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# Performance of Brazilian credit unions: An analysis from PEARLS indicators

## Desempenho das cooperativas de crédito brasileiras: Uma análise a partir dos indicadores PEARLS

Alexsandra Silva[1], Joséte Florencio dos Santos[1], and Adhemar Ranciaro Neto[2]

[1] Federal University of Pernambuco, Recife, PE, Brazil
[2] Federal University of Alagoas, Maceió, AL, Brazil

### Authors' notes

Alexsandra Silva is now an intellectual complexity technician at the Monitoring Department of the Brazilian Ministry of Citizenship; Joséte Florencio dos Santos is now a full professor at the Department of Administrative Sciences of Federal University of Pernambuco; Adhemar Ranciaro Neto is now an adjunct professor at the Economics Department of Federal University of Alagoas.

Correspondence concerning this article should be addressed to Joséte Florencio dos Santos, Av. dos Funcionários, s/n, Departamento de Ciências Administrativas da Universidade Federal de Pernambuco, Cidade Universitária, Recife, Pernambuco, Brasil, ZIP code 50740-580. Email: jfs@ufpe.br

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## Abstract

Purpose: To explain the performance of Brazilian credit unions, focusing on the institutions with the best segmentation level in the National Financial System (NFS).

Originality/value: This study used a scenario not yet explored seeking to relate a homogeneous group of unions selected through the NFS segmentation framework and applying financial indexes standardized by the World Council of Credit Unions (Woccu), known as the PEARLS System, to fill, in a practical way, a gap regarding the perspective of identification of factors that impact the performance of Brazilian credit unions.

Design/methodology/approach: The statistical technique of multiple linear regression was used, operationalized by the ordinary least squares (OLS) method on a balanced panel in the period from 2009 to 2018, modeled with three performance proxies and explained by the Pearls key indexes, with a sample of 81 unions.

Findings: The main results showed that cooperatives have low rates of profitability and that it is necessary to increase investments in productive assets. Regarding performance, the net loan portfolio (E1) is directly and positively associated with profitability (ROA and ROE) and to the adjusted net equity growth (CPLA). However, default (A1) reflects a tendency to consume the net institutional capital (E9) and compromises the growth of these institutions. Moreover, the credit portfolio is indeed the most valuable asset and one of the most responsible factors for the performance of Brazilian credit unions.


*Keywords*: credit unions, performance, PEARLS, Woccu, Bacen



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## Resumo

Objetivo: Explicar o desempenho das cooperativas de crédito brasileiras, tendo como enfoque as instituições enquadradas em melhor nível de segmentação no Sistema Financeiro Nacional (SFN).

Originalidade/valor: Por se tratar de instituições que precisam conciliar aspectos regulatórios às premissas associativas, este estudo utilizou um cenário ainda não explorado, em que busca relacionar um grupo homogêneo de cooperativas selecionadas mediante enquadramento da segmentação do SFN e aplicar índices financeiros padronizados pelo Conselho Mundial das Cooperativas de Crédito (Woccu), conhecidos como Sistema PEARLS, para, de forma prática, preencher uma lacuna diante da perspectiva de identificação de fatores que impactam o desempenho das cooperativas de crédito brasileiras.

*Design*/metodologia/abordagem: Utilizou-se a técnica estatística de regressão linear múltipla, operacionalizada pelo método de mínimos quadrados ordinários (MQO), em painel balanceado, no período de 2009 a 2018, modelado com três *proxies* de desempenho e explicada por índices-chave do PEARLS, tendo como amostra 81 cooperativas classificadas em melhor nível de segmentação no SFN.

Resultados: Os principais resultados demonstraram que as cooperativas são rentáveis, mas é preciso ampliar investimentos em ativos produtivos. A carteira líquida de empréstimos (E1) está direta e positivamente associada à rentabilidade (ROA e ROE) e ao crescimento do patrimônio líquido ajustado (CPLA). Porém, a inadimplência (A1) reflete tendência de consumir o capital institucional líquido (E9) e compromete o crescimento dessas instituições. Ademais, a carteira de crédito corrobora que é o ativo mais valioso e um dos principais responsáveis pelo desempenho das cooperativas de crédito brasileiras.


*Palavras-chave*: cooperativas de crédito, desempenho, PEARLS, Woccu, Bacen



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## INTRODUCTION

The credit or financial union system plays a relevant role as a booster of the economy by making services and products more accessible than the traditional banking market, even in times of economic instability (Cordeiro et al., 2018).

With the purpose of protecting society and the financial system from adverse consequences, the regulatory agencies discipline and control the financial agents, and this study highlights the regulation established by the Central Bank of Brazil (Banco Central do Brasil – Bacen), Resolution no. 4,553, of January 30, 2017, which, in compliance with the deliberations of the National Monetary Council (Conselho Monetário Nacional – CMN), adapted all Brazilian financial institutions to the Basel international standards, classifying them into segments for proportional application of prudential regulation.

This regulation, in brief, links size parameters and participation in the gross domestic product (GDP) to equate the levels of risk management and capital that each institution must hold. In this way, all financial institutions are now framed into five segments (S1, S2, S3, S4, and S5), with credit unions and other financial institutions included in segments S4 and S5.

The fact is that credit unions, being associations of people who aim to maximize the socioeconomic development of their members with no profit motives, differ from other financial institutions, since banks usually seek to maximize profits to shareholders (Bittencourt et al., 2018). However, the inclusion of credit unions in segment S4, for example, has placed these institutions on normative parity with financial institutions whose objective is profit maximization, such as Banco Estadual do Pará, Banco Estadual do Espírito Santo, Banco ABN AMRO S. A., Crefisa S. A., XP Investimentos, among others.

Although credit unions have similar products and services to banks, such as checking accounts, loans, collection services, among others, for Cunha et al. (2016), the biggest difference refers to the corporate type, since unions are civil partnerships while banks are capital companies. In this sense, they differ in relation to the allocation of profits, which are called surpluses by the credit unions, being distributed directly to their members (Barroso & Bialoskorski Neto, 2010), and may be reinvested in the union, or even favor the members with lower costs of fees and services (Ferreira et al., 2007), whereas in banks the profits go to shareholders as dividends (Bittencourt et al., 2018; Oliveira et al., 2014; Teixeira et al., 2020).



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Thus, the problem is that the inclusion of credit unions at the same regulatory level as these institutions can make their economic and financial performance unviable since unions have a social function and characteristics that differ from other institutions. Considering that, the following question arises:

- What factors impact the performance of Brazilian credit unions?

Having said that, the objective of this study is to explain the performance of Brazilian credit unions focusing on the best segmentation level of the National Financial System (NFS) – level S4 – as a way to signal factors that impact the performance and can make these companies more sustainable and competitive regarding the NFS competition.

The rationale behind this is the accessibility to credit that unions provide to different social classes, as well as the possible financial fragility that may compromise the capillarity of credit and the solidity of the NFS. In addition, studying the unions that have been classified at the best segmentation level (level S4), because they are more robust institutions (with total assets over 50 millions of reais, established for over ten years, and with a greater plurality of products), may signal performance predictors or even predict possible vulnerabilities and strengthen the system as a whole.

