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PERSISTENCE OF SURPLUSES AND STAGES OF THE LIFE CYCLE IN FINANCIAL COOPERATIVES

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ABSTRACT

The objective of this study is to examine the persistence of surpluses across different stages of the life cycle in financial cooperatives. The sample comprises 622 individual Brazilian financial cooperatives over the period 2017–2022. Cooperatives were grouped into life cycle stage clusters based on revenue growth, personnel expense growth, and participation in the National Cooperative Credit System, following the models of Vasylieva and Chmutova (2015) and Maia (2022). Surplus persistence was measured using the model proposed by Dechow and Schrand (2004). The results indicate a sector in transformation, with a reduction in cooperatives classified in the Decline stage and an increase in the Growth and Maturity stages. Cooperatives in the initial stages tend to exhibit higher rates of revenue and personnel expense growth, whereas cooperatives in the Maturity and Decline stages show lower rates, which may reflect stabilization. Surplus persistence differs across the life cycle stages, with surpluses being more persistent in cooperatives at the Maturity and Decline stages. The originality and relevance of this study lie in its investigation of surplus persistence in Brazilian financial cooperatives, considering the role of these entities within the financial system and the impact of sectoral changes in banking. This study contributes to the literature on surplus persistence by incorporating the influence of life cycle stages in financial cooperatives. From a practical and social perspective, the research provides insights for financial cooperatives to develop financial strategies aligned with their specific realities, thereby strengthening their sustainability in a highly competitive banking environment.

Keywords: Life Cycle. Financial cooperatives. Surplus Persistence.

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1 INTRODUCTION

Financial cooperatives, characterized by the voluntary association of individuals with the purpose of providing mutual financial services, have gained prominence in the Brazilian financial landscape. Their importance is highlighted by the growing attention in the academic literature (Favalli et al., 2020; Maia et al., 2019; Unda et al., 2019), which recognizes them as financial institutions with unique characteristics. In the cooperative model, members are simultaneously owners and users of the institution, actively participating in its management and benefiting from its products and services (Central Bank of Brazil, 2024). This distinctive structure gives financial cooperatives a social and democratic character, differentiating them from traditional financial institutions.

In recent years, Brazilian financial cooperatives have experienced significant growth, driven by factors such as the dynamism of the agricultural sector, government incentives, and the demand for more accessible financial services. In this context, these institutions face the need to expand their operations to meet the growing demand of their members and strengthen their market position. Financial cooperatives operate in a highly competitive and dynamic sector and must continuously adapt to survive in a market that tends toward concentration, while also producing financial results that justify their social role (Silva et al., 2017). Fried et al. (1999) argue that financial cooperatives share the same merger aspirations as banks, with potential to increase profitability, enhance cost and revenue efficiency, and exploit market power.

Damodaran (2012) emphasizes that a company's value is based on its ability to generate cash flows, so more profitable companies tend to have higher valuations. However, this logic must be applied cautiously in the context of financial cooperatives, whose corporate nature and objectives differ from profit-driven firms. Market value, in turn, can be influenced by various economic factors, including production functions, supply and demand, investment opportunities, and the level of associated risk. Goddard et al. (2009) found that in U.S. financial cooperatives, smaller and less profitable cooperatives had a higher likelihood of being acquired. Furthermore, differences in market value between similar organizations can be explained by the stage of the organization's life cycle (Liu, 2006; Park & Chen, 2006; Xu, 2007).

Life cycle theory focuses on how an organization grows, matures, and declines. The objective of life cycle analysis is to group firms into similar categories to examine how different incentives, constraints, and strategies throughout the life cycle relate to performance decisions and outcomes (Mueller, 1972). Dickinson (2011) identifies five life cycle phases: introduction, growth, maturity, shakeout, and decline. Drake (2012) highlights that fluctuations in sales revenue, return on assets, cash flows, and earnings persistence vary according to life cycle stage. This study explores the variation in surplus persistence across these life cycle phases.

The life cycle stage identification model used in this research was proposed by Vasylieva and Chmutova (2015), developed specifically for the banking sector. This model evaluated life cycle stages in Ukrainian banks through cluster analysis based on market share growth, revenue growth, and personnel expense growth.

In Brazil, Lima et al. (2015) analyzed the effect of life cycle stages on the quality of accounting information, measured through conservatism, earnings persistence, cash flows, and earnings management. Their results indicate significant differences in the quality of accounting information, except for earnings management, across life cycle stages of Brazilian publicly listed companies. However, the study of surplus persistence aligned with the life cycle stages of financial cooperatives remains an unexplored field.

This study investigates the persistence of surpluses in Brazilian financial cooperatives. Accounting literature links earnings persistence to the ability to predict future results, suggesting that more stable profits provide more informative data for investment decision-making (Kolozsvari & Macedo, 2016). Research on persistence converges into two main approaches. The first focuses

on the quality of accounting information, arguing that more consistent results offer more reliable data for asset valuation. The second approach examines, more broadly, the effectiveness of profits in improving asset evaluation (Dechow et al., 2010).

