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The differences between credit unions and commercial banking institutions in a scenario before and after economic crises in the period from 2010 to 2021

As diferenças existentes entre cooperativas de crédito e instituições bancárias comerciais em um cenário antes e depois de crises econômicas no período de 2010 a 2021

Las diferencias entre cooperativas de crédito e instituciones de banca comercial en un escenario antes y después de las crisis económicas en el período 2010 a 2021

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Abstract
Background: Financial institutions make decisions about resource acquisition and allocation to profit from financial intermediation.
Purpose: This research evaluates the differences between credit unions and commercial banks, analyzing before and after the economic crisis. The study period was between 2010 and 2021, encompassing two economic crises: the first between 2015 and 2016 and the second in 2020 and 2021.
Method: Indicators of net loans and derivatives extracted from the data platform provided by the Central Bank of Brazil were analyzed. The method used was pooled cross-section with random effects.
Results: The results indicate a reduction in cooperative loans and derivatives compared to commercial banks. The data analyzed suggest greater conservatism of cooperatives compared to banks.
Conclusions: Economic crises also negatively affected the loans and derivatives of credit cooperatives compared to commercial banks.
Keywords: credit unions; commercial banks; economic crisis; net loans; derivatives.

Resumo
Contextualização: As instituições financeiras tomam decisões sobre a captação de recursos e liberação destes e, com esse giro, obter lucro na intermediação financeira.
Objetivo: A presente pesquisa tem como objetivo avaliar as diferenças das cooperativas de crédito e dos bancos comerciais, analisando antes e depois da crise econômica. Neste estudo o período analisado foi entre 2010 e 2021, onde houve dois períodos de crises econômicas, sendo a primeira entre 2015 e 2016 e a segunda no ano de 2020 e 2021.
Método: Para isso, foram analisados indicadores de empréstimos líquidos e derivativos extraídos da plataforma de dados disponibilizados pelo Banco Central do Brasil. O método utilizado foi o *pooled cross-section* com efeitos aleatórios.
Resultado: Os resultados apontam para uma redução dos empréstimos e dos derivativos das cooperativas em relação aos bancos comerciais. Os dados analisados sugerem um conservadorismo maior das cooperativas em relação aos bancos.
Conclusões: As crises econômicas também afetaram negativamente os empréstimos e os derivativos das cooperativas de créditos em relação aos bancos comerciais.
Palavras-chave: cooperativas de crédito; bancos comerciais; crise econômica; empréstimos líquidos; derivativos.

Resumen
Contextualización: Las instituciones financieras toman decisiones sobre la captación y liberación de recursos para obtener beneficios en la intermediación financiera.
Objetivo: Esta investigación tiene como objetivo evaluar las diferencias entre las cooperativas de crédito y los bancos comerciales, analizando antes y después de la crisis económica. El período analizado fue entre 2010 y 2021, abarcando dos períodos de crisis económicas: el primero entre 2015 y 2016 y el segundo en 2020 y 2021.
Método: Se analizaron indicadores de préstamos netos y derivados extraídos de la plataforma de datos proporcionada por el Banco Central de Brasil. El método utilizado fue el pooled cross-section con efectos aleatorios.
Resultados: Los resultados indican una reducción en los préstamos y derivados de las cooperativas en comparación con los bancos comerciales. Los datos analizados sugieren un mayor conservadurismo de las cooperativas en comparación con los bancos.
Conclusiones: Las crisis económicas también afectaron negativamente los préstamos y derivados de las cooperativas de crédito en comparación con los bancos comerciales.

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Palabras clave: cooperativas de crédito; bancos comerciales; crisis económica; préstamos netos; derivados.

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1 INTRODUCTION

The economic, financial and political scenario, following the 2014 fiscal crisis, resulting from the presidential elections, the post-World Cup scenario, Operation Lava Jato and allegations against Petrobras, led the country into a severe economic recession. Real GDP recorded negative growth rates, as shown in Table 5, in the order of -3.53% in 2015 and -3.26% in 2016 (Ipeadata, 2021). Still in this same view of economic crisis, 2020 recorded a negative GDP growth rate as a consequence of COVID-19 at about -4.45%. This led institutions to change their business management strategies.

Before the recession, economic projections for the banking sector and credit unions were increasing in spreads, customer acquisition and total assets (Bacen, 2021a). As a result, both cooperatives and commercial banks reacted to face these economic crisis situations. This research addressed the main differences between credit cooperatives and banks in the pre- and post-economic crisis periods from 2010 to 2021.

Another important point for economic development is their relationship with the credit market. Sant'ana (2009) states that access to credit allows families to increase their consumption of durable goods and to invest, especially, in housing and education. According to the author, a market where the flow of financial resources is intense is characterized as a lively and rapidly expanding market. Therefore, in periods of 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 main active operations of banks are financing of fixed and working capital, subscription or acquisition of securities and bonds, interbank deposits and transfer of external loans. Investment banks mobilize billions, and, as they are profit-oriented companies, they are always incorporating new institutions into their portfolio (Bacen, 2021).

On the other hand, Ayadie et al. (2017) argue that a credit union is a non-profit association of people, with its own legal nature, part of the National Financial System, and intended to provide credit and financial products exclusively to its members. This greater relationship between members and cooperatives is called the atomized model. This same author also postulates that credit unions in countries have a looser relationship with their agents. McKillop et al. (2020) add that credit unions, which are more common in emerging countries, have four characteristics that differentiate them from commercial banks: Self-help; Identity; Democracy; and Cooperation among Cooperatives.

According to Lewgoy (2018), credit unions are financial institutions authorized to operate by the Central Bank of Brazil and offer the same types of products and services as a commercial bank. Although they have points in common, banks and cooperatives have differences, the main one being corporate control. While banks are capital companies, in which the vote is proportional to the shareholding, cooperatives are partnerships of individuals, in which each member has the right to only one vote in meetings, regardless of the value of their share in the institution's capital. In 2017, in Brazil, there were 967 credit unions and 6,037 service points.

Lewgoy (2018) also argues that credit unions are important for financial inclusion and for democratizing credit. Another difference that is noticeable in banks is the distance from the customer: according to Marucci and Machado (2022), banks focus their efforts on offering agility in customer service. However, one of the biggest complaints from these customers is that this service is generally cold and depersonalized, that is, very objective, where the customer is seen only as a means through which the organization achieves its goals.

Cooperatives are one of the main sources of credit for micro, small and medium-sized companies due to easy access and lower rates, since cooperatives are not focused on profit (Jacques & Gonçalves, 2016). In this sense and continuing what has already been explained, the research problem to be studied will be based on H1, H2, H3 and H4 and will answer the following research question: Did credit cooperatives perform worse or better than commercial banks in the period 2010-2021?

Considering the difference in structure and functioning of financial institutions, especially in periods of financial crises, the objective of this study is to verify the difference between credit cooperatives and banking institutions, especially commercial banks, during the period 2010-2021.