Moreover, considering the particularities and operational complexities of these institutions, which need to reconcile the regulatory requirements with the doctrinal principles (Bressan et al., 2010), this study sought to use financial indexes referred in the literature and standardized by the World Council of Credit Unions (Woccu), known as the PEARLS System, as these are specific indicators used worldwide for monitoring and managing the financial health of credit unions (Kidney, 2016; Richardson, 2009).

The PEARLS System has been used in national and international studies to analyze the financial health of credit unions, highlighting its applicability to analyze insolvency and risk-related aspects (Bressan et al., 2011a, 2011b; Huscher et al., 2020; Teixeira et al., 2020). Other studies have sought to monitor financial indexes (Cunha et al., 2016; Forker & Ward, 2012; Esomar & Titioka, 2021; Tirfe, 2014; Villalba et al., 2019). However, besides the very incipiency of the theme, there is a lack of studies that use specific and standardized indicators to predict the performance of credit unions.

Hence, this study differs from others as it observes the particularities of credit unions and seeks the homogeneity of the sample in the normative classification, in addition to addressing specific indicators for these institutions with key indexes of the PEARLS System. Moreover, it will be opera-



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tionalized by the ordinary least squares (OLS) method on a balanced panel in the period from 2009 to 2018, with three performance proxies to enable the identification of predictors of the performance of Brazilian credit unions.

Thus, following this introduction, this article was organized by presenting the theoretical framework, the methodological procedures, and the results of the main evidence found in the research, followed by the final considerations, limitations, and suggestions for further studies.

## THEORETICAL FRAMEWORK

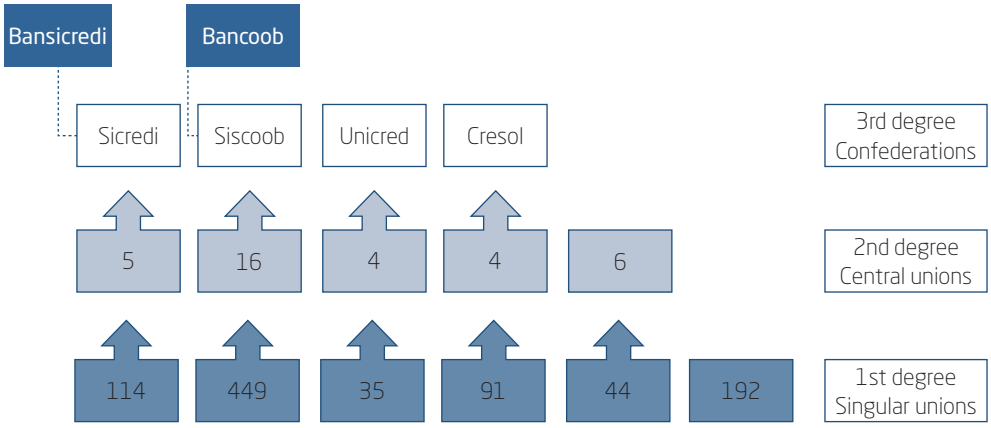
### Brazilian financial cooperativism

The financial cooperative system is structured by singular unions, central unions, and cooperative confederations/systems in which the singular unions provide services directly to the members, the central unions are organized on a larger scale to provide reciprocal services of an economic and welfare nature to the singular unions, and the union confederations/systems provide services to the members when exceeding their operational capacity (Pinheiro, 2008).

Until 2018, the structure of the Brazilian financial cooperativism was distributed according to Figure 1.

**Figure 1**

***Structure of the Brazilian financial cooperativism***




*Source:* Adapted from Bacen (2018).



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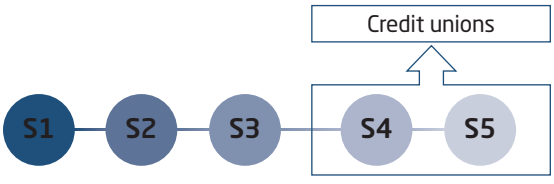
In this structure, the singular unions are in the first degree of performance, composed, at the time, of 925 institutions, 192 of which were independent institutions, that is, unions that chose to act independently and without affiliation to any system. In the second degree, there were 34 central unions, five of which with no connection to the next level. In the third degree, there were four confederations/union systems, composed of Cresol, Unicred, Sicoob, and Sicredi, the two former ones being authorized by Bacen to provide financial services, and the two latter ones not providing financial services, which are provided by the respective union banks, Bansicredi and Bancoob.

Over the last few years, several mechanisms have contributed to the evolution of credit unions from a legal and regulatory aspect (Ferreira et al., 2007; Soares & Melo Sobrinho, 2008), highlighting Complementary Law no. 130, of January 3, 2009, which governs the National Cooperative Credit System, effectively inserting these institutions in the NFS, reiterating the CMN's legal competencies and the Bacen's supervision, as well as providing greater legal security and specific regulation for the sector.

It is worth pointing out that Resolution no. 4,553/2017, instituted by the Bacen (2017), is in line with the CMN's provisions, which disciplined the proportionality of prudential regulation (minimum capital requirement, risk management requirement) in order to establish a more balanced and efficient financial system. In this way, the NFS segmentation aimed at adjusting the Brazilian rule to the international standards of the Basel Committee on Banking Supervision (BCBS), increasing the efficiency of financial intermediation and reducing the costs of compliance with regulatory requirements (Bacen, 2017).

By this norm, according to GDP-related parameters, the financial institutions were classified into five segments, namely: S1, S2, S3, S4, and S5. Within this structure, the credit unions were framed into segments S4 and S5, with the former including the unions with a bolder risk profile and the latter, institutions with a more simplified risk profile, as shown in Figure 2.

**Figure 2**
***Segmentation of the National Financial System***




*Source:* Adapted from Bacen (2017).



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Although the purpose of the NFS segmentation is to increase the efficiency of financial intermediation and reduce regulatory compliance costs, it was identified that in 2018, the first year of the effective application of this norm, out of the 925 financial unions active at the time, as shown in Figure 1, only 82 unions were included in segmentation S4, indicating that few unions had the profile to access this level of segmentation, since the majority of the unions, 843 in number, were classified as S5 for being less risky operations.

Notwithstanding the fact that there are fewer unions at segmentation level S4, they present characteristics that strengthen the participation of this segment in the NFS, since they have been active for more than ten years, centralized in the most developed regions of the country, having individually total assets of above 50 millions of reais, and classified in the "full" and "classic" categories, as well as being of the free admission type, which represents greater diversification of financial operations and plurality of members.

However, as both profit and non-profit institutions were included in segment S4, credit unions compete, in terms of risks, regulation, and supervision by Bacen, with banking institutions that are consolidated in the financial market, such as Banco Estadual do Pará, Banco Estadual de Sergipe, Banco Estadual do Espírito Santo, Banco ABN, AMRO S. A., Crefisa S. A., XP Investimentos, among others.