The study of surplus persistence in Brazilian financial cooperatives is particularly relevant given the significant role these entities play in the national financial system and their notable growth in recent years. Furthermore, the competitive dynamics of the banking sector, characterized by mergers and acquisitions, impose unique challenges and opportunities for these institutions, especially regarding asset valuation and the measurement of value in consolidation processes. Importantly, life cycle theory provides a valuable framework to understand how financial cooperatives evolve over time, directly impacting the quality of accounting information and, consequently, earnings persistence.

In this context, the research question addressed by this study is: What is the persistence of surpluses in Brazilian financial cooperatives across the different stages of their life cycles? The primary objective is to examine surplus persistence across the life cycle stages of financial cooperatives.

The theoretical relevance of this study lies in expanding the understanding of life cycle theory as applied to surplus persistence in financial cooperatives. The theory suggests that organizations go through distinct phases—introduction, growth, maturity, and decline—that influence their financial and operational strategies (Mueller, 1972). Specifically, earnings or surplus persistence in financial cooperatives may vary significantly depending on the life cycle stage. Drake (2012) observed that variations in financial metrics, such as return on assets and cash flows, are indicative of an organization's life cycle stage. This study seeks to extend this line of research by exploring how these variations directly impact financial cooperatives.

From a practical perspective, understanding the relationship between life cycle stages and surplus persistence is crucial for the financial and strategic management of financial cooperatives. These institutions face unique challenges due to their ownership structure and dual mission of serving members' interests while remaining financially viable. As the banking sector becomes more competitive and mergers and acquisitions become common growth strategies, financial cooperatives require insights into how their life cycle stage affects financial sustainability and their ability to generate value for members. For example, Carvalho et al. (2015) highlighted the importance of mergers and acquisitions for financial cooperatives to expand operations, which can be influenced by their life cycle stage.

2 LITERATURE REVIEW

2.1 Financial cooperatives

Law No. 5,764 (1971) establishes the National Cooperativism Policy in Brazil and regulates the operation of cooperatives. The law states that cooperatives are associations of people formed to provide services to their members, aiming for common benefits rather than profit. Consequently, cooperatives do not generate profit but rather surpluses, which result from providing services to their own members. The allocation of these surpluses is determined by the general assembly, in accordance with the bylaws and Article 28 of the aforementioned law, which mandates that a minimum of 5% be allocated to the Technical, Educational, and Social Assistance Fund and 10% to the Legal Reserve Fund. After these allocations, the remaining surpluses may be distributed proportionally to the members.

Oliveira et al. (2014) state that in many countries, financial cooperatives are important instruments for development and play a significant role in the local economy. Between 2008 and 2013, credit cooperativism experienced substantial growth worldwide, with cooperative assets increasing by 45.1% and the number of loans granted by cooperatives rising by 34.0%. In 2013,

there were 56,904 financial cooperatives across 103 countries, with assets of USD 1.7 trillion, loans of USD 1.1 trillion, reserves of USD 171.6 billion, and 207.9 million members.

Financial cooperatives have specific characteristics, particularly regarding financial intermediation policies. Managers can choose from four approaches: (a) maximize operational surplus (in the form of profit); (b) allocate resources favoring borrower members (through lower interest rates); (c) allocate resources benefiting saver members (through higher deposit rates); or (d) adopt no specific direction, seeking equal distribution of benefits (Smith et al., 1981).

In financial cooperatives, earnings derived from activities with members are known as surplus. These gains can be reinvested in the cooperative's development or distributed among members, based on their level of transactions, operations, and deposits within the entity. Doctrinally, the term "profit" is not used, as it is associated solely with capital remuneration, while surpluses are distributed proportionally to each member's activity level. Nonetheless, maintaining efficiency and profitability remains essential, as surplus reflects effective resource management and ensures the institution's capacity to fulfill its social role (Carvalho et al., 2015).

According to Azevedo and Gartner (2020), financial cooperatives also play a role in intensifying competition in the credit market. The authors justify this by highlighting scale advantages, the absence of profit-seeking obligations, fiscal benefits, and positive feedback loops between members and the institution, which can contribute to lower interest rates within these cooperatives.

2.2 Life Cycle Stages

Samadiyan and Rezaei (2012) describe the life cycle model as one of the most widely used frameworks for analyzing a company's value and market position. Drake (2012) states that the purpose of life cycle analysis is to assess how variations in incentives, constraints, and strategies throughout the life cycle relate to managerial decisions and firm performance.

Mueller (1972) proposes that a typical company exhibits a development pattern initially characterized by a slow growth phase upon market entry, followed by accelerated growth, and ultimately reaching a maturity stage, which may lead to stagnation or moderate advancement. These life cycle stages are interpreted as a combination of variables reflecting the economic context in which the company operates and its organizational structure. In this model, contextual dimensions are identified by age, size, and expansion rate of the company, linking them to the specific challenges the firm faces.

For financial cooperatives, Ferguson and McKillop (1997, 2000) use an organizational life cycle methodology to divide them into distinct growth phases, including an emerging (formative) stage, a transition stage, and a maturity stage.

Cook (1995) introduced a pioneering model describing the life cycle phases of agricultural cooperatives, positing that the economic vitality of these entities fluctuates over their existence. This dynamic can be observed through key financial metrics such as return on equity and net profit margin.