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. Another point that deserves to be highlighted concerns the international health crisis that began in December 2019, caused by Covid-19, which also impacted the dynamics of the national financial market.

The research gap involves an in-depth analysis of the national financial system regarding the relationship between credit unions and commercial banks, using already known parameters and adding liquid loans and derivatives as an elementary point, as per Bechetti, Ciciretti and Paolantonio (2016). It is a new way of looking at this difference between credit unions and banks, the aim of which is to understand how the latter behaves in times of crisis in relation to obtaining capital to release into the market, and how they behave in raising funds in periods before crises, during crises and after crises. The survey data covered only Brazilian institutions from 2010 to 2021. The scope of the database had as main variables, to assess whether credit unions are different from banking institutions, the percentage of net loans in relation to assets and derivatives in proportion to total assets, whether these are more withdrawn or not when the topic is obtaining

capital through net loans or derivatives.

The contribution of this research to society, and especially to decision-makers, is to provide an understanding of how the financial market behaved throughout the period studied, between 2010 and 2021. Cooperatives are still seen as smaller and more restricted entities; their administrators and those of banks will be able to check how they behave in a crisis based on their debt potential. It is also important to highlight the business community, that is, users of the financial system who are always looking for resources, which financial agents are more financially restricted in releasing capital, and which have fewer resources to contribute to the business.

In addition to this introduction, the research is composed as follows: Section 2 presents the theoretical framework on cooperatives, credit unions, financial banks, digital banks, and the effect of the crisis on these relationships; Section 3 reports the Methodology, in which the methodological procedures used in data collection and processing were described; while Section 4 presents the results obtained through data analysis using statistical tools; and finally, Section 5 contains the final thoughts of the research.

2 THEORETICAL FRAMEWORK

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

According to Macedo, Santos and Silva (2020), a commercial bank is a financial entity, whether public or private, that provides services by making resources available for financing, both in the short and medium term, for industries, commerce, service providers, individuals and others.

For Bressan, Maia and Souto (2020), the main characteristic of credit unions is voluntary and free membership. Therefore, they are open to all people, and they must be free from any form of discrimination based on gender, race, political ideology and belief.

The annual report of the European Association of Co-Operative Banks shows that credit unions in Europe reach around 224 million customers, being 68 million members, with a market share of around 20% of deposits. The survey carried out by the World Council of Credit Unions (WOCCU, 2022) shows the different degrees of importance of credit unions, measured by the percentage of members in relation to the economically active population in the most important regions of the world. Figure 1 shows the growth potential that credit unions have in the Brazilian economy, as they have a penetration of only 9.16% in society. Even so, it is significant to note that they have the largest assets and reserves in relation to all other Latin American countries.

Credit Unions & Financial Cooperatives	Members	Savings & Shares (Usd)	Loans (Usd)	Reserves (Usd)	Assets (Usd)	Penetration
Bolivia – 42	1,088,979	1,053,583,975	1,072,203,231	171,197,780	1,502,688,247	14.71%
Brazil – 818	13,648,000	44,567,620,427	48,941,425,547	12,207,480,593	75,052,928,723	9.16%
Chile – 7	1,550,000	2,675,341,246	2,367,694,955	786,474,777	3,370,767,953	11.81%
Colombia – 175	8,116,044	4,858,141,687	5,625,106,999	1,788,196,297	7,421,639,875	23.04%
Costa Rica – 66	628,914	5,219,460,221	4,038,477,638	258,707,456	6,508,180,436	17.79%
Dominican Republic – 17	1,134,069	1,599,247,703	953,482,013	298,005,853	1,927,805,458	15.91%
Ecuador – 522	4,994,500	14,878,370,923	12,561,719,841	1,676,082,391	17,800,988,848	42.95%
El Salvador – 27	326,288	963,000,000	778,000,000	51,500,000	1,133,000,000	7.72%
Guatemala – 25	2,380,915	2,786,953,375	1,646,908,936	340,786,844	3,267,505,768	22.46%
Honduras – 333	1,538,465	2,102,000,000	1,568,000,000	N/A	2,311,000,000	23.60%
México – 153	8,169,367	8,848,640,000	5,459,718,000	2,976,200,000	10,350,308,000	9.41%
Nicaragua – 6	34,435	6,350,215	N/A	N/A	N/A	0.79%
Panama – 180	130,053	405,022,465	385,906,765	57,579,865	740,306,304	4.57%
Paraguay – 458	1,829,621	2,944,000,000	2,378,000,000	N/A	3,469,000,000	39.36%
Peru – 419	2,192,615	2,881,173,781	2,405,842,633	N/A	3,623,882,179	9.90%
Suriname – 25	13,778	3,217,296	1,497,052	313,214	3,699,913	3.51%
Uruguay – 62	534,528	155,685,453	265,399,908	294,887,635	393,679,489	23.78%
Total Member Countries – 1,880	**36,726,265**	**72,129,259,659**	**70,234,868,531**	**17,978,456,908**	**110,025,556,743**	**13.33%**
Total Other Countries – 1,455	**11,584,31**	**23,818,549,108**	**20,214,514,987**	**2,928,955,797**	**28,851,824,450**	**20.06%**
Total Latin America – 3,335	**48,310,571**	**95,947,808,767**	**90,449,383,518**	**20,907,412,705**	**138,877,381,193**	**16.50%**

Figure 1. Economic data of Latin America's Credit Unions
Source: WOCCU Annual Statistics, 2022.

In this theoretical referential, we brought concepts and evidence about cooperatives as a whole, credit unions and the banking institutions, just like the hypothesis brought by this research.

2.1 Cooperatives

Credit unions are Micro Financial Institutions (MFIs) organized under a non-profit tax regime, whose members are the owners organized to promote credit and safeguard the capital of their members at a fair and reasonable interest rate (Henock, 2019).

Helping communities develop is a natural path for cooperatives, creating social and economic benefits for community members and society as a whole, seeking to achieve social interests (Trein; Griebeler, 2018).

In the same view, McKee, Kagan e Ghosh (2019) argue that the lack of credit unions in certain regions or countries means that the population of that particular location does not have access to consumer credit, agricultural credit and mortgage loan services.

Cooperatives can be classified as a set of ideas and notions such as mutuality, joint efforts, solidarity, association between people based on common goals, non-exploitation of man by man, social justice, democracy and self-management (Silva, 2011).

According to Barbosa (2022), Credit Cooperatives open their doors to young students through internship and young apprentice programs who are given the opportunity to apply in practice all the theory learned in college (Geração Cooperação, 2021). On the other hand, 2,189 bank branches were closed in 2021 throughout Brazil, resulting in 15,400 unemployed people. The reduction occurs amid the increase in digital payment channels, but, according to union members, it increases the workload of bank employees. This shows that in addition to its social role, being more neighborhood-oriented, it can reach and employ a portion of these young people and workers who end up unemployed.

Article 4 of Law No. 5.764/71 defines a cooperative as "[...] partnerships of people, with their own shape and legal nature, of a civil nature, not subject to bankruptcy, established to provide services to members, distinguished from other partnerships" by the following characteristics listed in Figure 2.

