

STATUTORY BODIES IN BRAZILIAN CREDIT COOPERATIVES
PERFORMANCE: WHICH ASPECTS ARE DECISIVE?

ÓRGÃOS ESTATUTÁRIOS NA ATUAÇÃO DAS COOPERATIVAS DE
CRÉDITO BRASILEIRAS: QUAIS ASPECTOS SÃO DECISIVOS?

ÓRGANOS ESTATUTARIOS EN EL DESEMPEÑO DE LAS
COOPERATIVAS DE AHORRO Y CRÉDITO BRASILEÑAS: ¿QUÉ
ASPECTOS SON DECISIVOS?

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ABSTRACT

Objective: Credit cooperatives face competition not only from traditional banking institutions but also from emerging players like fintech's. As a result, it becomes imperative for credit cooperatives to actively monitor their performance to stay competitive in the market. Given the economic significance of these entities, the study aims to explore the impact of the characteristics of statutory bodies on the economic performance of Brazilian credit cooperatives.

Methodology: Using panel data on 973 cooperatives over 2005-2022, we employed panel tests and the generalized method of moments (GMM) to address endogeneity, assessing how board size, gender diversity, and tenure of the board of directors, executive management, and supervisory board relate to performance. It was not possible to strongly support that those variables influence performance. Nevertheless, our models underscore the importance of accounting for both the dynamic relationship between variables and time-invariant unobservable heterogeneity in the analysis.

Results: The findings highlight the importance of tailored board composition and developing female leadership pipelines to balance member representation and financial oversight as cooperatives evolve. Monitoring board structure is key for these entities to remain competitive while upholding their social mission.

Contributions: This study is pioneering in investigated the influence of statutory bodies in performance of Brazilian credit cooperatives, given the difficulty in obtaining the dataset, which is not publicly available.

Keywords: Credit cooperatives, Cooperate Governance, Board of directors, Gender diversity, Financial performance.

RESUMO

Objetivo: As cooperativas de crédito enfrentam concorrência não apenas de instituições bancárias tradicionais, mas também de novos participantes como fintechs. Como resultado, torna-se imperativo que as cooperativas de crédito monitorem ativamente seu desempenho para se manterem competitivas no mercado. Dada a importância econômica dessas entidades, o estudo busca explorar o impacto das características dos órgãos estatutários sobre o desempenho econômico das cooperativas de crédito brasileiras.



Metodologia: Utilizando dados em painel de 973 cooperativas entre 2005-2022, empregamos testes em painel e o método dos momentos generalizados (GMM) para tratar da endogeneidade, avaliando como o tamanho do conselho, a diversidade de gênero e o mandato do conselho de administração, da diretoria executiva e do conselho fiscal se relacionam com o desempenho. Não foi possível comprovar fortemente que essas variáveis influenciam o desempenho. No entanto, nossos modelos ressaltam a importância de considerar tanto a relação dinâmica entre as variáveis quanto a heterogeneidade não observável invariável no tempo na análise.

Resultados: Os resultados destacam a importância de uma composição de conselho personalizada e do desenvolvimento de lideranças femininas para equilibrar a representação dos membros e a supervisão financeira à medida que as cooperativas evoluem. Monitorar a estrutura do conselho é fundamental para que essas entidades permaneçam competitivas enquanto mantêm sua missão social.

Contribuições: Este estudo é pioneiro na investigação da influência dos órgãos estatutários no desempenho das cooperativas de crédito brasileiras, dada a dificuldade em obter o conjunto de dados, que não está publicamente disponível.

Palavras-chave: Cooperativas de crédito, Governança cooperativa, Conselho de administração, Diversidade de gênero, Desempenho financeiro.

RESUMÉN

Objetivo: Las cooperativas de crédito enfrentan competencia no solo de instituciones bancarias tradicionales, sino también de nuevos participantes como las fintechs. Como resultado, se vuelve imperativo que las cooperativas de crédito supervisen activamente su desempeño para mantenerse competitivas en el mercado. Dada la importancia económica de estas entidades, el estudio busca explorar el impacto de las características de los órganos estatutarios en el desempeño económico de las cooperativas de crédito brasileñas. **Metodología:** Utilizando datos en panel de 973 cooperativas durante 2005-2022, empleamos pruebas en panel y el método generalizado de momentos (GMM) para abordar la endogeneidad, evaluando cómo el tamaño del consejo, la diversidad de género y la duración del mandato del consejo de administración, de la dirección ejecutiva y del consejo de supervisión se relacionan con el desempeño. No fue posible apoyar firmemente que esas variables influyan en el desempeño. Sin embargo, nuestros modelos subrayan la importancia de tener en cuenta tanto la relación dinámica entre variables como la heterogeneidad no observable invariable en el tiempo en el análisis.