Canassa et al. (2022) examined the relationship between membership growth and the likelihood of closure in Brazilian financial cooperatives, drawing on life cycle theories developed by Cook (1995) and later refined by Cook and Burress (2009). Using advanced statistical methods, such as Kaplan-Meier estimators and duration models, the study analyzed 253 financial cooperatives established between 2003 and 2018, focusing on how member growth can influence institutional longevity. This study is notable for its unique approach, shifting the focus from traditional financial indicators to the impact of membership size on cooperative survival.

Cook (2018) deconstructs the traditional life cycle concept and identifies five distinct phases: justification, organizational design, growth, analytical reflection, and choice. In the justification phase, cooperatives are formed in response to market failures or to reduce transaction

costs. During organizational design, rules and structure are established, a critical period for attracting members with aligned visions. The growth phase involves working toward cooperative objectives, though emerging differences among members may generate internal conflicts. Analytical reflection occurs when adaptations fail to resolve these differences, leading to identification of new paths. The final phase, choice and reinvention, involves decision-making among the options identified in the previous phase (exit, status quo, generation, or reinvention).

In this article, we adopt the model of Vasylieva and Chmutova (2015), which is specifically designed for measuring the life cycle in the banking sector. In this model, banks are classified into creation, extensive growth, intensive growth, maturity, decline, and liquidation stages. Cluster analysis was performed using three indicators: market share growth, revenue growth, and personnel expense growth.

Table 1 summarizes the main life cycle models used in the study and their characteristics.

Table 1
Life cycle models

Authors and Year	Number of Stages	Stage Description	Type of Organization
Cook (1995); Cook & Burress (2009)	5	1) Emergent; 2) Growth; 3) Maturity; 4) Recognition of Need for Change; 5) Decision Path (Reinvention or Exit)	Agricultural cooperatives
Ferguson & McKillop (1997, 2000)	3	1) Emergent; 2) Transition; 3) Maturity	Financial cooperatives
Mueller (1972)	4	1) Birth; 2) Growth; 3) Maturity; 4) Decline	General companies
Vasylieva & Chmutova (2015)	5	1) Creation; 2) Growth; 3) Maturity; 4) Decline; 5) Liquidation	Ukrainian banks

Source: Research data.

In Brazilian financial cooperatives, two recent studies stand out for applying the life cycle model. Maia's (2022) thesis investigated the evolution of the economic and social efficiency of these institutions throughout their life cycle, drawing on the models of Ferguson and McKillop (1997, 2000), Cook (1995), and Cook and Burress (2009) for stage definitions, and on Vasylieva and Chmutova (2015) for selecting the variables used in cluster analysis. Complementarily, Espich's (2025) thesis examined the relationship between social and economic-financial performance across the different life cycle stages of Brazilian financial cooperatives, adopting a methodology similar to that proposed by Maia (2022) for stage classification.

2.3 Surplus Persistence

High-quality accounting information is defined as information that accurately reflects an entity's financial performance and is relevant for decision-making (Dechow et al., 2010). Within this definition, three key elements can be identified. First, quality is linked to the importance of the decision being made. Second, quality is influenced by the disclosure of financial performance, considering that some aspects cannot be directly observed. Finally, quality is viewed as the interaction between the significance of financial performance after a decision and accounting's ability to capture that performance (Ferreira et al., 2021).

Although accounting information is regulated by the authorities overseeing market operations, the literature also indicates that managers may make accounting choices to achieve specific objectives, which can impact the quality of the accounting information (Dechow et al., 2010; Xu, 2007).

There is no consensus on how to measure the quality of accounting information; the most commonly used metrics include earnings persistence, earnings management, asymmetric loss recognition (conservatism), value relevance, transparency, and comparability (Lima et al., 2015).

In this study, the attribute of information quality explored is the **persistence of surpluses** in Brazilian singular financial cooperatives.

Earnings persistence serves as a proxy for accounting information quality and is associated with its contribution to forecasting future results, assuming that persistent earnings are more useful for investment evaluation (Kolozsvari & Macedo, 2016).

The ability to predict future returns is highly valued by investors when considering companies as potential investments in financial markets. Typically, publicly listed companies are expected to demonstrate a higher level of continuity in earnings compared to private firms, aiming to attract more investors by reducing risks associated with the predictability of financial performance. In this context, a company exhibiting greater consistency in its earnings provides higher-quality information, as stable profits serve as a reliable indicator for future projections, thus facilitating investor decision-making (Arruda et al., 2015).

Even though cooperatives do not trade shares in capital markets, social capital investors may still perceive the continuity of net surpluses or the various investment options offered by the cooperatives favorably (Diniz, 2020).

Ferreira et al. (2021) reviewed publications on accounting information quality in cooperatives from 2010 to 2020. using Spell, Google Scholar, and Web of Science databases. The sample included only 17 articles. The results indicate that earnings management (12 studies) was the primary metric for measuring information quality. Only four studies addressed earnings smoothing, and one study examined earnings persistence, highlighting the relevance and originality of the present research.