In this sense, the economic and financial performance of credit unions can be affected, since they have a different social function and characteristics from the other institutions included in level S4, not usually having the same organizational structure or qualified technical staff. In turn, the implementation of the NFS segmentation may establish the homogeneity of a group, which, aligned with specific indicators, may explain the performance of Brazilian credit unions.

## PEARLS System

Currently, credit unions face the challenge of creating management mechanisms that are compatible with their administrative complexity, meet regulatory requirements and are still aligned with their doctrinal principles (Bressan et al., 2010).

In this sense, Woccu, the maximum association for global financial cooperatives, which until 2018 was present in 117 countries and had a network of 89,026 institutions, mobilizing more than US$ 1.7 trillion in savings, developed a set of financial indicators known worldwide. as the PEARLS System (Muriuki & Country, 2019).



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The PEARLS System emerged in the late 1980s from the adaptation of the CAMEL system, developed by banking regulatory authorities in the United States to protect the solvency of financial institutions, and, because it was not suitable for unions, the PEARLS System was then developed (Bressan et al., 2010; Kidney, 2016; Richardson, 2009). This system has been refined and adjusted over the past decades to provide quantitative information on key risk areas, measuring and monitoring the financial health of credit unions worldwide (Kidney, 2016).

Therefore, PEARLS is a management and monitoring system of the financial situation of credit unions, used worldwide in the prevention of shortcomings and vulnerabilities, also serving as a supervision tool for regulatory agencies, besides allowing the comparison and classification of similar institutions in the country or abroad (Bressan et al., 2010; Kidney, 2016; Richardson, 2009). According to Bressan et al. (2010), Kidney (2016), and Richardson (2009), PEARLS is an acronym, in which each letter stands for a specific theme, arranged under the following dimensions: protection, effective financial structure, assets quality, rates of return and costs, liquidity, and signs of growth.

In Brazil, the PEARLS System has become more empirically visible with the study by Bressan et al. (2010), in which the PEARLS indicators were adapted to the Chart of Accounts for Financial Institutions of the National Financial System (*Plano Contábil das Instituições Financeiras do Sistema Financeiro Nacional* – Cosif), making it possible to identify the nomenclature for the application of PEARLS indexes in the Brazilian accounting structure.

The International Development Foundation Limited (Ilcu Foundation), an Irish entity whose mission is to support financial credit unions in developing countries, has recently used Woccu technique and made the most updated version for PEARLS indicators available, identifying key indexes for developing countries' contexts, based on the manual written by Kidney (2016).

Although the PEARLS System is a globally used tool, according to a study by Oliveira and Bressan (2015), Brazilian singular credit unions are unaware of this system and use their own indicators to meet the Bacen requirements. However, the authors mention that the PEARLS System presents approximately 90% of similarity with the indicators used by this regulatory agency that monitors Brazilian credit unions.

## PEARLS System correlated studies

Several national and international studies have used the PEARLS System to examine the financial health and performance of credit unions, pointing



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out key weaknesses and highlighting conditions that contribute to the sustainability of the business.

After adapting the PEARLS System indexes to the Brazilian accounting nomenclature developed by Bressan et al. (2010, 2011a) consequently sought to identify the probability of insolvency in 112 credit unions from Minas Gerais affiliated with Sicoob, in the period between January 1995 and May 2008. A selection of 13 PEARLS indicators was carried out, and only 15 credit unions were identified as insolvent, corresponding to approximately 13% of the sample.

Forker and Ward (2012) used PEARLS indicators to analyze the financial monitoring of credit unions in Northern Ireland from 1996 to 2008. They found that institutions complied with the mandatory minimum level of capital reserves and that there was a positive association between self-regulation and financial ratios that measure the prudence and quality of the loan portfolio. The authors added that there is oscillation in the return on assets and low levels of growth.

Tirfe (2014), in turn, examined the financial performance of savings and rural credit union societies in Tigray, Ethiopia, by using the standards established by the PEARLS System. The results indicated that the unions have good levels of default protection but do not make financial investments and have capital that is idle or invested in less productive assets, presenting a low return rate and, consequently, a weakness in the financial structure of the studied institutions.

Cunha et al. (2016) studied 34 free admission Brazilian cooperatives in the state of Paraná in 2015 to create a standard index table using the PEARLS System. They identified that the institutions studied had a very stable scenario, which, in some cases, was considered satisfactory, as the indices presented positive variations, although they showed that, in periods of recession, the administrative structure can cause changes in the indicators.

From this perspective, Villalba et al. (2019) sought to compare the standard indexes of the PEARLS System in credit unions of free admission and rural credit in Paraná in the period from 2013 to 2015. The results indicated that rural credit unions presented a high level of protection against credit risks and that most of them finance their investments with their own resources, presenting an acceptable level of immobilization, despite the low levels of liquidity.

Expanding the use of the PEARLS indexes, Teixeira et al. (2020) investigated whether the accounting indicators proposed by the PEARLS System bear a relationship with the risk of Brazilian credit unions. To do so, the



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authors used 496 singular credit unions as a sample in the period from 2010 to 2018. They identified that the accounting beta, used as a measure of risk, presents a mean of 2.41, suggesting that the singular credit unions have a high level of risk and that the independent variables analyzed (PEARLS) were relevant for Brazilian credit unions, with the default provisions, the volume of deposits, and operating expenses positively influencing the increased risk of those entities.

In turn, Huscher et al. (2020), with the objective of presenting a rating model for evaluating Brazilian credit unions, used 212 credit unions as a sample in 2014 and 2015, based on the Pearls model of economic and financial analysis of credit unions and the risk rating of the Guarantee Fund (*Fundo Garantidor do Cooperativismo de Crédito* – FGCoop). As a result, the authors presented a statistically significant model with five variables from the six pillars of the PEARLS model that was able to produce an accuracy of 80.1% in the training sample and 81.7% in the test sample.

Finally, Esomar and Titioka (2021) used the PEARLS method with the purpose of analyzing the level of financial health of the Hati Amboina Credit Union Saumlaki in Indonesia from 2017 to 2019. The results indicated that the union showed good financial performance, highlighting risk protection, operational cost efficiency to remunerate members, and cash availability to meet the members' needs as strengths. However, the defaulting credit index, the institutional capital, and the ability to manage non-productive assets were pointed out as institution's weaknesses.

The presented studies signal the various applicabilities of the PEARLS System, diagnosing weaknesses and potentialities of credit unions, and reinforcing the importance of this research.

## METHODOLOGICAL PROCEDURES

This paper is characterized as empirical research, with a quantitative approach. As to the means, it is documental and bibliographic; and as to the ends, it is descriptive and exploratory (Vergara, 2013).

### Population and sample

The population was formed by all the singular credit unions active in the period from 2009 to 2018, consisting, in 2018, of 925 institutions and the sample consisting of all 82 unions that integrated the best segmentation



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level in the NFS, i.e., level S4. However, to maintain uniformity and balance the data, it was necessary to exclude one institution for not having accounting and financial information for the period under study, with the final sample consisting of 81 credit unions.

The data were collected on the Bacen website, using the Cosif, consolidated on the base date of December of each year and adapted according to Bressan et al. (2010).