Resultados: Los hallazgos destacan la importancia de una composición de consejo adaptada y del desarrollo de líderes femeninas para equilibrar la representación de los miembros y la supervisión financiera a medida que las cooperativas evolucionan. Monitorear la estructura del consejo es clave para que estas entidades permanezcan competitivas mientras mantienen su misión social.

Contribuciones: Este estudio es pionero en investigar la influencia de los órganos estatutarios en el desempeño de las cooperativas de crédito brasileñas, dada la dificultad para obtener el conjunto de datos, que no está disponible públicamente.

Palabras clave: Cooperativas de crédito, Gobernanza cooperativa, Consejo de administración, Diversidad de género, Desempeño financiero.

1 INTRODUCTION

In this paper, we investigated how the size, female representation, and tenure of the board of directors, executive management, and supervisory board are related to the performance of Brazilian credit cooperatives. In credit cooperatives context, some studies have used the term "cooperate governance" (Jamaluddin *et al.*, 2023; Kusmiati *et al.*, 2023) to refer to a structure of governance in cooperatives.

Recently, there has been a considerable amount of research conducted on the topic of cooperate governance (Franken & Cook, 2019; Ghosh & Ansari, 2018; Grashuis, 2020; Hakelius, 2018; Hemrit, 2020; Mathuva *et al.*, 2017; Sallaberry *et al.*, 2024; Santos, 2019; Singh *et al.*, 2019; Teixeira *et*

al., 2021; Unda *et al.*, 2019; Yamori *et al.*, 2017). However, none of these studies have made efforts to analyze the statutory bodies of Brazilian financial cooperatives collectively.

Over the past five years, the credit cooperative sector has experienced an impressive 188% growth in assets, which sharply contrasts with the 62% expansion observed in other segments of the National Financial System during the same period (Banco Central do Brasil [BCB], 2022). This data underscores the significant role played by credit cooperatives in the Brazilian financial landscape, as emphasized by the central bank. This robust performance underscores the significant role credit cooperatives play in the Brazilian financial landscape.

Previous studies in financial cooperatives have predominantly emphasized board composition rather than encompassing all statutory bodies. There is limited research specifically examining the impact of statutory body composition and diligence on the performance of Brazilian credit cooperatives. Bittencourt *et al.* (2017) highlight the necessity of assessing, in the Brazilian context, how the characteristics of the Board of Directors of credit cooperatives relate to performance. Additionally, the governance challenges faced by financial cooperatives receive much less attention, posing potential risks that might go unnoticed (Fonteyne, 2007). In this context, the analysis of the performance of credit cooperatives becomes relevant, as their boards have been less explored. Furthermore, there are incentives for the sector's expansion, given that it represents a distinct model of organizational development compared to other financial institutions.

Cooperatives play a crucial role in local communities, serving as key financial hubs that offer secure deposit services and crucial credit access to households and small- to medium-sized businesses (McKillop *et al.*, 2020). With a focus on maximizing benefits for members and ensuring long-term viability, good corporate governance enables effective oversight of cooperative activities, leading to improved financial, social, and environmental performance (Jamaluddin *et al.*, 2023). Therefore, analyzing the characteristics of statutory bodies is essential for monitoring this performance.

The scarcity of literature on cooperative governance in numerous emerging economies, such as Brazil, underscores a notable gap. In response, this study seeks to examine how the traits of statutory bodies affect the financial performance of credit cooperatives. Given the economic significance of these institutions, the research poses the inquiry: What is the impact of statutory body characteristics on the financial performance of Brazilian credit cooperatives? Consequently, the study endeavors to assess how statutory bodies influence the performance of credit cooperatives, drawing upon a broad array of literature encompassing both corporations and cooperatives.