I – Voluntary membership, with a limited number of members, except when being technically impossible to provide services; II – Variability of the share capital represented by shares; III – Limitation of the number of shares of the capital for each member, although it is possible to establish proportionality criteria, if this is more appropriate for fulfilling the company's objectives; IV – Inaccessibility of shares of the capital of third parties, not members of the company; V – Singularity of vote, with central cooperatives, federations and confederations of cooperatives, with the exception of those that carry out credit activities, being able to opt for the proportionality criterion;	VI – Quorum for the functioning and deliberation of the General Assembly based on the number of members and not on the capital; VII – Return of net surpluses for the fiscal year, in proportion to the operations carried out by the member, unless otherwise decided by the General Assembly; VIII – Indivisibility of the Reserve and Technical Educational and Social Assistance funds; IX – Political neutrality and indiscriminate religion, race and social status; X – Provision of assistance to members and, when provided for in the bylaws, to the cooperative's employees; XI – Area of admission of members limited to the possibilities of meetings, control, operations and provision of services.

Figure 2. Characteristics of cooperatives
Source: Adapted from Law nº 5.764, 1971.

Cooperatives have significant importance in the Brazilian economy because they are capable of aligning human development with sustainable development (Matos & Ninaut, 2007). In this aspect of sustainable development, Santos (2009) states that one of the major problems of small business owners is obtaining credit at rates and terms that are possible for their realities. Given this need, credit unions emerge as a good alternative.

Credit unions reflect the importance of cooperatives because they have brought more operational autonomy to credit unions, eliminating the need to establish agreements with private institutions or long relationships with commercial banks in order to obtain credit (Silva, 2011).

Regarding the social role that such cooperatives play, Widiyanti (2012); Velazco et al. (2009) and Villalobos (2015), state that credit cooperatives emerge in the market with the aim of promoting the economic interests of their members and are understood as an organization with a social character because cooperatives reveal that they continually tend to defend themselves, showing strong human characteristics and defending justice and equality.

2.2 Credit Unions

McKillop and Quinn (2017) examined Irish credit unions from 2002 to 2013, seeking to measure their structural performance. The study found that they are divided into three classes within Ireland: credit for small cooperative members, agricultural financing, and a third mortgage structure, with the second class, credit for agricultural financing, standing out from the others.

The results of Mariano et al. (2019) and Bertolinet al. (2008) are in agreement in the sense that they argue that the investments made and obtained in the credit union are the result of the interests that the cooperative members have in its

operation, that is, in monitoring, managing, and informing stakeholders, seeking to maximize results. In this sense, it can be said, based on the findings of Cruz et al. (2019), that the longer the cooperative member has been involved in the cooperative, the more he or she invests. Cooperatives, as more restricted entities, always seek the participation of their members in their management and supervision. In addition, they have an important characteristic, which is that they do not aim for profit, but rather to meet the needs of their members (Prado et al., 2014).

As for participation in management, cited by Cruz et al. (2019), Unda and Renasinghe (2019) assess the risks of Australian credit unions and show that, given the characteristics of credit unions, in smaller cooperatives where the board of directors is unpaid (volunteers) and composed of their own members, the risk of insolvency is lower. In larger credit unions, the boards of directors are very well paid and are linked to a lower risk of insolvency.

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: are central offices 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: are confederations. They bring together at least three cooperative central offices, which represent them in politics and defend their interests. They have their own legal personality and standardize services based on operational, financial, regulatory and technological integration.

In 2018, there were 973 individual cooperatives authorized to operate in the country, most of which were linked to one of the following systems: Brazilian Credit Cooperative System (Sicoob), Cooperative Credit System (Sicredi), National Confederation of Central Cooperatives (Unicred), Urban Credit Cooperative System (Cecred), Rural Credit Cooperative System with Solidarity Interaction (Cresol) and Uniprime. In 2017, these institutions held approximately 90% of the service network and total members in the country (Confebras, 2020).

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

McKillop et al. (2020), in their studies, also brought up the disadvantages of credit unions, where they argue three risks of credit unions in relation to banks, namely: 1. Transfers of profits to reserves are one of the few sources of income, and, in many cases, it is even the only source of capital accumulation; 2. As there is no capital held outside and no negotiable property rights, credit unions are sometimes weak in disciplining ownership or corporate control; and finally 3. The system of each member having only one vote weakens engagement, as the member may not have sufficient incentive for a higher level of monitoring.

2.3 Banking Institutions

Financial institutions have specific structures: (i) it is an incorporated corporation; (ii) carry out short-term credit operations; (iii) the ability to create currency; (iv) are prone to concentration and mergers; (v) provide services such as payment of checks, collections, transfers, payment orders, rental of safes, custody of valuables and exchange operations.

Digital banks and fintech companies issued approximately R$9 billion in loans in 2021, three times the amount disbursed in 2019. For the Brazilian Digital Credit Association (ABCD), the significant increase in the volume of credit issued is due to changes in consumer behavior, which force consumers to migrate their financial activities to the digital world due to social isolation caused by the coronavirus pandemic in 2020 (Olher, 2020).

As for classification, we have: a) retail banks: many customers; b) business banks: focused on large operations; c) private bank: serves individuals with high income/net worth; d) personal bank: serves individuals with high income and small and medium-sized companies; and finally, e) corporate bank: large legal entities.

The main objective of commercial banks is to provide the necessary resources to finance, in the short and medium term, commerce, industry, the service sector and individuals (Bacen, 2021; Zanon & Dantas, 2020).

In this sense, one of the findings of Bechetti, Ciciretti and Paolantonio (2016) is related to this thought: they discovered that banking diversity is important. The high intensity of traditional intermediation activity and internal financing or financing channels, confirming their hypothesis that, in some sectors, this makes a difference, but emphasizing that it must be carefully monitored by regulatory bodies.

2.4 Differences among cooperatives and commercial banks

First, for the International Cooperative Alliance (ICA, 2007), a credit union is an autonomous association of people willingly united to meet their economic, social and cultural needs, through a jointly owned and managed company.

According to Christensen, Hansen and Lando (2004), Ayadi, Arbak and Carbó (2009) and Canassa, Costa and

Bonacim (2022), credit unions attribute a double financial result to themselves: institutions that aim to generate positive results to survive and expand without having profit as their sole objective. In the same sense, Hesse and Cihák (2007) state that credit unions, instead of profits, maximize the financial surplus of their members, which we call superavit.

Since the objective of the work is to compare credit unions (which aim at results) with banks (which have as their principle the work for profit), a comparative table between the two modalities is relevant.