The study by Diniz and Girão (2019) was the only article found investigating the persistence of surpluses in Brazilian financial cooperatives. The period analyzed was 2000–2017, covering 700 singular financial cooperatives, grouped by total asset size—above or below 50 million in total assets. The results indicate that larger financial cooperatives exhibit greater surplus persistence than smaller ones. However, this study did not explore surplus persistence across different life cycle stages, which is the theoretical gap addressed in the present article.

3 RESEARCH METHODS AND PROCEDURES

3.1 Population and Sample

The population comprises all singular financial cooperatives with data published in the Central Bank of Brazil database, available at: https://www3.bcb.gov.br/ifdata/#. Table 2 shows a reduction in the number of financial cooperatives over the years. Prolo Júnior (2019) argues that this decrease over the past decade is mainly due to a number of mergers and acquisitions, reflecting a trend toward concentration in the cooperative sector, likely aimed at increasing size, reducing costs, and improving efficiency. The selected period spans 2017 to 2022. This timeframe was chosen to capture significant transformations in the credit cooperative sector, marked by mergers and consolidation (Prolo Júnior, 2019), as well as the advancement of digital financial services and the effects of the COVID-19 pandemic, which directly impacted the performance of financial institutions.

The study sample was subjected to several filtering criteria. Initially, financial cooperatives that had published their financial statements for the entire analysis period were selected, totaling 796 cooperatives. Subsequently, 171 cooperatives were excluded due to missing or zero data, negative equity (liabilities exceeding assets), or lack of funding values—typically pertaining to mutual cooperatives for public servants and employees. Consequently, the final sample comprises 622 financial cooperatives, totaling 3,710 observations.

Table 2
Population of cooperatives by year

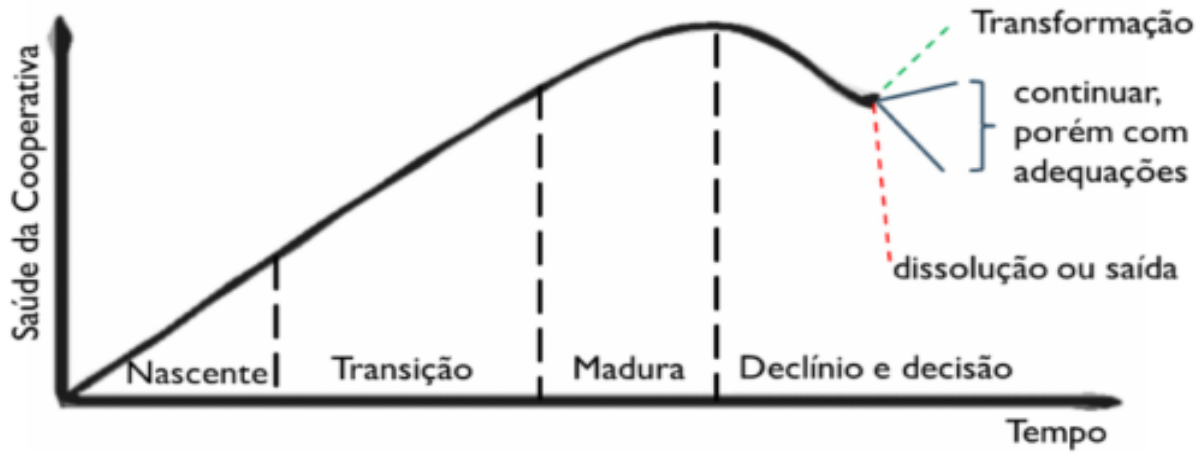
Year	Total number of cooperatives
2022	799
2021	818
2020	847
2019	872
2018	925
2017	967

Source: Research data.

3.2 Variables and Theoretical Model

Studies on the life cycle of cooperatives present different approaches. The proposition adopted in this work is based on the model by Maia (2022), as shown in Figure 1. This model combines the stages proposed by Ferguson and McKillop (1997, 2000) Emerging, Transition, and Mature with the Decline and Decision phases, following the framework of Cook (1995) and Cook & Burress (2009).

Figure1
Proposition of the life cycle of financial cooperatives



Source: Maia (2022).

The life cycle stage was measured using Cluster Analysis, which groups elements with similar characteristics. Clusters were calculated annually to assess each cooperative in different years. Analyzing all cooperatives across all years in a single cluster would result in comparisons of each institution with itself (Maia, 2022). The variables used in the cluster analysis were based on life cycle studies of financial institutions, following the proposals of Vasylieva and Chmutova (2015) and Maia (2022).

The growth rate reflects the changes in values generated by the cooperative's activities and was calculated by dividing the current year's revenue by the previous year's revenue. It is expected that in the initial stages, this rate will be lower; during the growth phase, revenues are expected to increase until reaching stability. In the decline phase, revenue variation tends to be negative.

The personnel expense growth rate refers to spending on employees, such as salaries, benefits, and other charges, calculated by dividing the current year's personnel expenses by the previous year's expenses. Personnel costs typically start higher and decrease over time due to the automation of many cooperative processes (Kolodiziev et al., 2016; Vasylieva & Chmutova, 2015).

