 2020.

However, further studies on this theme are highly relevant to the national literature since the present study has limitations, such as considering the size and geographical location of these financial institutions and the effects of *leads and lags* on the performance variables.

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