## Definition of variables

The composition of variables consisted of indicators referred in the literature and used in research with credit unions. Therefore, to measure performance, three proxies were used as dependent variables, applied alternately to verify the robustness of the model, as described below:

- Adjusted net equity growth (CPLA): operationalized by the variation of the adjusted net equity in relation to the previous year.
- Return on assets (ROA): operationalized by the surplus in relation to the total assets of the financial unions.
- Return on equity (ROE): operationalized by the surplus in relation to the net equity of the financial unions.

These dependent variables were selected as per the following studies: Cordeiro et al. (2018), which analyzed the performance of credit unions in a recession period; Maia et al. (2019), which studied the factors influencing the profitability of credit unions; and Vieira (2016), which used them to assess whether revenue diversification would be associated with the performance of Brazilian credit unions.

The explanatory variables, in turn, refer to the indicators developed and standardized by Woccu, the PEARLS System, which will be used from the key indexes presented in the update conducted by the ILCU Foundation, written by Kidney (2016), considered relevant to the contexts of developing countries.

In addition, the following items have been used alternately in several studies, for example, Bressan et al. (2011a, 2011b), Esomar and Titioka (2021), Forker e Ward (2012), Huscher et al. (2020), Teixeira et al. (2020), Tirfe (2014), and Villalba et al. (2019), represented by:

- P1: protection – operationalized by the ratio of the loan loss provision to total loans. The instruction is that the better the portfolio, the lower the loss protection.



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- E1: effective financial structure – operationalized by net credits (gross credit – provision for credit operations) in relation to total assets, whose recommendation is that this ratio be from 70% to 80%.
- E9: effective financial structure – operationalized by the net institutional capital in relation to total assets, with a recommendation of over 10%.
- A1: asset quality – operationalized by loans in arrears in relation to total loans, with the recommendation being not to exceed 5% default.
- L1: liquidity – operationalized by the ratio of net investments to the total sight deposits, with a minimum recommendation of 15% immediate resources.

For operationalization, the variables were identified in the Cosif according to the adaptation by Bressan et al. (2010) and analyzed longitudinally on the December base date of each year over the period from 2009 to 2018. The estimation of the results was conducted with three regressions alternately, one for each dependent variable (CLPA, ROA, ROE), to verify how sensitive the PEARLS System predictor variables (P1, E1, E9, A1, L1) are in explaining credit union performance. Table 1 presents the variables used in this study.

**Table 1**

***Overview of variables***

| Variable | Measure | Expected sign | Cosif accounts |
|---|---|---|---|
| CPLA (adjusted net equity growth) | $CPLA_i = \frac{PLA_i}{PLA_{i-1}}$ | (+) | [Net equity (6000000-2); income statement creditor accounts (7000000-9); income statement debtor accounts (8000000-6)]. |
| ROA (return on assets) | $ROA = \frac{S}{AT}$ | (+) | [Accumulated surplus or loss (61700.00-2)]; [current and long-term assets (1000000-7); permanent (2000000-4)]. |
| ROE (return on equity) | $ROE = \frac{S}{PL}$ | (+) | [Accumulated surplus or loss (6170000-2)]; [net equity (6000000-2)]. |
| P1 (protection) | $P1 = \frac{PE}{TE}$ | (-) | [Provision for credit operations (1690000-8)]; [classification of the credit portfolio (3100000-0)]. |
| E1 (effective financial structure) | $E1 = \frac{EL}{AT}$ | (+) | [Credit operations (1600000-1); provision for credit operations (1690000-8)]; [current and long-term assets (1000000-7); permanent (2000000-4)]. |

*(continue)*



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**Table 1** (conclusion)

*Overview of variables*

| Variable | Measure | Expected sign | Cosif accounts |
|---|---|---|---|
| E9 (effective financial structure) | $E9 = \frac{CIL}{AT}$ | (+) | [Institutional capital (closing balance); legal reserve (6.1.5.10.00-3); statutory reserves (6.1.5.20.00-0); contingency reserves (6.1.5.30.00-7); FATES (4.9.3.20.00-2); accumulated surplus or loss (61700.00-2)]; [current and long-term assets (1000000-7); permanent (2000000-4)]. |
| A1 (asset quality) | $A1 = \frac{EA}{TE}$ | (-) | [C-level risk operations (31400002); D-level risk operations (31500005); E-level risk operations (31600008); F-level risk operations (31700001); G-level risk operations (31800004); H-level risk operations (31900007)]; [credit portfolio classification (31000000)]. |
| L1 (liquidity) | $L1 = \frac{IL}{DT}$ | (+) | [Availabilities (1100000-6)]; [sight deposits (4110000-0)]. |

*Source:* Elaborated by the authors.

PLA: adjusted net equity in period *i*; S: surplus or loss; AT: total asset; PL: net equity; PE: loan loss; TE: total loans; EL: net loans; CIL: net institutional capital; FATES: Technical, Educational and Social Assistance Fund; EA: loans in arrears; IL: net investments; and DT: total sight deposits.

## Data analysis technique

To conduct the empirical tests, the statistical technique of multiple linear regression using the OLS method on a balanced panel was used. This technique allows for a greater number of observations, produces asymptotic properties of the estimators and generates better efficiency in the estimation, a greater degree of freedom, and results in more information (Wooldridge, 2012).

The regression model with panel data, also known as combined data, aggregates a combination of time series and cross-sectional observations over several periods of time, allowing for several observational units $i$ ($i = 1. \ldots n$) to be measured over several periods of time $t$ ($t = 1. \ldots t$). Thus, the use of panel data enables the observation of the diversity of behaviors of financial credit unions at different times (Wooldridge, 2012).



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For data analysis, this study involved three regressions, one for each performance measure defined as a dependent variable (CPLA, ROA, and ROE). The tests were conducted using two approaches: fixed effects and random effects, defined according to the Hausman test, in which the former combines all observations so that each union has its own intercept without varying over time, i.e., $\beta_0$ is constant, invariant in space and time, while in the latter approach the intercept varies from one union to another, but not over time (Gujarati & Porter, 2011).

Still according to Gujarati and Porter (2011), both approaches make it possible to control the effects of omitted variables, which vary among individuals but are constant over time. The main difference is the treatment of the intercept, which, when estimated in fixed effect, presents a single parameter for each studied union, whereas the random effect considers the variation of each union in time and does not correlate with the other variables, treating the intercepts as random variables.

The data were tabulated and analyzed using Microsoft Office Excel 2010 and Stata 13 software. The mathematical models used were expressed according to the following equations:

$$CPLA_{it} = \beta_0 + \beta_1 P1_{it} + \beta_2 E1_{it} + \beta_3 E9_{it} + \beta_4 A1_{it} + \beta_5 L1_{it} + \mu_{it} \quad (1)$$

$$ROA_{it} = \beta_0 + \beta_1 P1_{it} + \beta_2 E1_{it} + \beta_3 E9_{it} + \beta_4 A1_{it} + \beta_5 L1_{it} + \mu_{it} \quad (2)$$

$$ROE_{it} = \beta_0 + \beta_1 P1_{it} + \beta_2 E1_{it} + \beta_3 E9_{it} + \beta_4 A1_{it} + \beta_5 L1_{it} + \mu_{it} \quad (3)$$

in which performance will be measured by the proxies CPLA, ROA, and ROE, used alternately in statistical procedures; the PEARLS indicators (P1, E1, E9, A1, L1) are the independent variables; $\mu_{it}$ is the error term, and *i*, *t* represents union *i* in year *t*.