Cooperatives have played a crucial role in expanding access to credit in areas where traditional banking services are lacking, thus promoting financial inclusion and economic growth (Kuznyetsova *et al.*, 2022). Moreover, credit cooperatives were initially established to attract external investments into underserved communities, emphasizing their role in providing financial assistance to resource-deprived regions (McKillop *et al.*, 2020). Recognizing the significance of these entities, government officials, managers, and scholars have demonstrated keen interest in assessing their economic performance and their broader impact on the communities they serve.

2 LITERATURE REVIEW

2.1 BACKGROUND ON CREDIT COOPERATIVES AND STATUTORY BODIES

Credit cooperative refers to an association formed by individuals or legal entities with the purpose of offering financial services to its members (Coelho *et al.*, 2019). Traditionally, credit cooperatives enforced occupational and territorial prerequisites for prospective members; however, since 2003, in Brazil, these requirements have been lifted, allowing for the so-called free admission of members (Zancan *et al.*, 2023). This policy shift has contributed to a subsequent rise in the number of credit cooperatives members (Canassa *et al.*, 2022).

Scholars have engaged in a prolonged discourse regarding the definition of cooperative success. Concerning this aspect, two primary perspectives have emerged. The first contends that cooperative success is contingent on its sustained viability over the long term, while the second posits that success hinges on the economic development of members; in essence, cooperatives can thrive for the benefit of their members (Kusmiati *et al.*, 2023). Conversely, Puusa *et al.* (2016) observed that cooperatives endeavor to confer advantages upon members while simultaneously generating substantial profits to ensure the long-term sustainability of the cooperative.

Credit cooperatives in Brazil are classified into three different levels: standalone or single financial cooperative, federations of cooperatives, and confederations. Single financial cooperatives are modest in size, operate with straightforward business models, and exclusively serve their members (Santos, 2019). On the other hand, federations and confederations of cooperatives consolidate the resources of single financial cooperatives, forming autonomous entities that include consolidated groups of internal support (Coelho *et al.*, 2019). These centrally coordinated networks can bear similarities to the operations of major banking groups, engaging in business with non-members and offering a diverse range of services.

Cooperative credit institutions in Brazil represent unique financial entities characterized by member ownership and governance. These institutions, acting as both members and customers through deposits and borrowing activities, are structured to involve their members in key decision-making processes. Notably, members may assume roles in statutory bodies, leading to the possibility of conflicts of interest. The governing structure, including the board of directors, supervisory board, and executive management, is shaped by the cooperative's bylaws. This flexibility allows for adaptation in governance structures, although within the framework of regulations established by the Central Bank of Brazil. These regulations are in place to ensure the election of qualified individuals and the adherence to transparent governance practices, thereby fostering a robust and accountable cooperative credit system.

2.2 COOPERATE GOVERNANCE AND COOPERATIVE PERFORMANCE

Since the early 1900s, economists have shown significant interest in governance practices, a topic that has gained even more prominence following fraud scandals in the United States and the recent financial crisis triggered by Covid-19. These events have underscored uncertainties regarding the responsibilities of supervisors, business models, and risk assessment, particularly concerning the characteristics and functioning profiles of entity boards (Di Biase & Onorato, 2021). In today's business



environment, there is widespread recognition among researchers and practitioners of the pivotal role effective corporate governance policies play in an organization's success (Zaid *et al.*, 2020).

As the credit cooperatives do not prioritize maximizing profit as their primary goal. Although profitability is crucial for credit cooperatives since retained earnings serve as the primary source of capital and growth, their focus differs from that of publicly traded companies, where profit maximization is the primary objective. Furthermore, members who choose to leave a credit cooperative typically receive only the nominal value of their investment, foregoing potential market valuation gains. This may suggest lower incentives for credit cooperatives to engage in higher-risk activities and potentially result in more stable returns throughout economic and financial cycles (Coelho *et al.*, 2019). Additionally, some members/customers might not be aware that they are also owners of the credit cooperative, viewing it simply as a financial institution from which they are customers and have borrowed.

New research endeavors have concentrated on utilizing economic and financial metrics as benchmarks for assessing the prosperity and sustainability of cooperatives (Cheng *et al.*, 2022; Grashuis, 2020; Singh *et al.*, 2019; Unda *et al.*, 2019). On the flip side, Macagnan and Seibert (2021) assert that measures of cooperative success encompass economic, social, environmental, and cultural indicators. Teixeira *et al.* (2021) endorsed the idea of the effectiveness of governance of the cooperative model when contrasted with traditional models.