Cooperatives	Banks
• Simple, non-profit association of individuals. • Unlimited number of members. • Each member has one vote. • The shares are inaccessible to outsiders to the cooperative, even by inheritance. • The financial results arising from cooperative activities are exempt from taxes. • The surpluses (positive result between income and expenses) are returned to the members, in proportion to their operations with the cooperative during the fiscal year. • It develops through collaboration.	• A business corporation, with capital, prioritizes profit for shareholders. • Limited number of shares. • Voting proportional to ordinary shares. • Shares are freely traded and/or transferred. • Positive results are taxable. • Net profit is available to shareholders, proportional to the number of shares or participation in the bank's capital. • Advances through competition.

Figure 3. Main differences among a credit union and a financial institution
Source: Adapted from Santos (2009).

Aduseie et al. (2020) note that the level of complexity of each one is well defined. While cooperatives have a simplified structure because they do not aim for profit, banks have a series of regulatory standards, in addition to having their main focus on their shareholders and not their customers. The authors also state that, in economically developing countries, cooperatives have a fundamental role in providing credit, promoting financial inclusion and alleviating extreme poverty. Therefore, the authors were able to conclude that developing countries should regulate and treat credit cooperatives as strong mechanisms, free from political influences that aim to establish ease of access to credit for small farmers and entrepreneurs.

For Bechetti, Ciciretti and Paolantonio (2016), at least from a theoretical perspective, due to the different objective of banking institutions, the business of credit cooperatives can have pros and cons in terms of credit quality. On the one hand, being smaller in size and with a stronger focus on local business, it can reduce a type of arm's length relationship, which reduces information asymmetries between creditors and debtors, 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 capture by local politics, suffering greater insolvency towards local businesses. In addition, credit unions are more likely to end up with insufficiently diversified credit portfolios, since they are small and operate in geographically delimited areas. These latter effects may, conversely, reduce credit quality.

Finally, according to Chaddad and Cook (2004) and Hansmann (1996), credit unions tend to be less risk-taking 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 support to the member, and (iii) a reduced dependence on global credit markets reduces earnings volatility and allows for greater intertemporal risk management performance. Many studies have investigated the empirical evidence of the difference between credit unions and banking institutions. Figure 4 summarizes the main international studies on this subject cited by Bechetti, Ciciretti and Paolantonio (2016).

Authors	Contribution	Country
Altunbaset al. (2001)	The 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)	Found that credit unions in the United States tend to adopt less risky strategies than banking institutions.	United States
Hesse e Cihák (2007)	Showed that cooperative banks have relatively greater financial stability with relatively less volatile returns.	OECD countries
Groeneveld and de Vries (2009)	Cooperative banks have lower earnings volatility (i.e., lower return on standard deviation of assets) over the period 2002-2007 relative to private banks.	Europw
Brunettiet al. (2014)	After the global financial crisis (2008), customers were less likely to switch from cooperative to commercial banks than customers were to switch from commercial to cooperative banks.	Italy
Brunneret al (2004)	Found no evidence that cooperative banks are less effective in managing revenues and costs than commercial banks.	France, Germany, Italy and Spain
Barth, Caprio and Levine (1999)	Found that a greater degree of government ownership of banks tends to be associated with greater fragility of financial systems.	60 countries
Goodhart (2004)	Interpret this finding as perhaps indicating that the presence of any profit-maximizing nonprofit banking entities may make financial systems more fragile	Switzerland

Figure 4. Main empirical contributions of the difference among cooperative and banking institutions
Source: Adapted from Bechetti al. (2016).

2.5 Research hypothesis

The motivation for H1 and H2 cited below is that, both over time and pre- and post-crisis, credit unions resort less to loans in the interbank market than commercial banks, as already explained in the introduction when mentioning the research gap.

H3 and H4 show that, during the years under analysis and in periods of crisis, credit unions resort less to derivative instruments than banking institutions.

In the academic study, the crisis definitions of H2 and H4 (H for 'hypothesis') that will be presented consider the period between 2015, 2016 and 2020 (Veiga et al. 2019).

2.5.1 Hypothesis 1

Premise: Credit unions performed worse than banking institutions in terms of net loans over the period 2010-2021.

Credit unions have a higher liquidity risk. According to Freitas et al. (2018), this risk is associated with the fact that the partner and the client are the same person, and this can lead to financial mismanagement. Therefore, over time, obtaining credit becomes a complex task, and, as a result, H1 was formulated. Regarding H1, according to Gonçalves (2015), credit is costly for credit unions, even though this credit is negotiated to fund the activities of its members. Most of the time, it is mainly aimed at agribusiness, which, in 2013, represented 24.3% of the National GDP, that is, the cost is linked to the primary activity. For banks, this is easier to manage, since they serve large industries and, therefore, are not at risk of seasonal climate change and have high demand from society; therefore, they do not need to be very secure.

2.5.2 Hypothesis 2

Premise: Credit unions perform worse than banking institutions in terms of net loans during a crisis.

During Dilma Rousseff's impeachment process, there was an economic decline: the unemployment rate rose, reaching 12.8% in 2018, and public finances practically froze. According to IBGE data, 32 million Brazilians at that time were in the informal sector and 4.8 million people had no job prospects (Chaib et al., 2021).

In this context, H2 is debated, with all sectors suffering the impacts of such intense changes, the cooperative and banking sectors also suffered their problems. The discussion, in this paper, was to consider whether, perhaps, this crisis had been a setback for both or whether, at that moment, the differences between cooperatives and banks had increased or decreased.

H2 is also linked to net loans, but in this sense, there is a restriction, according to the methodology of presenting it in a period of crisis, which is the additional test to be carried out in the H1 model.

In line with the basis of H3 and H4, there are studies by Haiss and Sammer (2010) and Merton and Bodie (2005) on financial instruments, among which derivatives are included, which showed that these can play an important role in expanding the set of these traditional functions. Derivatives can, in fact, be pre-organizers of capital attraction and withdrawal and can be conceived as "adapters" between different financial systems that are not fully integrated.

2.5.3 Hypothesis 3

Premise: Credit unions perform worse than banking institutions in terms of derivatives over the period 2010-2021.

An important point to be mentioned in this separation of credit risk between credit unions and banks is CMN Resolution No. 4,557 (Brazil, 2017), which regulates that financial institutions must maintain a continuous and integrated risk management structure compatible with the business model, the nature of operations and the complexity of the institution's products, services, activities and processes. Since the derivatives market is still a major risk and not as common in credit unions as in banks, a worse relationship is expected in this regard.

Since the capital market and the search for resources from external investors are present in large commercial banks, so are cooperatives, but in a more restricted way, inserted in an environment in which uncertainty is present and, with it, risk, highlighting the fluctuations in production and prices of agricultural commodities (Toesca et al., 2020). Due to this, H3 is formulated and presented above.

The results of the research by Toesca et al. (2020) show an increase in the perception of risk and use of derivatives by the financial managers of agricultural cooperatives. In a period of crisis, this situation worsens and the following hypothesis is justified.

2.5.4 Hypothesis 4

Premise: Credit cooperatives perform worse than banking institutions in terms of derivatives in periods of crisis.