## ANALYSES AND RESULTS

### Descriptive statistics

The first step in the results consists of evaluating the descriptive statistics for each metric and exploring the behavior of the sample, as shown in Table 2.



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**Table 2**

***Descriptive statistics of variables***

| Variable | Mean | Median | Minimum | Maximum | Standard deviation |
|---|---|---|---|---|---|
| CPLA | 0.2604 | 0.2190 | -1.0000 | 5.2563 | 0.2776 |
| ROA | 0.0139 | 0.0145 | -0.1083 | 0.0452 | 0.0116 |
| ROE | 0.0736 | 0.0856 | -0.9920 | 0.2213 | 0.0752 |
| P1 | 0.0584 | 0.0542 | 0.0000 | 0.3131 | 0.0277 |
| E1 | 0.5079 | 0.5161 | 0.0000 | 0.7939 | 0.1070 |
| E9 | 0.0792 | 0.0708 | -0.1064 | 0.3863 | 0.0498 |
| A1 | 0.2956 | 0.2745 | 0.0000 | 0.9015 | 0.1585 |
| L1 | 0.0860 | 0.0747 | 0.0000 | 0.4224 | 0.0529 |

*Source:* Elaborated by the authors.

This result may be attributed to the managers' option to adopt a policy of promoting surplus above the operating costs since the standard deviation is not so distant from the means. This strategy can increase the trust of cooperative members and the competitiveness of the sector (Barroso & Bialoskorski, 2010; Bittencourt et al., 2018).

The result of the performance proxies (CPLA, ROA, and ROE) corroborates Vieira's study (2016), which presented 11.63% for CPLA, 1.42% for ROA, and 6.48% for ROE, and Cordeiro et al.'s (2018) with 23.3% for CPLA, 1% for ROA, and 5.6% for ROE. Woccu evaluation for these indicators is the higher, the better.

In sequence, the PEARLS indexes (P1, E1, E9, A1, and L1), for representing a strategic tool capable of signaling eventual weaknesses, will be analyzed according to Woccu standardization, since there is a specific target for each indicator, according to the following considerations.

The protection index (P1), which represents risk protection, indicates that, in each credit operation carried out, the sample presents a mean of 5.58% provisions for doubtful receivables. Woccu reference for this indicator is the lower, the better since it presents the members a safe environment to deposit their money.

The net loan index (E1), which represents the proportion of net loan operations in relation to the total assets of the credit union, presented a mean of 50.79%, indicating that the resources are invested in idle or fixed assets. Woccu recommends keeping this index between 70% and 80% of



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the total assets invested in productive assets since non-productive or unprofitable assets are those which do not generate income (Kidney, 2016; Richardson, 2009).

The institutional capital indicator (E9), which measures the percentage of total assets financed by the institutional capital, was 7.92%, indicating that it is insufficient to cover eventual contingencies, since Woccu recommendation is that this index be above 10%. This result indicates that the sample may be using its own capital to cover potential losses (Richardson, 2009; Kidney, 2016).

As for the index that refers to default (A1), the sample presented a mean of 29.56%, and Woccu recommendation is that this index should not exceed 5%. This result signals fragility and income loss by default, with the assets being considered problematic since the percentage identified in the credit operations of the sample is overdue by more than 60 days, as specified in the Resolution no. 2,682, of December 22, 1999 by Bacen (1999).

Index L1, which lists only short-term accounts, presented a mean of 8.60%, indicating that the sample does not have enough resources to meet timely requests or withdrawals from members. Woccu reference is to maintain 15% of immediate availability.

Finally, the studied credit unions are observed to be out of harmony with the worldwide references set by Woccu, needing to expand the participation of investment in productive assets and devise a strategy to mitigate defaults.

## Analysis and discussions of regressions

In order to verify the factors that impact the performance of credit unions, measured by the CPLA, ROA, and ROE dependent variables, the regression model for panel data was estimated by combining cross-sectional (81 credit unions) and temporal (ten years) data as from the Pearls indicators (P1, E1, E9, A1, and L1). This study was operationalized with three distinct regressions, one for each dependent variable (CPLA, ROA, ROE), to check the robustness of the model and observe how sensitive the predictor variables of the PEARLS System (P1, E1, E9, A1, L1) are, allowing for an explanation of the performance of Brazilian credit unions.

Since the sample is large, with 810 observations, the model is considered to be both asymptotic and normally distributed, with eventual heteroscedasticity problems, which were directly corrected in the econometric program, considering the robust standard errors for the OLS estimators with the White correction method (Wooldridge, 2012).



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The autocorrelation Durbin-Watson test = 1,753 ($p$ value = 0.0215) showed that there is no evidence of autocorrelation of the residuals, and the variance inflation factor (VIF) showed an absence of multicollinearity since in all models the VIFs were lower than ten (Wooldridge, 2012).

Moreover, the panel was defined according to the model that best presented the estimators, whether a fixed effect model or a random effect model, defined as from the results of the Hausman test, which, if significant, indicates that the fixed effect model is preferable to the random effect model.

On the panel that highlights the relationship between performance (CPLA) and the Pearls indicators, the Hausman test presented 0.106 $p$ value, allowing the null hypothesis to be accepted and indicating the use of the random effects model.

It is worth mentioning that, although the panel for this variable (CPLA) has presented $R^2$ = 6.02%, it does not invalidate the real relationship between the significant predictors and the response variable, since the model not only does not present autocorrelation of the residuals nor multicollinearity among the variables, but it also presented a good estimate of the effect that the error exerts on the overall adjustment of the model, with a confidence level of 99%, with (0.0001) $p$ value of test F, corroborating that the explanatory power of a regression model is not restricted only to $R^2$.

The low value for this statistic has also been observed in other studies on credit unions. For example, Teixeira et al. (2020), when analyzing the risk estimates for Brazilian credit unions, found a value of $R^2$ = 8.1%. Westrup et al. (2018), when studying the decision-making power of members who were borrowers or savers of resources on the performance of credit unions, demonstrated that $R^2$ = 7.46%. Yamori et al. (2017), when analyzing governance in cooperative banks in Japan, found $R^2$ = 6.45%.

Moreover, the specificities of credit unions may be reflected in the CPLA variable because it is a performance proxy related to the surplus of the financial years, increase in capital stock, reserves, and shares, as described by Vieira (2016), since the referred author presented in her study adjusted $R^2$ = 3.54%, 3.53%, and 3.54% in models No. 11, 12, and 13, respectively. In the study by Maia et al. (2019), which sought to present the relationship of the factors influencing the profitability of Brazilian credit unions, the panel with this variable identified $R^2$ = 0%, indicating that the variables used did not influence the variations in the CPLA.