In addition to gauging cooperative success, it is equally important to comprehend the variables influencing this success, akin to exploring the existing body of cooperative scientific literature. Jamaluddin *et al.* (2023) reviewed 30 selected papers, indicating four categories of cooperative governance used in relation to cooperative performance: board characteristics, policy compliance, management, leadership and strategies, and the board's social or human capital. The results suggested mixed and inconclusive findings on the performance relationship.

Other investigations have identified factors that impact cooperative performance. These factors include social capital (Yu & Nilsson, 2018), executive management (Cook & Burrell, 2013), the cooperative board (Ghosh and Ansari, 2018), economic policy uncertainty (Singh *et al.*, 2019), active member participation (Cheng *et al.*, 2022), among others.

Yu and Nilsson (2018) explore the link between social capital and the success of cooperative finance in China, finding that the financial success of Chinese farmer cooperatives is tied to various social capital characteristics within the cooperative. Cook and Burrell (2013) investigate the relationship between internal governance and cooperative performance, considering variables like executive management size, tenure, and age. Ghosh and Ansari (2018) examine the correlation between financial performance and the management of Indian urban cooperative banks, suggesting that the size of the management team has minimal influence on cooperative performance. Hakelius (2018) indicates that certain traits of the board contribute positively to the performance of cooperatives. Consequently, it is anticipated that the attributes of statutory bodies within credit cooperatives will impact their economic performance, directly shaping cooperative governance.

2.3 COOPERATIVE PERFORMANCE: STATUTORY BODIES



Esteban-Salvador *et al.* (2019) examined Spanish cooperatives and found that those with a higher proportion of women on the board tend to carry less debt. However, they did not find significant correlations with variables related to economic performance. In a separate study, Hernández-Nicolás *et al.* (2019) investigated gender diversity on the boards of Spanish agricultural cooperatives. Their findings indicate that companies with greater female representation on their boards experience higher returns and operational risk, along with lower levels of debt.

From a perspective of social performance, Périlleux and Szafarz (2015) propose that boards predominantly comprised of women in financial cooperatives in Senegal prioritize social considerations in loan approvals. Subsequently, in another study, Périlleux and Szafarz (2022) suggest that female directors serve as role models for their subordinates (the "trickle-down effect"), with their influence being "bottom-up," meaning that female employees exhibit higher motivation when working under female leadership in financial cooperatives in Senegal. Thus, with a greater proportion of female representation in the workforce, it is expected that the performance of female board members will improve. Building on this research, the hypotheses one, two and three were formulated regarding gender:

H1: Increasing female representation on the board of directors is positively correlated with the performance of credit cooperatives.

Ghosh and Ansari (2018), however, conclude that an increased presence of women on boards, especially in larger proportions within the board of directors, could potentially have an adverse effect on the financial performance of Indian banking cooperatives. Conversely, Mathuva *et al.* (2017) expanded their study to examine the presence of women on both boards of directors and supervisory committees in credit cooperatives in Kenya. They observed a slight uptick in gender diversity during the studied period (2008-2013), yet the overall proportion of women remains relatively low, indicating significant room for improvement in female representation on these boards and committees. Building on this, hypotheses two and three were formulated regarding the supervisory board and executive management:

H2: Increasing female representation on the supervisory board is positively associated with the performance of credit cooperatives.

H3: Increasing female representation in executive management is positively associated with the performance of credit cooperatives.

Empirical studies in the realm of corporate enterprises (Assenga *et al.*, 2018; Brahma *et al.*, 2021; Livnat *et al.*, 2021) examining the association between board size and its effectiveness yield mixed results. For Ghosh and Ansari (2018), the findings indicate that, after controlling for various factors, board size does not affect performance on cooperative banks in India. The findings indicate that adjusting board sizes should be done with consideration of regional and economic factors, as suggested by the results. Franken and Cook (2019) found that board size has a significantly negative effect on the performance of the United States Agricultural Cooperatives. Given the significance of this variable in academia, the hypothesis for credit cooperatives is formulated as follows:

H4: A larger number of board of directors members is positively associated with the performance of credit cooperatives.