Melo and Lima (2015) argued that, as far as they have been observed, the difficulties in financial institutions around the world have ended and, in many cases, end up leading to the insolvency of these entities and justifying the high-risk scenarios in which they operate. The debate remains largely focused on derivatives markets, which are incipient for credit unions.

This negative relationship between credit risk and efficiency may suggest that risk-averse managers would tend to

increase operating expenses for loan assessment and monitoring in an attempt to control the increase in default, which would have results in bank efficiency assessments. On the other hand, it would have a positive impact on the default of credit portfolios, to the point that it would reduce it. As a result, risk-averse managers tend to increase monitoring costs to control defaulting creditors, which would reduce bank efficiency (Tabak, Craveiro and Cajueiro, 2010). It is in this scenario that the H4 study is designed, as the credit union is more withdrawn than the bank and has a smaller area of operation, its performance in relation to obtaining capital through derivatives for use in the market is expected to decrease in times of crisis.

3 METHODOLOGY

3.1 Data

The building of cooperatives' and banking institutions' sample began from data found at the statistical platform of temporal series from Central Bank's institutional websites (BACENb, 2022).

The variables used to quantitatively measure the difference between cooperatives and non-cooperatives are an adaptation of the model by Bechetti, Ciciretti and Paolantonio (2016), and their description is shown in Figure 5.

From the original sample, considering the years 2010 to 2021, banking institutions that represent less than 1% of the average assets of the sample were removed. For cooperatives, only those in which there is no selection by professional activity were left in the sample, such as the Cooperative of State Employees of Araraquara-SP and Cooperatives of Workers of UFMG.

Variables	Definition	Characteristics
EL	Net loans / total assets	Index
DER	Derivatives / total assets	Index
RCA	Share capital / total assets	Index
EMP	Impaired loans / gross loans	Index
RES	Loss reserves / non-performing loans	Index
Dcoop	Dummy for credit union (1 = yes, 0 = no)	Binary
Dcrise	Dummy for fiscal and economic crisis (1 = for 2015, 2016 and 2020 0 – otherwise)	Binary
ROA	Return on assets = (net income / total assets)	Percentage
ROE	Return on equity = (NE / total assets)	Percentage
LG	(Assets + long-term receivables) / total liabilities	Index
IMOB	Permanent Assets / NE	Index
PCT	(Current Liabilities + Long-term Liabilities) / NE	Index
SIZE	Total Assets	Logarythm

Figure 5. Variables used
Source: Prepared by the author.

3.2 Empirical strategy

Considering the objective of this study (to assess the difference between credit unions and financial banks during the period from 2010 to 2021, with a focus on the pre- and post-crisis period of 2015-2016), the econometric regression model sought to answer the difference between credit unions and commercial banks regarding net loans and derivatives, responding to the research hypotheses.

Table 1
Database Selection and Composition

Sample selection	Observations
Initial data (2010-2021)	15,021
Retrieved from institutions (banks and cooperatives) with same name and CNPJ	12,045
Total observations	2,976

Source: Own elaboration.

All credit unions and financial banks in Brazil that had the variables listed in Figure 5 available for consultation and analysis were evaluated. The afore mentioned model, equations 1 and 2, below, were adapted from Bechetti et al. (2016):

$$EL_{it} = \alpha_0 + \theta Dcoop + \phi Dcrise * \phi Dcrise + \sum_{j=1}^{n} \theta_j controles_{it} + \pi_t + \epsilon_{it} (1)$$

$$DER_{it} = \alpha_0 + \theta Dcoop + \phi Dcrise * \phi Dcrise + \sum_{j=1}^{n} \theta_j controles_{it} + \pi_t + \epsilon_{it} (2)$$

Where $\sum_{j=1}^{n} \quad \theta_j controles_{it}$ are the controls; π_t, ε_{it} are time controls and the error term of the model, respectively. All the other variables have been listed. Thus, the estimated parameter θ, in both equations, reflected the average affect of

being a cooperative about net loans and derivatives.

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

4 RESULTS

This section presents the results of descriptive statistics and regressions. According to Table 2, banks make up 66.53% of the sample. This reflects reality well, since, on average, cooperatives are regionalized and have a scope of customers with different profiles than retail banks.

Table 2
Frequency and Percentage (Cooperatives and Banks)

	Fi	Fi (%)
Banks	1,980	66.53
Cooperatives	996	33.47
Total	2,976	100.00

Source: Own elaboration based on Bacen (2022).

Table 3 shows the descriptive statistics of the data and the test of difference of means for the groups of cooperatives and banks. It can be seen that the variable EL (net loans), on average, is higher for cooperatives than for banks, considering the entire period (2010-2021). The test of difference of means for this variable was also statistically significant (p = 0.000).

Table 3
Banks' and Cooperatives' Descriptive Statistics

	Cooperatives					Banks					
Variable	**N**	**Average**	**Standard deviation**	**Min**	**Max**	**N**	**Average**	**Standard deviation**	**Min**	**Max**	**t-stat***
EL	996	0.136	0.157	0.00	1.021	1980	0.0628	0.0909	0.00	0.837	-.0735* (0.000)
DER	996	0.0879	0.196	0.00	1.008	1980	0.0692	0.0986	0.00	1.003	-0.0187* (0.005)
RCA	996	0.104	0.149	0.00382	3.193	1980	0.103	0.188	0.000335	4.192	-0.0012 (0.00683)
EMP	778	5.95e-08	3.21e-07	0.00	8.21e-06	1381	6.06e-10	2.94e-09	0.00	7.14e-08	-5.89e-08* (8.65e-09)
RES	778	30.60	575.4	0.00	15627	1381	787.7	16114	0.00	505136	757.057 (577.98)
SIZE	996	15.84	1.860	9.128	20.63	1980	19.79	2.648	-3.912	26.55	3.94* (0.0937)
ROA	996	0.122	0.0721	0.00196	0.572	1980	0.137	0.427	2.00e-09	16.96	0.0142 (0.013)
ROE	996	0.126	0.135	-0.763	1.095	1980	0.123	0.207	-0.0317	2.00	-0.0028* (0.007)
LG	996	1.399	0.194	1.033	1.994	1980	1.268	0.155	1.001	2.00	-0.1303* (0.0067)
IMOB	666	0.0141	0.0499	1.77e-06	0.860	1241	0.0273	0.0630	2.90e-09	0.631	0.1327* (0.002)
PCT	845	5.066	8.742	0.0124	173.2	1978	5.930	6.394	-18.02	59.51	0.863* (0.294)

Source: Own elaboration.
Note: EL - Net loans / total assets (%); DER- Derivatives / total assets (%); RCA – share capital / total assets (%) ; EMP - Impaired loans + gross loans / total assets (%) not divided by assets; RES - Loss reserves / non-performing loans; SIZE - Total Assets in Logarithm; ROA - Return on assets (%) (net income / total assets); ROE - Return on equity (%) (PL / total assets); LG - (Assets + long-term receivables) / total liabilities; IMOB - Permanent Assets / PL (%); PCT - (Current Liabilities + Long-term Payables) / PL (%). t-stat – test and difference of means. * p < 0.05; standard error in parentheses.