Table 3
Variables and Life cycle stages of financial cooperatives

Stage	Revenue Growth Rate	Personnel Expense Growth Rate	Participation Rate in the National Cooperative Credit System
1. Emerging	Low	High	Low
2. Growth	Increase	Decline	Increase
3. Mature	Stable	Stable	Stable
4. Decline/Decision	Decline	Low	Decline

Source: Vasylieva and Chmutova (2015) and Maia (2022).

Participation in the National Cooperative Credit System (SNCC) indicates sector competition. In this study, the participation rate was calculated considering the total assets of the cooperative relative to the sum of all credit cooperative assets in Brazil. The expected behavior is similar to the revenue growth rate. During the growth stage, substantial increases are expected due to the pursuit of profit and stability in the operating area. In maturity, growth stabilizes, and in the decline stage, the organization loses market share and competitiveness (Kolodiziev et al., 2016; Maia, 2022).

A The persistence of surpluses was measured using the standard persistence estimation model, as shown in the following equation (Dechow & Schrand, 2004). The higher the α1, coefficient, the more persistent the cooperative's surplus.

$$So_{it+1} = \alpha_0 + \alpha_1 So_t + \varepsilon_{it}$$

Where: So_{it+1} it is the value of the surplus for cooperative *i* in year $t + 1$; So_t is the value of the surplus for cooperative *i* in year *t*; ε_{it} is the regression error.

3.3 Procedure and Data Analysis

The data were collected from the Central Bank of Brazil website, from individual institutions, using the December database for the years 2017 to 2022, and refer to the Asset, Liability, and Income Statement reports, accessed via the webpage: https://www3.bcb.gov.br/ifdata/# . After downloading all the spreadsheets, the data were tabulated and organized in a Microsoft Excel spreadsheet.

Financial performance indicators were calculated in Microsoft Excel, while cluster analysis, discriminant analysis, descriptive statistics, and the linear regression of surplus persistence were performed using RStudio.

Outlier values were excluded as follows: the median, lower quartile (Q1), and upper quartile (Q3) were calculated; the interquartile range (L) was determined by subtracting Q1 from Q3; values greater than Q3 + 3L and less than Q1 - 3L were considered extreme observations (Fávero et al., 2009).

Another aspect verified was the presence of multicollinearity among the variables, which occurs when two or more variables explain the same phenomenon. In cluster analysis, multicollinear variables can be implicitly weighted more heavily, altering the clustering patterns (Hair et al., 2010). To address this, a correlation analysis of the variables was performed, and no such problem was identified.

For the identification of the life cycle stages of financial cooperatives, cluster analysis was used, which consists of a group of multivariate techniques aimed at aggregating objects based on their characteristics (Hair et al., 2010). In this study, the K-means clustering algorithm, available in RStudio, was used. K-means clustering is applied in machine learning to partition data based on similarity and create data clusters. To validate the clusters, multiple discriminant analysis was performed, which is the linear combination of two (or more) independent variables that best discriminates among objects in the groups defined a priori (Hair et al., 2010).

Regarding the descriptive statistics of the variables, the normality assumption was not met, so the non-parametric Kruskal-Wallis test was applied to verify differences in means between groups (Fávero et al., 2009). Subsequently, Dunn's test (1964) was calculated to compare results and identify which stages presented significantly different values.

A limitation of the study is that the evaluation of the life cycle stages was based on personnel expenses and revenues, which are related to the formation of surpluses. This association may introduce bias in determining the relationships, and although the results provide relevant evidence, caution is required.

4 DATA ANALYSIS AND DISCUSSION OF RESULTS

4.1 Life Cycle

For the definition of clusters, four groups were established, and the analysis was conducted individually for each year. In identifying the life cycle stage, the aspects presented in the studies by Vasylieva and Chmutova (2015) and Maia (2022) were considered, as follows:

(i) Nascente (NC): in this stage, cooperatives are expected to exhibit high growth rates in personnel expenses and low growth rates in revenue and participation in the SNCC.

(ii) Transition / Growing (TC): cooperatives in this stage show an increase in SNCC participation and revenue growth rates, combined with a decrease in personnel expenses due to process automation.

(iii) Mature (MD): this stage comprises cooperatives with stability in the variables, meaning there are no significant variations in the growth rates of revenue, personnel expenses, and SNCC participation, remaining at overall median values.

(iv) Decline / Decision (DD): in this stage, the growth rate of personnel expenses is low, and the growth rates of revenue and SNCC participation are at median levels with a downward trend over the years.

Table 4 shows the number of cooperatives grouped by life cycle stage and year. In 2018, cooperatives were predominantly in the Mature (264) and Decline (295) stages, indicating an established sector but with many cooperatives facing significant challenges. Compared to the previous year, 2019 saw an increase in cooperatives in the Growth stage (154) and a reduction in those in Decline (192). In 2020. there was a strong presence of cooperatives in the Mature stage (341), the highest number for any stage in a single year, while Nascent cooperatives dropped sharply to only 6. In 2021, there was a significant increase in cooperatives in the Growth stage (208), while the number in Decline decreased to 125, indicating sector recovery or strengthening. In 2022, the large number of cooperatives in Growth (256) and Mature (257), along with the reduction in Decline (100), suggests a period of expansion for the cooperative sector.