Grashuis (2020) conducted a study focusing on both the board and executive management sizes, uncovering positive connections between board size, management size, and agency costs in

farmer cooperatives in the United States. Meanwhile, Yamori *et al.* (2017) asserted that having a substantial number of board members adversely affects efficiency metrics for both stock and cooperative banks. Hemrit (2020) found that board size negatively impacts the financial performance of cooperative insurance industries in Saudi Arabia. Conversely, Hakelius (2018) observed that Swedish farmer cooperatives with higher performance typically had larger boards than their lower-performing counterparts. Although the results are conflicting and extend beyond just the board of directors, most literature suggests that larger boards are associated with lower performance. Therefore, the hypothesis for supervisory board and executive management is formulated as follows:

H5: A larger number of supervisory board members is positively associated with the performance of credit cooperatives.

H6: A larger number of executive management members is positively associated with the performance of credit cooperatives.

In the corporate context, Livnat *et al.* (2021) uncovered that performance sees an uptick with the average length of tenure until around 6-8 years, following which it stabilizes or slightly declines. While extended tenure may compromise the monitoring function, a board member with a lengthy service might bring enhanced experience, dedication, and insight into the values and operations of the credit cooperative (Unda *et al.*, 2019). As a result, the following hypotheses are formulated:

H7: The tenure of board of directors members is positively associated with the performance of credit cooperatives.

In Cook and Burress's study (2013), cooperatives led by CEOs with less than a decade of tenure were 1.52 times more likely to actively engage in strategy development. Hakelius (2018) scrutinized the influence of long-serving directors on the boards of Swedish farmer cooperatives, suggesting a potential connection with poorer overall performance and yielding inconclusive findings. This prompts the formulation of two additional hypotheses for the supervisory board and executive management:

H8: The tenure of supervisory board members is positively associated with the performance of credit cooperatives.

H9: The tenure of executive management members is positively associated with the performance of credit cooperatives.

Findings from Franken and Cook's study (2019) on U.S. Agricultural Cooperatives indicate that smaller boards often exhibit superior overall performance, with CEO tenure typically increasing with performance. However, contrary to what the corporate governance literature suggests, there seems to be no statistically significant link between CEO tenure and board size.

3 METHODOLOGICAL PROCEDURES

3.1 DATA AND SAMPLE

The collection of statutory data from credit cooperatives has been challenging because this information is not publicly available, unlike data from companies or banks, which are easily accessed through commercial databases. The data from the statutory bodies were directly requested from the Central Bank of Brazil through the "Request information from the BCB" since they are not readily

available on the website. The data were structured in an Excel spreadsheet and organized in a cross-sectional manner, forming a panel dataset. We utilized the R software for conducting the analyses, and the script is made available for reference if needed.

The accounting information used in this study is secondary data extracted from the IF.data of the Central Bank of Brazil. The data were collected between the years 2005 and 2022, arranged on a quarterly basis (March, June, September, and December) and separated by a legal entity (Cadastro Nacional da Pessoa Jurídica [CNPJ] in Portuguese) or individual institutions. Certainly, it's crucial to highlight that the analyses in this study were conducted from the second trimester of 2005 to the fourth trimester of 2022. This timeframe was selected because model (1), to be presented in the subsequent subsections, incorporates variables lagged by one trimester.

The dataset encompasses individual cooperatives, federations, and cooperative confederations. We removed any missing values, creating a well-balanced panel dataset with 36,715 quarterly observations from 973 credit cooperatives across the years 2005 to 2022. To address the impact of outliers, all variables were winsorized at both the first and ninety-ninth percentile levels.

3.2 DEFINITION OF THE VARIABLES

Profitability metrics serve as a means of evaluating performance. The choice of these financial performance indicators aligns with the PEARLS monitoring system established by the World Council of Credit Unions (WOCCU). This system provides a comprehensive set of performance metrics to oversee credit cooperatives on a global scale. Following the precedent set by previous cooperative studies (Franken & Cook, 2019; Unda *et al.*, 2019), two profitability measures are employed: Return on Equity (ROE), calculated as net income divided by equity, and Return on Assets (ROA), determined by dividing net income by total assets. While the use of these indicators aims to optimize outcomes, it is acknowledged that this may not always be feasible for cooperatives. Nevertheless, these metrics have been widely adopted in the literature (Bittencourt *et al.*, 2017).

The formula for performance measures, as well as the determinants of statutory bodies considered in this paper, is shown in Table 1.