Cooperatives, on average, have a derivatives value (DER) of 0.08, while banks have 0.069, and presented statistical significance for the test of difference of means (p = 0.000). In turn, depreciated loans/gross loans (EMP) also presented a statistical difference (p = 0.000) and are higher in cooperatives.

The variable SIZE, which captures the size of the institutions, was higher in banks than in cooperatives (p = 0.000). On average, the SIZE of cooperatives was 15.8 and that of banks was 19.8, emphasizing once again that cooperatives are smaller and more regionalized than banks. According to Barrett (2008), the issue of cooperatives being smaller than banks is explained by the fact that they are less extensive, but they still do a job of serving small farmers and helping with trade channels with wholesalers and retailers in China.

The indicator and ROE were also statistically significant for the difference of means test, and, on average, 0.126 and 0.123 for cooperatives and banks, respectively. This difference was significant at the 10% level (p = 0.094), therefore, with a higher error level than those mentioned previously.

The General Liquidity Index (LG) was also higher, on average, for cooperatives: 1.399 versus 1.268 for banks, respectively. The IMOB and PCT variables were, on average, higher for banks. In this sense, Scopel and Dos Santos (2020) argue that, due to their social role, credit unions are more concerned about not getting into as much debt as banks. The latter have a heavier third-party capital, due to their debt to move the relationship with their stakeholders, the descriptive statistics and the result converge in this sense.

The results in Table 3 converge with the data from Brown, Cookson and Heimer (2019), when they state that commercial banks have more propulsion to release credit than cooperatives, and therefore, do not need to take on as much debt in times of crisis. It is important to mention that, in periods like these, third-party capital becomes more expensive for everyone, including banks.

The historical series of Brazilian GDP growth is highlighted in Table 4. It can be seen that the years 2015, 2016 and 2020 marked a sharp decline in economic activity. The GDP growth rate, Table 4, represents in this work the period in which it is considered a crisis, the sharp economic decline in less developed countries that causes a reduction in the search for and release of credit, there is political interference in the economy, according to (Adusei et al., 2020).

Table 4
GDP Growth Rate (Br: 2010-2021)

Year	GDP (var. %)	GDP	GDP (var. %)
2010	7.53	2016	-3.28
2011	3.97	2017	1.25
2012	1.92	2018	1.27
2013	3.00	2019	1.08
2014	0.50	2020	-3.88
2015	-3.55	2021	3.92

Source: Own elaboration with data from Ipea (IPEADATA, 2022).

The calculation of GDP growth is always used in studies when they want to verify the causal relationships of the behavior of a given economy, as can be said of the studies by Démurger (2001) who studied the behavior of the Chinese economy in the period from 1985 to 1998 and Seethepalli et al. (2007) who studied the behavior of Asian countries in the period from 1985 to 2004 and found a positive association between infrastructure and logistics with GDP growth.

Relating the crisis demonstrated here with its effects on financial institutions' net loans (NL), it is noted that the years 2015, 2016 and 2020 were marked by a severe decline, especially for cooperatives. Figure 6 relates this finding.

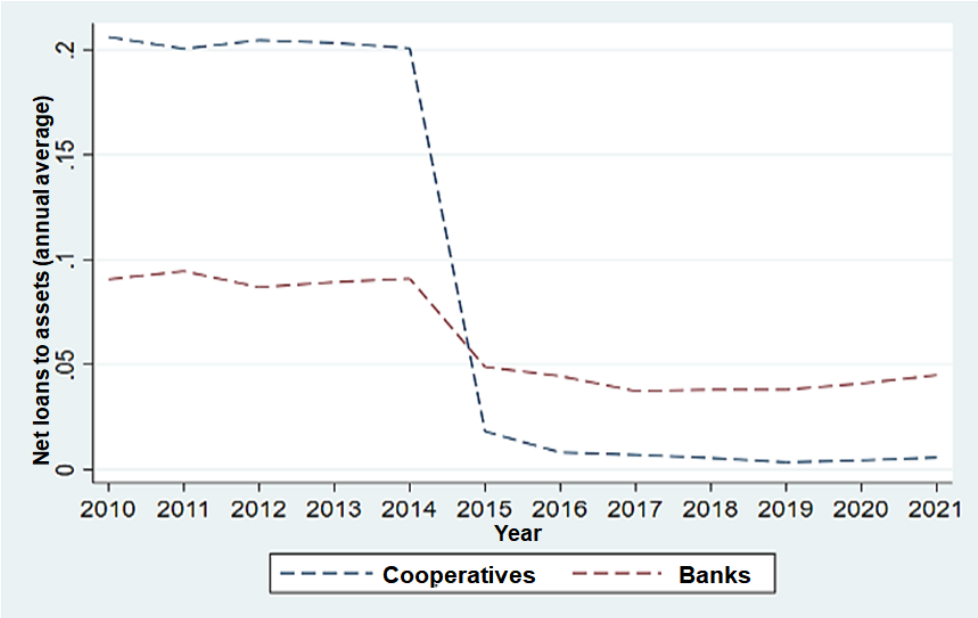

Figure 6. Temporal dynamics of the net loans/total assets ratio (banks and cooperatives)
Source: Own elaboration with data from Ipea (IPEADATA, 2022).

Tables 5 and 6 present the correlation matrix for cooperatives and banks, respectively. It is noted that there are correlations between the variables of interest, but most of them present a weak correlation. The data in Table 5 demonstrates the correlation of the variables that explain the cooperative model, demonstrating low co linearity. There is

only a strong correlation between loans and share capital, which is explained by the premise of the increase in capital in cooperatives: the more money allocated to the cooperative, the greater its share in terms of share capital.

The arguments above are supported by the theory of Schenk (2007) and WOCCU (2009), where they show that, compared to banks, where there is an increasingly greater proximity, cooperatives tend to have lower rates than banks, which is not only linked to the release of credit, but also to the reduction in the cost of remittance transfers.

Table 5 demonstrates, in general, a low linear correlation between the variables, although significant. That is, the variables demonstrate intrinsic relationships between them, but with low co linearity. If they had a high correlation, the estimates could generate biased results, as prescribed by (Imbens & Wooldridge, 2009).

Table 5

Correlation Matrix (Cooperatives – Panel A)

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
(1) EL	1.000											
(2) DER	-0.189*	1.000										
(3) RCA	0.295*	-0.062	1.000									
(4) EMP	0.132*	-0.008	0.838*	1.000								
(5) RES	-0.059*	-0.013	-0.024	-0.010	1.000							
(6) SIZE	-0.447*	0.198*	-0.574*	-0.351	0.052	1.000						
(7) ROA	0.335*	0.086*	0.477*	0.380*	-0.049	-0.461*	1.000					
(8) ROE	0.325*	-0.061	0.535*	-0.038*	-0.031	-0.552*	0.301*	1.000				
(9) LG	0.071*	0.697*	0.181*	0.046	-0.016	-0.012	0.399*	0.269*	0.962*	1.000		
(10) IMOB	-0.060	0.181*	-0.068	0.069	-0.040	0.091*	0.348*	-0.054	0.1473*	0.168*	1.000	
(11) PCT	-0.031	0.538*	-0.240*	-0.061	0.008	0.203*	-0.020	-0.292*	0.257*	0.370*	0.072	1.000

Source: Own elaboration.