However, the present study allows to conclude that the five variables tested in the PEARLS System (P1, E1, E9, A1, L1) explain, moderately, 6.02% of the variance in performance (CPLA), in which E1 and E9 are the indicators



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that make up the effective financial structure, and A1 is the asset quality index, with statistical significance of 1%, according to Table 3.

**Table 3**

***Impact of PEARLS indicators on performance (CPLA)***

| Random effect | | |
|---|---|---|
| Variables | CPLA | |
| | Coefficient | *p* value |
| P1 | -0.1328803 | 0.834 |
| **E1** | **0.52684*** ** | **0.000** |
| **E9** | **-0.71981*** ** | **0.019** |
| **A1** | **0.17848*** ** | **0.012** |
| L1 | -0.1672102 | 0.382 |
| Constant | 0.0192449 | 0.832 |
| Number of observations | | 810 |
| $R^2$ | | 0.0692 |
| F/Wald | | 38.72 |
| Prob. F | | 0.00 |
| Rho | | 0.0409 |
| Hausman | | 0.106 |

*Source:* Elaborated by the authors.

* Significant at 10%; ** significant at 5%; *** significant at 1%.

Index (E1), which refers to net loans, shows a positive relationship in which each asset unit disposed in the net loan portfolio provides a 52.68% increase in the performance unit (CPLA), which means that the volume of resources made available by these institutions generates an impact and makes the equity growth of the credit unions possible. Therefore, the greater the net credit volume, the greater the performance (Bressan et al., 2010; Kidney, 2016; Richardson, 2009).

In turn, with index (E9), which represents the net institutional capital, the result indicated a negative relationship, showing that each unit financed with institutional capital produces a reduction of -71.98% in the performance (CPLA). This result means that the institutional capital may have been used to cover possible contingencies because, as this index (E9) is



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associated with the equity capital of the credit unions, potential losses may have contributed to negatively impacting the performance (Kidney, 2016; Richardson, 2009). This circumstance has a relevant impact and compromises the expansion of the studied unions, which, according to the study by Bressan et al. (2011a), may indicate the probability of insolvency to occur.

Index A1, represented by the default rate, shows the portion of the overdue loan portfolio in relation to the total credit portfolio of the credit unions. The result evidenced a positive relationship with a significance level of 1%, indicating that the increase in defaults produced an impact of 17.84% on performance.

As the CPLA index represents the growth of adjusted net equity, the suggested explanation for this effect would be the payment of new capital shares due to the loans acquired by the associates, since, in cooperative societies, the capital subscription aims to generate services to associates, and leftovers are distributed proportionally to the operations and services performed by associates (Portal do Cooperativismo Financeiro, 2016).

This finding suggests that the studied credit unions use capital contributions and reserves to finance defaults and maintain financial services to members, thus implying a compromise in equity growth. Moreover, since the default is the most important measure of institutional weakness (Kidney, 2016; Richardson, 2009), the higher the default, the higher the probability of insolvency (Bressan et al., 2011a, 2011b).

The ROA and ROE indexes will be presented in conjunction on the panel below, since the sample presented similar behavior for these indicators. The results pointed out that the performance was impacted by the same variables and maintained the same sign relations. In addition, the models were presented on the panel with fixed effects for both, because the Hausman tests allowed rejecting the null hypothesis, indicating a *p* value of 0.000 for ROA and 0.001 for ROE, as shown in Table 4.

**Table 4**

***Impact of PEARLS indicators on performance (ROA and ROE)***

| Variables | Fixed effect | | | |
|---|---|---|---|---|
| | ROA | | ROE | |
| | Coefficient | *p* value | Coefficient | *p* value |
| P1 | -0.08501*** | 0.003 | -0.82655*** | 0.000 |
| E1 | 0.02411*** | 0.010 | 0.13750** | 0.087 |

*(continue)*



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**Table 4** (conclusion)

***Impact of PEARLS indicators on performance (ROA and ROE)***

| Variables | Fixed effect | | | |
|---|---|---|---|---|
| | ROA | | ROE | |
| | Coefficient | *p* value | Coefficient | *p* value |
| E9 | 0.21710*** | 0.000 | 1.11247*** | 0.004 |
| A1 | 0.00125 | 0.726 | 0.02718 | 0.206 |
| L1 | 0.00351 | 0.665 | 0.04783 | 0.411 |
| Constant | -0.01128 | 0.118 | -0.04826 | 0.455 |
| N | | 810 | | 810 |
| $R^2$ | | 0.4132 | | 0.1839 |
| F/Wald | | 8.12 | | 4.54 |
| Prob. F | | 0.000 | | 0.0011 |
| Rho | | 0.5594 | | 0.5548 |
| Hausman | | 0.000 | | 0.001 |

*Source:* Elaborated by the authors.

* Significant at 10%; ** significant at 5%; *** significant at 1%.

The protection index (P1), which represents risk protection, showed, as expected, a negative relationship with ROA and ROE performances. This means that an increase in the provision for loss produces an effect that reduces performance by -8.5% in relation to ROA, and -82.66% in relation to ROE, both with a significance of 1%, and the lower the allowance for clients with doubtful accounts (*provisão para crédito de liquidação duvidosa* – PCLD), the higher the performance, being more impactful in relation to ROE due to the direct effect of the surplus/loss account on equity.

The indicators of the effective financial structure (E1 and E9) show a positive relationship as recommended by Woccu. According to Bressan et al. (2011a, 2011b), the positive relationship for these indicators signals a lower probability of insolvency and, consequently, a better financial situation for credit unions.

The result of the net loan index (E1), after discounting the risk provision, indicates that each asset unit disposed in the net loan portfolio provides a 2.4% and 13.7% increase for ROA and ROE, respectively. However, as the loan portfolio is the most valuable asset for these institutions, the



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sample is observed to be incurring an opportunity cost, since great part of the assets is contained in non-productive investments (Table 2), mainly in fixed assets, not generating income for the unions, which is why this index is below Woccu recommendation.

The institutional capital index (E9) impacted the performance by 1.71% and 111.25% when measured by ROA and ROE, respectively, with a significance of 1%. The performance in relation to ROE is noteworthy, which can be attributed, among other aspects, to the incorporation process that these institutions have been going through in the last few years, or yet to the increase in the surplus (profit) or capital inputs by union members, as suggested in the result of this index in relation to the CPLA index.

The result of the typification of the indicators validated in this study is presented below in Table 5.

**Table 5**

***Overview of the impact on credit unions' performance***

| Variables | CPLA | ROA | ROE |
|---|---|---|---|
| P1 | N/A | -0.08501*** | -0.,82655*** |
| E1 | 0.52684*** | 0.02411*** | 0.13750** |
| E9 | -0.71981*** | 0.21710*** | 1.,11247*** |
| A1 | 0.17848*** | N/A | N/A |
| L1 | N/A | N/A | N/A |

*Source:* Elaborated by the authors.

* Significant at 10%; ** significant at 5%, *** significant at 1%.

N/A: there is no statistical significance.