Table 1
Description of the study variables

Variable Name	Description of the Variable	Abbreviation	Authors in the Context of Credit Cooperatives
Dependent Variables (Performance Variables)			
Return on Equity	Net Income / Equity	ROE	Franken & Cook (2019); Unda <i>et al.</i> (2019).
Return on Assets	Net Income / Total Assets	ROA	Franken & Cook (2019); Unda <i>et al.</i> (2019).
Independent Variables (Statutory Bodies Characteristics Variables)			
Gender of the Board of Directors	Percentage of Women on the Board of Directors	FemaleBOD	Ghosh & Ansari (2018); Unda <i>et al.</i> (2019).
Gender of the Executive Management	Percentage of Women on the Executive Management	FemaleEM	Mathuva <i>et al.</i> (2017).

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affiliated with a cooperative system enhances security and improves efficiency and effectiveness in service provision, member relations, and organizational and systemic controls.

The incorporation of the variable representing the type of credit cooperative (DummyType) is warranted due to the unique characteristics present in these cooperatives. These characteristics have the potential to shape how their managers supervise and carry out activities, consequently influencing their overall performance (Santos, 2016).

3.3 ECONOMETRIC MODEL AND PROCEDURES

The association between the determinants proposed and performance of Brazilian credit cooperatives was tested using model 1.

$Performance_{i,t} = \alpha + \beta_1 Female_{i,t-1} + \beta_2 BoardSize_{i,t-1} + \beta_3 Tenure_{i,t-1} + \theta + \varepsilon_i$ (1)

Where *performance* represents the specific dependent variable presented in Table 1 used in the model. Where *i* goes from credit cooperative 1 to credit cooperative 973 and *t* takes the value of the quarters from 2005 to 2022. The parameters β_1 to β_3 are formulated to encapsulate the potential effects of various characteristics of statutory bodies on credit cooperative performances. This encompasses variables that are lagged by one trimester, suggesting a temporal delay in the influence of these characteristics on performance. θ represents the control variables outlined in Table 1. We conducted panel tests, opting to present the results using the pooled method and fixed effects (FE). Additionally, as a robustness check, we employed the generalized method of moments (GMM) to address endogeneity, a common issue in the context of corporate governance (Wintoki *et al.*, 2012) and corporate finance (Barros *et al.*, 2020). In our GMM estimation, we utilize lagged values of the dependent variables as instruments for the current explanatory variables. According to Wintoki *et al.* (2012), including two lags is sufficient to capture the dynamic aspect of the governance/performance relation.

The decision to opt for the FE model was influenced by the results of specific tests. We conducted the Chow Test, yielding a p-value of 0.00 for both regressions. This leads to the conclusion that the FE model is preferable to the pooled model. For comparing the pooled model with random effects (RE), we conducted the Breusch-Pagan test (both p-values 0.00), leading to the conclusion that there is heteroscedasticity in the residuals. Finally, we performed the Hausman test, with results of 0.00 for both p-values, rejecting the null hypothesis and indicating, in this case, that the FE model is preferable to the RE model.

Additional tests were conducted to evaluate the robustness of the results from the regressions in Model (1). The Anderson-Darling normality test was employed to examine the distribution of residuals, resulting in a p-value of 0.00 for both tests. However, a thorough examination of histograms for the residuals showed a close resemblance to a normal distribution.

Pearson correlation analysis was conducted, though not tabulated, to assess potential collinearity among the determinants. Additionally, to test for multicollinearity, we evaluated the Variance Inflation Factor (VIF), and the results indicated the absence of this issue. To mitigate issues related to

heteroskedasticity and autocorrelation, we performed robust covariance matrix estimation for both pooled and FE models.

4 RESULTS

4.1 DESCRIPTIVE STATISTICS AND CORRELATION MATRIX

Table 2 reports the descriptive statistics. For board characteristics, Table 2 indicates that, on average, credit cooperative boards of directors (BoardSizeBOD) consist of eight members. Those findings corroborate the study by Unda *et al.* (2019), who also found a similar number of board memberships in Australian credit cooperatives, as well as Franken and Cook (2019), who reported an average of nine board members in United States Agricultural Cooperatives. On the other hand, the executive management board (BoardSizeEM), composed of individuals responsible for the cooperative's operations, had the lowest average number of members among the board sizes.