Note: EL - Net loans / total assets (%); DER - Derivatives / total assets (%); RCA – share capital / total assets (%) ; EMP - Impaired loans plus gross loans / total assets (%) not divided by assets; RES - Loss reserves / non-performing loans; SIZE – Total assets (in Logarithm); ROA - Return on assets (%) (net income / total assets); ROE - Return on equity (%) (NE / total assets); LG - (Assets + long-term receivables) / total liabilities; IMOB - Permanent assets / NE (%); PCT - (Current liabilities + Long-term payables) / NE (%). Note: * p < 0.05.

Table 6

Correlation Matrix (Banks – Panel B)

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
(1) EL	1.000											
(2) DER	-0.010	1.000										
(3) RCA	-0.145*	0.122*	1.000									
(4) EMP	0.014	0.080*	0.306*	1.000								
(5) RES	-0.045	-0.014	0.031	-0.007	1.000							
(6) SIZE	0.009	-0.069*	-0.443*	-0.374*	-0.020	1.000						
(7) ROA	0.020	0.120*	0.080*	0.164*	-0.018	0.050*	1.000					
(8) ROE	-0.198*	0.128*	0.767*	0.454*	0.061*	-0.453*	0.035*	1.000				
(9) LG	0.085*	0.206*	0.546*	0.322*	0.080*	-0.421*	0.122*	0.587*	1.000	1.000		
(10) IMOB	-0.107*	-0.103*	-0.102*	0.007	0.045	0.164*	0.003*	-0.098*	-0.062*	-0.057*	1.000	
(11) PCT	0.070*	-0.048*	-0.369*	-0.172*	0.009	0.523*	-0.001	-0.418*	-0.167*	-0.156*	0.058*	1.000

Source: Own elaboration.

Note: EL - Net loans / total assets (%); DER - Derivatives / total assets (%); RCA – share capital / total assets (%) ; EMP - Impaired loans plus gross loans / total assets (%) not divided by assets; RES - Loss reserves / non-performing loans; SIZE – Total assets (in Logarithm); ROA - Return on assets (%) (net income / total assets); ROE - Return on equity (%) (NE / total assets); LG - (Assets + long-term receivables) / total liabilities; IMOB - Permanent assets / NE (%); PCT - (Current liabilities + Long-term payables) / NE (%). Note: * p < 0.05.

The results of the estimations of models (1) and (2) are presented in Table 7. The Pooled cross-section regression considers the stacked data sectioned by years (2010-2021) and the estimator is Ordinary Least Squares. Thus, it can be seen that, when treating cooperative institutions, there was a reduction in derivatives, on average, of 0.016 in net loans and a reduction of 0.018 in derivatives. The effects of the crisis were also negative for net loans, but were not related to derivatives. On average, the financial crisis reduced loans by 0.0321.

Considering an unbalanced panel, Table 7 also presents the result of the random effects estimators (chosen according to the Hausman test). It can be noted that the direction of the sign and the significance were the same as in the Pooled cross-section regression, but the magnitude was different for net loans. Taking into account the random effects estimator, the effect of being cooperative on EL was, on average, -0.0135 and the derivatives were -0.0198.

Table 7

Results of Regression

	Pooled cross-section		Data in panel	
Dependent variables	**(1) EL**	**(2) DER**	**(1) EL**	**(2) DER**
Dcoop	-0.0162**	-0.0189***	-0.0135*	-0.0198***

	(0.00688)	(0.00446)	(0.00693)	(0.00456)
Dcrise	-0.0321***	-0.00558	-0.0356***	0.00194
	(0.00913)	(0.00652)	(0.00637)	(0.00420)
DYcrise	-0.112***	-0.023*	-0.110***	-0.0250
	(0.092)	(0.003)	(0.084)	(0.0021)
RCA	0.222*	0.253***	0.241***	0.250***
	(0.123)	(0.0662)	(0.0744)	(0.0490)
EMP	256,567***	-77,170**	254,760***	-77,709**
	(78,567)	(36,595)	(52,851)	(34,797)
RES	-1.73e-07**	-2.23e-08	-2.70e-07*	-2.02e-08
	(7.90e-08)	(1.55e-08)	(1.58e-07)	(1.04e-07)
SIZE	-0.00486***	0.00523***	-0.00748***	0.00549***
	(0.00115)	(0.000890)	(0.00135)	(0.000886)
ROA	0.0613*	0.160***	0.0639***	0.159***
	(0.0317)	(0.0340)	(0.0171)	(0.0112)
ROE	-0.0378	-0.232***	-0.0502	-0.227***
	(0.147)	(0.0728)	(0.0711)	(0.0468)
LG	0.114***	0.163***	0.115***	0.163***
	(0.0250)	(0.0220)	(0.0200)	(0.0131)
IMOB	-0.145***	-0.149***	-0.0917*	-0.153***
	(0.0387)	(0.0247)	(0.0496)	(0.0327)
PCT	-0.00126***	0.000507	-0.00102**	0.000477*
	(0.000439)	(0.000330)	(0.000423)	(0.000278)
Constante	0.0469	-0.263***	0.214***	-0.107***
	(0.0406)	(0.0361)	(0.0280)	(0.0184)
Fixed effect for the year	SIM	SIM	SIM	SIM
Observations	1.469	1.469	1,469	1,469
R-square	0.335	0.336	0.747	0.697
IM-test Heterocedasticity	672.15 ***	1016.51 ***		
Ramsey RESET	20.31***	39.30***		
Shapiro-Wilk test for normal data			0.973***	0.912***

Source: Own Elaboration.

Note[a]: *** p<0.01, ** p<0.05, * p<0.1. Note[b]: unbalanced panel data; the Hausman test (Test: H0: non-systematic difference in coefficients = chi2 = -0.47; rejects H0) was performed to better choose between fixed and random effects regressions; the best estimator, according to the test, was the random effects one. Notec: the EL and DER variables were winsorized at 5%. Noted: EL - Net loans / total assets (%); DER - Derivatives / total assets (%); DYcrise - Interaction Dcoop and Dcrise; RCA - Capital ratio; EMP - Impaired loans / gross loans; RES - Reserves for losses / non-performing loans; SIZE - Total Assets (in Logarithm); ROA - Return on assets (%) (net income/total assets); ROE - Return on equity (%) (PL/total assets); LG - (Assets + long-term realizable)/total liabilities; IMOB - Permanent assets/PL (%); PCT - (Current liabilities + Long-term liabilities)/PL.