Table 4

Number of cooperatives by life cycle stage and year

Year	Emerging	Growing	Mature	Decline
2018	57	6	264	295
2019	39	154	237	192
2020	6	73	341	202
2021	50	208	239	125
2022	9	256	257	100
Total	**161**	**697**	**1338**	**914**

Source: Research data.

The evolution of cooperatives over these five years suggests a sector in transformation, with a significant reduction in cooperatives in Decline and an increase in the Growth and Maturity

phases. This may reflect an increasingly favorable environment for the development and strengthening of cooperatives, possibly due to improved management practices, supportive policies, or more favorable market conditions.

The study by Lima et al. (2015) was conducted on Brazilian publicly traded companies and classified lifecycle stages using a different model. For comparison, the majority of companies were classified in the Maturity stage, followed by Decline, with a small percentage in Growth.

Santos (2023) addressed the concepts of income smoothing and organizational slack across the lifecycle stages of Brazilian financial cooperatives. A different model was used for classifying cooperatives into lifecycle stages, and the period analyzed was 2001–2020. Comparing only the overlapping period of this thesis with the present study (2018–2020), there is convergence in cooperative classification: most cooperatives were in the Maturity stage, followed by Decline and Growth, with a small percentage in the Nascent stage.

Maia (2022) analyzed efficiency and lifecycle stages of financial cooperatives using the same clustering method as this study for the period 2016–2020. However, the groupings differ, as Maia (2022) found the highest concentration of cooperatives in the Growth stage, followed by Maturity.

Subsequently, discriminant analysis was performed to validate the previous groupings. The model's accuracy across all periods averaged 95%, indicating a high discriminative power.

4.2 Descriptive Statistics

Table 5 presents the descriptive statistics of the financial and operational variables of cooperatives across different lifecycle stages: Complete (data aggregated from all stages), Nascent, Growth, Maturity, and Decline. The variables analyzed include Return on Assets (ROA), Revenue Growth Rate (CresRec), Personnel Expense Growth Rate (CresPes), and Participation Rate in the National Credit Cooperative System (TxPart). For each lifecycle stage, means, standard deviations, minimums, maximums, and medians are reported for each variable to understand how each stage behaves in terms of these financial metrics.

ROA represents the profitability of the cooperative relative to its assets. The values are fairly similar across stages, indicating homogeneous performance in terms of profitability. The higher standard deviation in the Decline stage indicates greater variation in profitability among cooperatives at this stage.

Revenue growth rate (CresRec) varies significantly between stages. Cooperatives in the Nascent and Growth stages show higher average growth compared to those in Maturity and Decline, in line with the assumptions of Vasylieva and Chmutova (2015). The high variation in the Nascent stage (standard deviation of 0.4509757) reflects substantial differences in how new cooperatives are growing their revenues.

Table 5

Descriptive Statistics

Stage	Variable	Mean	Standart Desviation	Minimmum	Maximmum	Median
Complete	*ROA*	0.013234	0.013558	-0.221542	0.111269	0.013048
Nascent	*ROA*	0.012361	0.010558	-0.016152	0.048568	0.011111
Growth	*ROA*	0.01449	0.008957	-0.04408	0.06512	0.01344
Mature	*ROA*	0.013814	0.012201	-0.107307	0.111269	0.013419
Decline	*ROA*	0.01158	0.017965	-0.221542	0.07629	0.01222
Complete	*CresRec*	0.286322	0.381806	-0.635029	2,075452	0.164728
Nascent	*CresRec*	0.72204	0.450976	-0.01632	1,99506	0.63017
Growth	*CresRec*	0.6606	0.338148	-0.2714	2,075452	0.7181
Mature	*CresRec*	0.233162	0.280336	-0.635029	0.863178	0.123075
Decline	*CresRec*	0.001940	0.181558	-0.608696	0.548152	0.006595
Complete	*CresPes*	0.17702	0.192648	-0.48552	1,83085	0.15025

Nascent	*CresPes*	0.49954	0.334038	-0.4659	1,83085	0.49954
Growth	*CresPes*	0.24864	0.171151	-0.08595	1,62593	0.24864
Mature	*CresPes*	0.14613	0.131978	-0.41292	1,15789	0.13411
Decline	*CresPes*	0.09278	0.139384	-0.48552	0.66110	0.08874
Complete	*TxPartic*	0.0293173	0.052439	0.0000297	0.5987299	0.0113281
Nascent	*TxPartic*	0.0189744	0.032419	0.0001544	0.2526363	0.007983
Growth	*TxPartic*	0.051316	0.070982	0.0000342	0.5987299	0.0250015
Mature	*TxPartic*	0.0282962	0.051769	0.0000316	0.5898074	0.0119553
Decline	*TxPartic*	0.01604	0.029037	0.0000297	0.3004	0.006046

Source: Research data. Note: *ROA: Return on Assets; CresRec: Personnel Expense Growth; TxPartic: Participation Rate*

The personnel expense growth rate (CresPes) also shows considerable variation across the life cycle stages. Nascent cooperatives have a higher average growth, which may indicate initial investments in personnel. Variation is lower in the Growth and Maturity stages, suggesting greater stability in personnel expenses.