The general perception of the performance analysis (CPLA, ROA, and ROE) of the studied credit unions is that they adopt good management tools, generating safe results with the recognition of risk provisions (P1) and financial structure (E1 and E9), producing positive impacts on profitability (ROA and ROE). Conversely, eventual losses and defaults (A1) are absorbed by the net institutional capital (E9), compromising the adjusted net equity growth (CPLA). Finally, the liquidity index (L1), responsible for measuring the immediate payment capacity, did not show statistical significance in any of the regressions, indicating that the availability of resources does not impact the performance of credit unions.



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## FINAL REMARKS

The present study aimed to explain the performance of Brazilian credit unions. To this end, 81 unions were studied, selected according to the level of segmentation of the NFS. The operationalization occurred using the OLS technique, on a balanced panel, for the period between 2009 and 2018, modeled with three performance proxies. Moreover, by considering the operational particularities and complexities of these institutions, this study used financial indexes of the PEARLS System, since they are Woccu standardized indicators, which are specific for credit unions.

The analysis of the PEARLS indicators showed that, on average, the sample demonstrated operational capacity to cover its expenses and generate returns, although modest, to the members. However, only 50.79% of the total assets are invested in productive assets capable of generating income, presenting the problem of default as the main weakness, with an average of 29.56%. Furthermore, the Brazilian credit unions were observed to have the means of the Pearls indexes below the targets recommended by Woccu.

Regarding the factors that explain the performance of credit unions, the results showed that, when measured by profitability indicators (ROA and ROE), these indexes were explained by the same variables, with the highest performance being associated with the lowest risk level of the credit portfolio (P1) and the highest composition of the net loan portfolio and institutional capital (E1 and E9), with statistical significance of 1%. This means that the sample makes provisions to mitigate business risks and that the financial structure reflects the influence of the credit and capital portfolio, generating security and returns to the members. Therefore, the lower the provisions for credit risk and the higher the composition of net loan and institutional capital, the greater the performance (ROA and ROE).

From the perspective of performance, as measured by the CPLA index, which represents the adjusted net equity growth, the net loan portfolio (E1) ratified its importance, corroborating that it is the most important asset for credit unions. Weakness in asset quality (A1), however, consumes the net institutional capital (E9), both at a 1% significance level. This means that fragility with default compromises the growth of the studied credit unions. This result suggests that the higher the composition of the net loan portfolio, the higher the asset quality, while the lower the net institutional capital, the greater the performance (CPLA).

These results point out to managerial implications to be followed/observed by managers and members as they present the main strengths and



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weaknesses of the studied credit unions. In this context, without intending to relate cause and effect, the main results indicated that, although these institutions have presented surpluses above the operating costs, they present misappropriation of fixed assets that do not generate income and that, to enhance performance, it would be important to increase the participation of the loan portfolio since it presented the same positive sign and level of statistical significance, ranging from 1% to 5%, in all estimates. Furthermore, the need to set acceptable limits for credit risk exposure and implement actions to control defaults is worth mentioning.

Thus, we hope to reduce the gap in the studies and contribute in a practical way for managers and/or members to make credit unions more efficient, improving the quality of credit operations and, consequently, the perenniality of these institutions, as well as helping the makers of public policies to be connected to the theme.

As an additional contribution, this study addressed the segmentation of the NFS, according to the Bacen (2017) Resolution no. 4,553/2017, which adapted all financial institutions to Basel international standards, demonstrating that the credit unions that ranked best in this regulation have attributes that foster returns to members in the net credit portfolio and net institutional capital.

As a limitation, this study addressed only financial aspects, in which management features were not explicitly addressed, but it is believed that the theme still needs to be explored. To this end, it is suggested to replicate the methodology and analyze the sample by category, or yet, make a comparison with the banks that were classified at the same S4 segmentation level.

## REFERENCES

Banco Central do Brasil (1999). Resolução nº 2.682, de 21 de dezembro de 1999. Dispõe sobre critérios de classificação das operações de crédito e regras para constituição de provisão para créditos de liquidação duvidosa. https://www.bcb.gov.br/pre/normativos/res/1999/pdf/res_2682_v2_L.pdf

Banco Central do Brasil (2017). Resolução nº 4.553, de 30 de janeiro de 2017. Estabelece a segmentação do conjunto das instituições financeiras e demais instituições autorizadas a funcionar pelo Banco Central do Brasil para fins de aplicação proporcional da regulação prudencial. https://www.bcb.gov.br/pre/normativos/busca/downloadNormativo.asp?arquivo=/Lists/Normativos/Attachments/50335/Res_4553_v1_O.pdf



ISSN 1678-6971 (electronic version) • RAM, São Paulo, *24*(1), eRAMR230057, 2023
https://doi.org/10.1590/1678-6971/eRAMR230057.en

Banco Central do Brasil (2018). Panorama do sistema nacional de crédito cooperativo na data-base de 31 de dezembro de 2018. https://www.bcb.gov.br/content/estabilidadefinanceira/coopcredpanorama/panorama_de_cooperativas2018.pdf

Barroso, M. F. G., & Bialoskorski Neto, S. (2010). Distribuição de resultados em cooperativas de crédito rural no estado de São Paulo. *Organizações Rurais & Agroindustriais*, *12*(2), 290–307. https://www.researchgate.net/publication/227367141_Distribuicao_de_resultados_em_cooperativas_de_credito_rural_no_Estado_de_Sao_Paulo

Bittencourt, W. R., Bressan, V. G. F., Goulart, C. P., Bressan, A. A., Costa, D. R. de M., & Lamounier, W. M. (2018) Rentabilidade em bancos múltiplos e cooperativas de crédito brasileiras. *Revista de Administração Contemporânea*, *21*(2), 22–40. https://doi.org/10.1590/1982-7849rac2017150349

Bressan, V. G. F., Braga, M. J., Bressan, A. A., & Resende Filho, M. A. (2010). Uma proposta de indicadores contábeis aplicados às cooperativas de crédito brasileiras. *Revista de Contabilidade & Controladoria*, *2*(3), 58–80. http://dx.doi.org/10.5380/rcc.v2i3.19625

Bressan, V. G. F., Braga, M. J., Bressan, A. A., & Resende Filho, M. A. (2011a). Uma aplicação do sistema PEARLS às cooperativas de crédito brasileiras. *Revista de Administração*, *46*(3), 258–274. https://www.revistas.usp.br/rausp/article/view/44540/48160

Bressan, V. G. F., Braga, M. J., Bressan, A. A., & Resende Filho, M. A. (2011b). Avaliação de Insolvência em Cooperativas de Crédito: Uma aplicação do sistema PEARLS. *Revista de Administração Mackenzie*, *12*(2), 113–144. https://doi.org/10.1590/S1678-69712011000200006

Cordeiro, F., Bressan, V. G. F., Lamounier, W. M., & Barros, L. A. B. C. (2018, julho). Desempenho financeiro das cooperativas de crédito brasileiras e a recessão econômica de 2015 no Brasil. *Anais do XVIII USP International Conference in Accounting*. Universidade de São Paulo. https://congressousp.fipecafi.org/anais/Anais2018/ArtigosDownload/1023.pdf