In the models for net loans, ROE was significant when the random effects pooled model strategy was used. On average, ROE impacts 0.232 on DER. In terms of model prediction quality, the net loan model has an explanatory power of 33.5% and the derivatives model of 33.6%. This means that this is the percentage of variation explained in the response variables when we use this set of independent variables.

A result that connects Tables 7 and 8 is DYcrise, which is the dummy for interaction in the relationship between cooperative and crisis. Gonçalves (2015) argued in his work that, even though the loan that the cooperative takes out is to reinvest in the business of its members, the cost in times of crisis does not compensate, this converges with the result of the interaction, in which the results were significant, but with negative coefficients, also contributing to the hypotheses tested, see Table 8.

Table 8
Hipothesis X Results

Hipothesis	Averages difference test		
	Coefficient expected signal	MQO estimator	Estimator Random effects
H1: Credit unions perform worse than banking institutions in terms of net loans over 2011 – 2021	Negative Hypothesis confirmed	Negative	Negative
H2: Credit unions perform worse than banking institutions in terms of net loans during a crisis period	Negative Hypothesis confirmed	Negative	Negative
H3: Credit unions perform worse than banking institutions in terms of derivatives over 2011 – 2021	Negative Hypothesis confirmed	Negative	Negative
H4: Credit unions perform worse than banking institutions in terms of derivatives during a crisis period	Negative Inconclusive for hypothesis confirmation	Positive	Positive

Source: Own elaboration.

In general terms, of the four hypotheses raised by this study, three of them were fully confirmed and only one was not validated through the results. The results demonstrated here are in line with the literature by Haiss and Sammer (2010);

Freitas et al. (2018), Chaib et al. (2021) and Toesca et al. (2020), as mentioned when demonstrating the research hypotheses, demonstrating linearity in terms of highlighting that credit unions are less risky, whether in periods of crisis or in pre- and post-crisis periods, in the sense of seeking capital in the market through liquid loans and derivatives in order to be able to operate on a day-to-day basis.

It is possible to verify that the pooled and random effects panel models had the same direction of results, indicating that there is no clear understanding of the need to separate the data by year, since the selected companies do not have a pattern of behavior over time that justifies this grouping.

5 DISCUSSION OF RESULTS

The results indicate a worse performance of cooperatives in relation to banks, since, in the coefficient model, there are negative signals for both loans and derivatives. On the other hand, the crisis had a negative impact on loans.

Being a cooperative had a negative result in relation to net loans, whether in periods of crisis or without crises. This is explained by the literature of Freitas et al. (2018) and Hesse and Cihák (2007), when they address that cooperatives are more restricted and, consequently, more stable than banks: the latter work less with market volatility, acting more with a market vision for their members.

The level of explanation of the model below 40% is a point to be highlighted, considering that many other variables, not considered in this work, can have a direct effect on loans and derivatives.

The fact that the pooled and random effects models maintained the signs of the relationships for most of the time, changing only the magnitude, indicates that, over time, the companies studied had quite fluctuating behaviors, since placing the data in a panel or stacked format did not show any real difference.

In the comparisons between the indicators of banks and cooperatives, many present significant differences. One of the indications for this difference in these indicators between cooperatives and banks pointed out that these institutions were operating with technical inefficiency, due to the corporate model and governance structure, according to Ferreira, Gonçalves and Braga (2007), in their study of credit cooperatives in Minas Gerais. Perhaps for this reason, loans were also significantly higher in cooperatives, as indicated by the hypothesis test.

Another finding that is in line with the results was the research by Bittencourt et al. (2017). Considering the performance indicators, for example, ROA, the research emphasizes that there is a difference in profitability between multiple banks and credit cooperatives. This difference reaches 1.42% 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 surpluses, since cooperatives have a different social function than banks and cooperatives will not always aim to maximize results.

Regarding the economic crisis of 2015-2016 and 2020, França et al. (2022) also agree with the results of this research when they find that the economic recession impacted the performance of credit unions. The research by Groeneveld and Vries (2009), when studying the 2008 crisis and its effects on European cooperatives, also emphasized that, although cooperatives are more stable than banks, they also suffered greatly from the effects of the crisis.

Referring to the literature presented in the article, Prado et al. (2014), regarding credit unions, states: because they have a more restrictive behavior, they are thinking about serving and preserving the capital of their members. The result corroborates the literature in this sense.

Also according to the results of this research, Trindade, Ferreira Filho and Bialoskorski Neto (2010) argue that both private banks and credit unions present similar behaviors in times of crisis (closing of branches and reduction of customers), even if the unions have different concepts than the banks. However, the intensity is also greater for the unions. The size of the companies (revenues) also has a negative effect on loans. The greater the revenue, the smaller the loan, and this may be linked to the fact that, naturally, the assets of banks are greater than those of the unions. That said, the need for loans ends up being smaller. Evaluating the assets, the current assets are greater in the unions and the permanent assets are greater in the banks, all of them with significant differences between the two groups.

Another explanation for the performance of cooperatives in terms of indicators being lower than that of banks, according to Bittencourt et al. (2018), is that cooperatives are inefficient due to the inadequate use of some production factors, such as total deposits and fundraising expenses. As a result, regardless of the economic crisis, cooperatives present, on average, a worse result than banks. During the crisis, this difference became even worse.

6 FINAL THOUGHTS

This research aimed to investigate the impacts on the performance of credit unions and banking institutions during the period from 2010 to 2021. To this end, a sample of 1,815 banks and 964 cooperatives was used (Bacen, 2021).

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

According to Bittencourt et al. (2017), Groeneveld and Vries (2009) and França et al. (2022), the economic recession, both national (2015-2016) and international (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 credit unions.

Thus, the results pointed to a negative impact, both on net loans and derivatives, when the financial institution is a cooperative, over the period from 2010 to 2021. The findings also emphasize a more intense effect on cooperatives than on banks during the crisis period of 2015/2016 and 2020, which, in this work, is considered as a crisis period, and tested through the interaction between crisis and cooperatives.

All these explanations are in agreement with the hypothesis tests, 04 hypotheses were tested H1, H2, H3 and H4, the answers found as already demonstrated in item 4 of this article show that 03 of the 04 hypotheses were confirmed and that they converse with the literature already cited in this work as well, when prudence is mentioned in times of crisis, that unlike commercial banks, credit cooperatives do not play with the market seeking capital and leverage regardless of the cost to do so.

In this sense, the research contributes to the theory by confirming previous research with the same focus, but with different models, demonstrating that regardless of the format or style of research when it comes to the relationship between commercial banks and credit unions, most research shows a certain conservatism focused more on credit unions.

Finally, this work contributed to the literature on credit unions, filling a gap in the literature on the subject, since, until now; there was no research in the Brazilian literature that compared the performance of cooperatives and banking institutions, using the proxy net loans and derivatives, both during the period of economic crisis and throughout the years 2010 to 2021.

However, conducting new studies on this topic is extremely relevant for the national literature, since the present study has limitations, such as considering the size and geographic location of these financial institutions, as well as the effects of leads and lags on the performance variables.

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