The participation rate in the National Credit Cooperative System (TxPart) represents the cooperative's integration into the national system. The variation of this rate is relatively low, indicating that participation in the national system may not be strongly influenced by the cooperative's life cycle stage.

The data did not meet the normality assumption for residuals; therefore, non-parametric Kruskal-Wallis and Dunn tests were used to verify differences between groups. All Kruskal-Wallis test results had p-values below 0.05, rejecting the null hypothesis and indicating that at least one group differs. To identify which stages had statistically significant differences, the Dunn test was performed, as shown in Table 6.

The Dunn test results reveal statistically significant differences, with p-values below 0.05, for most pairs of stages across the variables Revenue Growth Rate, Personnel Expense Growth Rate, Cooperative Market Participation Rate, and Return on Assets. Exceptions were observed between the Nascent and Growth groups (p = 0.472) for Revenue Growth and between Nascent and Decline (p = 0.076) and Maturity and Growth (p = 0.162), which did not show significant differences.

Table 6

Dunn Test – Group Comparisons

Comparison (Stages)	Revenue Growth	Personnel Expense Growth	Market Participation Rate	Return on Assets
Emerging vs. Growth	0.472	< 0.001***	< 0.001***	< 0.001***
Emerging vs. Maturity	< 0.001***	< 0.001***	0.002***	< 0.001***
Emerging vs. Decline	< 0.001***	< 0.001***	0.013**	0.076
Growth vs. Decline	< 0.001***	< 0.001***	< 0.001***	< 0.001***
Maturity vs. Growth	< 0.001***	< 0.001***	< 0.001***	0.162
Maturity vs. Decline	< 0.001***	< 0.001***	< 0.001***	< 0.001***

*** Statistical significance at the 1% level (p < 0.01)
** Statistical significance at the 5% level (p < 0.05)
Source: Research data.

In general, cooperatives in the early stages of Birth and Growth tend to exhibit higher growth rates, both in revenue and in personnel expenses, possibly reflecting a focus on expansion and scalability. In contrast, cooperatives in Maturity and Decline show lower rates, which may indicate stabilization or a reduction in operational scale. Another factor to consider is the high variation among cooperatives within each stage, as indicated by the standard deviations of the

variables. This suggests that there is considerable diversity in the performance and behavior of cooperatives that is not captured solely by the mean values.

4.3 Retained Earnings Persistence

The Table 7 presents the regression analysis across the different life cycle stages of credit unions (Complete, Nascent, Growth, Maturity, and Decline) in relation to the persistence of retained earnings. All constant term coefficients are positive and significant, indicating a consistent positive effect across all life cycle stages of the credit unions. The coefficients for So_{it} suggest that this variable has a positive and significant impact on the persistence of retained earnings in all life cycle stages. The R^2 ndicates the proportion of variation in the dependent variable explained by the independent variables in the model, with values ranging from 0.093 to 0.2643. The F-test is significant in all cycles, showing a statistically meaningful relationship among the variables. The White coefficient tests the homoscedasticity of residuals; to accept this assumption in all cycles, the confidence level needs to be raised to 10 %.

Previous studies indicate that the life cycle stage plays a significant role in understanding accounting information quality (Can, 2020; Krishnan et al., 2020). Moreover, firms in the decline stage tend to exhibit weaker performance regarding profits (Dechow et al., 2010; Dechow & Schrand, 2004; Dickinson, 2011; Lima et al., 2015). Organizations in the growth stage often report higher frequency of losses; however, since earnings persistence is a key measure of financial information quality, growing organizations require investors or new members—in the case of credit unions—who evaluate the institution when allocating resources, which likely results in persistent earnings (Lima et al., 2015).

The results in Table 7 indicate that life cycle stages influence retained earnings persistence, in line with previous research (Can, 2020; Dechow & Schrand, 2004; Dickinson, 2011; Krishnan et al., 2020). The findings further highlight that retained earnings are more persistent in credit unions at the Maturity and Decline stages. The result in the Decline stage contrasts with prior empirical evidence (Dechow & Schrand, 2004; Dickinson, 2011; Lima et al., 2015), where persistence was expected to be lower. These findings diverge from the existing literature, suggesting the need for further research. Possible explanations include the focus of previous studies on traditional firms, which differ substantially from credit unions, specific regulatory factors in the cooperative sector, the use of different methodological criteria for life cycle classification, or the implementation of defensive management strategies, all potentially contributing to higher retained earnings persistence even in periods considered as decline.

The result in the Maturity stage corroborates the findings of Dechow and Schrand (2004), Dickinson (2011), and Lima et al. (2015), as the organization starts positioning itself better in the market, undertaking more consistent projects, assuming less risk, and experiencing lower result volatility.