Cunha, P. V. S., Oliveira, W. C., & Gozer. I. C. (2016). Análise de desempenho das cooperativas de crédito do estado do Paraná: Aplicação do sistema PEARLS. *Revista de Ciências Empresariais da Unipar*, *17*(1), 131–153. https://revistas.unipar.br/index.php/empresarial/article/view/5710

Esomar, M. J. F., & Titioka, B. M. (2021). Pearls analysis to assess the health level of Haiti Amboina service office (KP) Saumlaki Cooperative Credit Union (CU). *The Accounting Journal of Binaniaga*, *6*(1), 19–26. https://doi.org/10.33062/ajb.v6i1.415

Ferreira, M. A. M., Gonçalves, R. M. L., & Braga, M. J. (2007). Investigação do desempenho das cooperativas de crédito de Minas Gerais por meio da Análise Envoltória de Dados (DEA). *Economia Aplicada, 11*(3), 425–445. https://doi.org/10.1590/S1413-80502007000300006

Forker, J., & Ward, A. M. (2012). Prudenceand financial self-regulation in credit unionsin Northern Ireland. *The British Accounting Review, 44*(4), 221–234. http://dx.doi.org/10.1016/j.bar.2012.09.001

Gujarati, D. N., & Porter, D. C. (2011). *Econometria básica* (5a ed.). (Pilar Carril Villarreal, Trad.). AMGH.

Huscher, P. F., Moreira, V. R., & Silva, R. A. (2020). *Rating* para avaliação de cooperativas de crédito: Uma aplicação do modelo PEARLS. *Revista de Gestão, Finanças e Contabilidade, 10*(2), 22–38. https://doi.org/10.18028/rgfc.v10i2.9534

Kidney, I. (2016). *PEARLS manual*. http://ilcufoundation.ie/wp-content/uploads/2017/02/PEARLS-Manual.pdf

Lei Complementar nº 130, de 17 de abril de 2009 (2009). Dispõe sobre o Sistema Nacional de Crédito Cooperativo e revoga dispositivos das Leis nºs 4.595, de 31 de dezembro de 1964, e 5.764, de 16 de dezembro de 1971. http://www.planalto.gov.br/ccivil_03/leis/lcp/Lcp130.htm

Maia, L. L., Colares, A. C. V., Cruz, N. G., & Bressan, V. G. F. (2019, junho). Fatores influenciadores da rentabilidade das cooperativas de crédito brasileiras. *Anais do 18º Encontro da Associação Nacional de Programas de Pós-Graduação em Ciências Contábeis*. http://anpcont.org.br/pdf/2019_CUE206.pdf

Muriuki, P., & Country, K (2019). Promoting financial inclusion: How credit unions are bringing financial inclusion to marginalised communities. https://www.un.org/development/desa/cooperatives/wp-content/uploads/sites/25/2019/03/Promoting-Financial-Inclusion.pdf

Oliveira, P. H. M., & Bressan, V. G. F. (2015). Cooperativas de crédito brasileiras adotam monitoramento internacional de desempenho? *Journal of Financial Innovation, 1*(2), 91–105. https://www.researchgate.net/publication/281669371

Oliveira, P. H. M., Bressan, V. G. F., Bressan, A. A. (2014). Existe diferença no desempenho financeiro das cooperativas centrais de crédito no Brasil? *Revista Evidenciação Contábil & Finanças, 2*(2), 40–54. https://periodicos.ufpb.br/ojs2/index.php/recfin/article/view/18131/11313

Pinheiro, M. A. H. (2008). Cooperativas de crédito: História da evolução normativa no Brasil (6a ed.). Banco Central do Brasil. http://www.concursosbancarios.com.br/Dataweb/ Editor/Livro-CoopDe%20Cr%C3%A9dito%20-%20Bacen.Pdf



ISSN 1678-6971 (electronic version) • RAM, São Paulo, *24*(1), eRAMR230057, 2023
https://doi.org/10.1590/1678-6971/eRAMR230057.en

Portal do Cooperativismo Financeiro (2016). Legislação e gestão – distribuição das sobras em uma cooperativa de crédito. https://cooperativismodecredito.coop.br/legislacao-e-gestao/distribuicao-das-sobras-em-uma-cooperativa-de-credito/

Richardson, D. C. (2009). PEARLS monitoring system. World Council of Credit Unions. https://www.woccu.org/documents/pearls_monograph

Soares, M. M., & Melo Sobrinho, A. D. (2008). *Microfinanças: O papel do Banco Central do Brasil e a importância do cooperativismo de crédito* (2a ed.). Banco Central do Brasil. https://www.bcb.gov.br/htms/public/microcredito/livro_microfinan%C3%A7as_internet.pdf

Teixeira, I. C., Maia, V. M., & Teixeira, R. F. A. P. (2020). Um estudo de risco das cooperativas de crédito brasileiras com base no beta contábil. *Revista Catarinense da Ciência Contábil, 19*, 1–20. https://doi.org/10.16930/2237-766220203025

Tirfe, A. G. (2014). Financial performance of rural saving and credit cooperatives in Tigray, Ethiopia. *Research Journal of Finance and Accounting, 5*(17), 63–74. https://www.iiste.org/Journals/index.php/RJFA/article/view/15827

Vergara, S. C. (2013). *Projetos e relatórios de pesquisa em administração* (14a ed.). Atlas.

Vieira, L. K. (2016). *Diversificação de receitas e o desempenho financeiro das cooperativas de crédito brasileiras*. [Dissertação de mestrado]. Universidade Federal de Minas Gerais. http://hdl.handle.net/1843/BUOS-BADJMR

Villalba, V. A., Garibaldi, A. L., Tapia, D. V., Cunha, P. V. S., & Gozer, I. C. (2019). Análise comparativa dos índices-padrão do Sistema PEARLS de cooperativas de crédito de livre admissão e crédito rural do estado do Paraná de 2013 a 2015. *Revista de Gestão e Organizações Cooperativas, 6*(11), 1–26. https://periodicos.ufsm.br/rgc/article/view/28790/pdf

Westrup, M. N., Camilo, S. P. O., & Estevam, D. O. (2018). Dominância de membros tomadores ou poupadores de recursos nas cooperativas de crédito e o desempenho: Análise sob a ótica da teoria de agência. *Navus: Revista de Gestão e Tecnologia, 8*(2), 27–42. http://dx.doi.org/10.22279/navus.2018.v8n2.p27-42.602

Wooldridge, J. M. (2012). *Introductory econometrics: A modern approach* (5th ed.). Cengage Learning.

World Council of Credit Unions (2017). Woccu International Operating Principles. https://www.woccu.org/documents/2017_WOCCU_International_Operating_Principles

Yamori, N., Harimaya, K., & Tomimura, K. (2017). Corporate governance structure of cooperative banks. *International Journal of Finance & Economics*, 22(4), 368–378. https://doi.org/10.1002/ijfe.1593





ISSN 1678-6971 (electronic version) • RAM, São Paulo, *24*(1), eRAMR230057, 2023
https://doi.org/10.1590/1678-6971/eRAMR230057.en