Table 2

Descriptive statistics

Variable	Mean	Median	Std. Dev.	Min	Max
ROE	0,042	0,045	0,076	-0,400	0,226
ROA	0,011	0,011	0,024	-0,128	0,079
FemaleBOD	0,138	0,111	0,158	0,000	0,667
FemaleEM	0,152	0,000	0,241	0,000	1,000
FemaleSB	0,199	0,167	0,202	0,000	0,833
BoardSizeBOD	8,394	8,000	3,193	3,000	21,000
BoardSizeEM	2,774	3,000	0,661	1,000	5,000
BoardSizeSB	5,706	6,000	0,609	3,000	6,000
TenureBOD	4,988	4,816	1,708	1,535	9,388
TenureEM	4,458	3,993	2,260	0,803	11,967
TenureSB	3,285	3,218	1,547	0,838	7,486
CCSize	10,702	10,835	2,224	4,955	15,269
CCLeverage	0,673	0,781	0,259	0,020	0,970

Notes: ROE is Return on Equity, ROA is Return on Assets, FemaleBOD is Gender of the Board of Directors, FemaleEM is Gender of the Executive Management, FemaleSB is Gender of the Supervisory Board, BoardSizeBOD is Board of Directors Size, BoardSizeEM is Executive Management Size, BoardSizeSB is Supervisory Board Size, TenureBOD is Board of Directors' Tenure, TenureEM is Executive Management' Tenure, TenureSB is Supervisory Board' Tenure, CCSize is Credit Cooperative Size, CCLeverage is Credit Cooperative Leverage.

Source: Elaborated by the authors (2024).

The average tenure differs across each board in this sample, hovering around four years. The average percentage of women on the board's spans from 13.8% (board of directors) to 19.9% (supervisory board). Notably, there were 796 observations where the Executive Management Board consisted entirely of women, observed in 113 distinct cooperatives. This highlights that the presence of women on this board is particularly influential. It is worth noting that the central bank's database includes the count of substitute members, which contributes to outliers in the data. These outliers are managed through winsorization for control purposes.

4.2 REGRESSION RESULTS



ROE (t-2)			(0.0289)			
			-0.0082			
			(0.0370)			
ROA (t-1)						0.2759***
						(0.0307)
ROA (t-2)						0.0756*
						(0.0335)
Observations	36715	36715	36715	36715	36715	36715
R ²	0.10	0.02		0.19	0.07	
adj. R ²	0.10	0.00		0.19	0.05	
F-statistic (p.value)	0.00	0.00		0.00	0.00	
Sargan test (p-value)			0.00			0.00
AR(1) test (p-value)			0.00			0.00
AR(2) test (p-value)			0.25			0.46
Wald test (p-value)			0.00			0.00

Notes: All t-statistics are based on robust standard errors (in parentheses). ***, **, * represent significance at the 1%, 5% and 10% level, respectively. AR(1) and AR(2) are tests for first-order and second-order serial correlation in the first-differenced residuals, under the null of no serial correlation.

Source: Elaborated by the authors (2024).

The GMM specification does not reveal any meaningful relationship between gender diversity and performance. Performance seems to slightly decline when more women join the board, but this is not very consistent. The hypotheses H1, H2, and H3 are not confirmed by the data.

BoardSizeBOD and BoardSizeEM do not exhibit consistent and significant correlations with performance. Thus, hypotheses H4 and H6 lack support. On the other hand, BoardSizeSB showed a positive relationship in all models and significance for the pooled models. However, the lack of statistical significance for the other models renders our hypothesis H5 inconclusive.

In examining the impact of tenure, the findings are varied. There's a noteworthy negative and statistically significant association observed for both the board of directors and supervisory board in the pooled and FE models. However, it's essential to note an exception, as the significance of TenureBOD in the pooled model differs. On a contrasting note, the GMM model reveals a positive indication for performance, with significance observed in the ROE model. Consequently, hypotheses H7 and H8 lack support based on these diverse outcomes.

TenureEM is significant only in the pooled model for the ROE variable. However, when it comes to the ROA variable, it lacks statistical significance, and the direction of the relationship varies. Consequently, there is inadequate evidence to support hypothesis H9.

The control variables demonstrated significance in nearly all regressions. The size of credit cooperatives (CCSize) exhibited a positive and significant association with performance. These results align with the findings reported by Unda *et al.* (2019) in Australian credit cooperatives for both ROE and ROA.

Conversely, leverage (CCLeverage) showed a negative and significant relationship in almost all cases, except for the GMM model in the case of ROE. Singh *et al.* (2019) identified a negative relationship between leverage and ROA in agro cooperatives in the United States; however, this relationship lacked statistical significance.