Table 7

Persistence of Retained Earnings

	Complete		Emerging		Growth		Mature		Decline	
	coefic.	p-value	coefic.	p-value	coefic.	p-value	coefic.	p-value	coefic.	p-value
Constant	0.0070	0.000	0.0083	0.000	0.0095	0.000	0.0082	0.000	0.0043	0.000
So_{it}	0.4454	0.000	0.2874	0.000	0.3915	0.000	0.3963	0.000	0.5043	0.000
Adjusted R^2	0.2001	-	0.093	-	0.1706	-	0.1451	-	0.2643	-
F Test	778.7	0.000	17.4	0.000	144.2	0.000	227.9	0.000	329.00	0.000
White Test	63.021	0.000	2.9794	0.084	49.236	0.000	0.0396	0.082	30.963	0.000
N	3110	-	161	-	697	-	1338	-	914	-

Source: Research data.

The study by Diniz and Girão (2019) identified the existence of persistence in the surpluses across the entire set of financial cooperatives. The sample was divided, and larger financial cooperatives exhibited greater persistence of surpluses than smaller ones. The results suggest expanding to new studies, aiming to investigate the determining factors of surplus persistence, including variables related to macroeconomic factors, the pandemic, growth in credit granting, and the increase in the number of service points of the financial cooperatives.

5 FINAL CONSIDERATIONS

This study investigated the persistence of surpluses in Brazilian financial cooperatives across their different life cycle stages, aiming to understand the dynamics of financial performance in this sector. The sample comprised 622 individual cooperatives, analyzed from 2018 to 2022. To classify the cooperatives by life cycle stage, the model proposed by Vasylieva and Chmutova (2015) and adapted by Maia (2022) was used. Surplus persistence was measured using the model of Dechow and Schrand (2004).

The results indicate a significant transformation in the cooperative sector between 2018 and 2022. Initially, cooperatives in the maturity and decline stages predominated, suggesting a consolidated sector facing challenges. However, in subsequent years, there was growth in the number of cooperatives in the expansion phase and a reduction in those in decline. This recovery and strengthening trend continued through 2022, with a notable increase in cooperatives classified as growing and mature. This dynamic suggests a more favorable business environment for cooperative development, possibly driven by improved management practices, government support policies, or more favorable market conditions.

Descriptive analysis of financial indicators reveals differentiated profiles across cooperatives at various life cycle stages. Return on Assets (ROA) showed similar mean values among the groups, indicating relatively homogeneous performance. However, cooperatives in decline exhibited greater dispersion in results, indicating higher heterogeneity at this stage.

Growth rates varied significantly between stages. Nascent and growing cooperatives demonstrated higher growth rates, consistent with existing literature, whereas mature and declining cooperatives had more moderate rates. Additionally, nascent cooperatives invested more in personnel, suggesting a focus on expansion and development. Participation in the National Credit Cooperative System remained relatively constant across stages, indicating that integration into the system is not strongly influenced by the cooperative's life cycle.

In summary, the results indicate that cooperatives in early stages tend to exhibit greater dynamism and growth focus, while more mature cooperatives show a more stable profile. The observed heterogeneity within the same stage suggests that internal factors, such as management strategies, and external factors, such as the business environment, influence cooperative performance. Surplus persistence varies according to life cycle stages (Can, 2020; Dechow & Schrand, 2004; Dickinson, 2011; Krishnan et al., 2020), being more pronounced in the Maturity and Decline phases.

Surprisingly, in the Decline phase, surplus persistence is higher, contrary to expectations from previous studies (Dechow & Schrand, 2004; Dickinson, 2011), which suggested reduced persistence. These results indicate the need for further detailed investigations. Potential explanations include the fact that prior studies focused on traditional companies with dynamics different from financial cooperatives. Moreover, regulatory factors specific to the cooperative sector, the adoption of distinct methodological criteria for classifying life cycle stages, and the implementation of management strategies may contribute to higher surplus persistence even during periods of decline.

Results in the Maturity stage align with findings from Dechow and Schrand (2004), Dickinson (2011), and Lima et al. (2015), reflecting that cooperatives at this stage tend to stabilize

their market position with more consistent projects, adopt lower-risk strategies, and exhibit less variation in results.

This study contributes to the literature by analyzing surplus persistence through the lens of organizational life cycle stages, offering a perspective scarcely explored in credit cooperative research. Practically, it provides guidance for managers to implement strategies aligned with the specific conditions of each life cycle stage. Socially, the study contributes to strengthening the sustainability of financial cooperatives, ensuring they meet the needs of their members.

For future research, it is recommended to extend the study period to monitor cooperatives over time and understand changes in their strategies and financial performance. Another suggestion is to investigate the influence of external factors (changes in legislation, economy, or market) on cooperative performance and surplus persistence across different stages. Additionally, the relationship between diversification of cooperative activities and financial performance and surplus persistence could be explored, identifying practices that maximize institutional stability and sustainable growth.

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Roles	1st author	2nd author
Conceptualization	♦	
Data Curation	♦	
Formal Analysis	♦	♦
Funding Acquisition		♦
Investigation	♦	
Methodology	♦	♦
Project Administration	♦	
Resources	♦	
Software	♦	
Supervision		♦
Validation	♦	♦
Visualization	♦	♦
Writing – Original Draft	♦	
Writing – Review and Editing	♦	♦

CONFLICT OF INTERESTS.

The authors declare that there is no conflict of interest regarding this submitted work.