The outcomes indicate that being part of a federation or confederation of credit cooperatives has a negative and significant impact on both ROE and ROA. Santos (2019) observed mixed results, while Unda *et al.* (2019) reported significant and positive outcomes for the dummy variable signifying



belonging to a community. The initial expectation was that cooperatives belonging to a group would exhibit higher performance. However, one possible explanation for this result is that credit cooperatives with better performance within the group may need to support those that are not performing as well.

The results for the variable indicating a credit cooperative with free admission of membership (DummyType) were both significant and positive, aligning with expectations. This policy, as highlighted by Canassa *et al.* (2022), contributes to an increase in the number of members. Consequently, there is an anticipation of growth in deposits, resulting in an increase in loans and higher revenue from credit.

A key observation from the dynamic Ordinary Least Squares (OLS) model (pooled) highlights the significance of considering past performance when evaluating the impact of board structure on cooperative performance. Our tests using the dynamic OLS model revealed an enhancement in R^2 from 10.43% in the static OLS model to 25.51% in the dynamic OLS model (not tabulated). It appears that past performance plays a crucial role in explaining a substantial portion of the variation in current performance.

The outcomes reveal that when FE are included in a dynamic model and estimated through the system GMM, the coefficient on BoardSizeBOD (ROE) is statistically insignificant (-0.0003, standard error = 0.0003). This stands in contrast to the results from the static FE model, where the coefficient on board size is positive (0.0006, standard error = 0.0005). However, the positive bias in the FE coefficient estimate aligns with the anticipated bias when overlooking the dynamic relationship between current board structure and past performance. If board size is negatively correlated with past performance, then FE estimates of the relationship between board size and cooperative performance will exhibit a positive bias. This applies to all variables.

However, there is a possibility that certain hidden variations, not accounted for by past performance, may exist. The system GMM model allows us to assess the relationship between governance and performance. It incorporates both past performance and FE to address the dynamic aspects of this relationship and time-invariant unobservable variations, respectively.

The outcomes obtained by controlling for heterogeneity in this study are comparable to those found in the estimates of Wintoki *et al.* (2012). However, this application also underscores the importance of accounting for both the dynamic relationship between current governance and past cooperative performance and time-invariant unobservable heterogeneity in the analysis.

5 CONCLUSIONS

This study analyzed the relationship between statutory body characteristics and the financial performance of Brazilian credit cooperatives. Using panel data on 973 cooperatives over 2005-2022, the results reveal complex links between board size, gender diversity, tenure, and performance measures.

It was not possible to support any of the nine hypotheses raised in this study. We find that the characteristics of statutory boards are, in part, influenced by past performance. After accounting for this factor, we observe statistical significance only for Tenure in GMM model, with very small coefficients in relation to cooperative performance. It is crucial that empirical research in credit cooperatives considers



the source of endogeneity inherited from the corporate finance literature. This arises because the relationships between observable characteristics of an entity are likely to be dynamic. In the context of statutory boards, current cooperative performance can influence future governance choices, and these choices, in turn, may impact future cooperative performance.

In the realm of cooperate governance research, acknowledging the influence of historical performance on current governance is crucial. This is especially significant because a substantial portion of this research seeks to uncover how governance impacts performance. Ignoring the connection between historical performance and present governance could introduce biases that might skew the findings.

For practitioners, tailored board composition and size is critical to balance member representation with financial oversight. Developing female leadership pipelines may further professionalize cooperatives, but requires tackling biases in selection. Fostering director expertise in accounting, finance and risk management is also pivotal to performance.

This study uniquely addressed an under-researched context – statutory bodies of Brazilian credit cooperatives. As these entities gain economic significance, insight into their governance-performance connections is valuable. The findings can inform regulation and practice for Brazil's cooperative sector and similar emerging markets.

Further research could explore interactions between board structure, strategy, exogenous variables and performance using qualitative studies. As pointed out by Sallaberry *et al.* (2024), the inclusion of macroeconomic control variables can influence the results in the context of Brazilian credit cooperatives.

Comparative analyses across countries may reveal institutional and cultural nuances. Trends during crises like COVID-19 can highlight how cooperatives balance financial stability and member service. With access to more granular data, future studies can refine measurement of constructs like expertise. Advancing and applying context-specific governance knowledge remains vital as credit cooperatives continue to evolve.

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