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Capital structure in Brazilian credit unions: which factors are really determinants?

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Abstract

Purpose – To assess the determinants of the capital structure of Brazilian credit unions.

Theoretical framework – Capital structure represents one of the central topics in corporate finance theory and decisions about capital structure are among the most important in the strategic management of an organization. Based on the literature on non-financial firms and banks, and further grounded in the trade-off and pecking order theories, determinants that can explain the capital structure of credit unions were selected.

Design/methodology/approach – The determinants were investigated for 889 Brazilian individual credit unions with information available at the Central Bank of Brazil from 2008 to 2021, totaling 10,132 annual observations, using panel data regression models.

Findings – Capital structure is negatively influenced by profitability and risk, and positively by size. For tangibility, there is no evident influence. Furthermore, the pecking order theory is more suitable for the case of credit unions.

Practical & social implications of research – The deepening of knowledge about determinants can help regulatory authorities in the development of public policies that aim to protect credit unions from systemic risk, promoting the growth of the sector, which plays an important role as an agent of social and economic development.

Originality/value – This study is pioneering in that it presents results indicating that the determinants traditionally considered for non-financial companies and banks are also valid for credit unions, even though they are organizations with different characteristics from the rest.

Keywords: Corporate finance, capital structure, determinants, credit unions, pecking order.

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1 Introduction

According to the modern financial literature, the study of capital structure began with Modigliani and Miller (1958), who stated that in a frictionless world, with full information and complete markets, the value of firms is independent of their capital structure, and there are no incentives for managers to implement specific capital structures in their firms. Since then, studies have focused on investigating assumptions that were not considered by Modigliani and Miller (1958) to explain patterns observed in the capital structure of companies. Noteworthy are the trade-off theory, which suggests an optimal combination of debt and equity for value maximization, and the pecking order theory, where managers have a preference for specific types of capital due to information asymmetry and depending on transaction costs (Myers, 1984; Myers & Majluf, 1984).

However, even though knowledge about capital structure, especially about its determinants, has advanced from the realm of non-financial companies to financial institutions, little has been investigated regarding the case of Brazilian credit unions. Thus, we seek to answer the following question: Which factors are determinants of the capital structure of Brazilian credit unions? Therefore, the objective of this paper is to evaluate the determinants of capital structure in Brazilian credit unions. To this end, a sample of individual credit unions between 2008 and 2021 was used, for which the association of leverage with profitability, size, tangibility and risk was tested, these being the determinants identified by Gropp and Heider (2010) for banks, based on the literature for non-financial firms.

Although both are financial institutions, it is important to emphasize that the quotas of unions, similar to the shares of banks, cannot be traded, are only redeemable, have their price determined in the bylaws, and can be acquired by any individual who meets the requirements for membership, which may make managerial decisions regarding the capital structure of unions different from those of banks. Otherwise, one could suggest the similarity of the case of credit unions to that of commercial banks, and consequently to non-financial firms, suggesting that the preferences of managers for the types of capital are also the same, even though they are different firms.

In recent decades, the vast majority of studies, international or national, that have investigated determinants for capital structure have been developed for non-financial firms (Rajan & Zingales, 1995; Frank & Goyal, 2009; Graham et al., 2015; Serfling, 2016; Ramli et al., 2019), justifying that financial institutions should not be considered for these studies because regulatory requirements, such as the minimum capital requirement, can directly affect their capital structures. However, Gropp and Heider (2010) demonstrated that the theoretical logic applied to non-financial firms is also valid for financial firms, subsequently receiving support from evidence from papers such as those of Teixeira et al. (2014) and Hoque and Pour (2018). If it was previously believed that regulatory requirements were sufficient to determine the capital structure of financial institutions, it is now understood that factors such as profitability, size, tangibility, and risk are also considered by their managers when making financing decisions.

However, although knowledge about determinants for capital structure has advanced for financial institutions, the research has focused on the case of banks. Little has been investigated regarding the case of credit unions, whose importance is growing given their increasing participation within the National Financial System. In fact, the Banking Economy Report released by Banco Central do Brasil (2020) points out that the National Credit Union System has grown more than the rest of the National Financial System in the last five years, mainly due to the increase in the number of members, which reached 11.9 million in 2020 (9.4% more compared to 2019 and 42.1% more compared to 2016), causing credit operations carried out in unions to reach 33.4% in 2020 (an 8.4% increase compared to 2019).

The study presents theoretical, practical, and social contributions. As for the theoretical aspects, financial institutions, such as credit unions, are usually excluded from investigations on capital structure. Thus, this study sought to deepen the knowledge about capital structure in credit unions, which are even less studied than banks (Oliveira, 2018; Zancan, 2021). In practical terms, since the capital structure of credit unions is associated with the risk taken by them (Froot & Stein, 1998), identifying the determinants can contribute to regulators in designing public policies aimed at protecting unions from too much exposure to risk, which can eventually harm them, in order to promote the sector (Mishkin, 1998). As for the social aspects, they are related to the importance of credit unions, whether for the role they play with their members or for their representativeness in regions where traditional banks have no interest in operating (Fontes Fo et al., 2008), which qualifies these institutions as important agents of social and economic development.

2 Literature review

2.1 Credit unions and capital structure

Credit unions have peculiarities arising from the characteristics of their ownership. The members (or associates) are owners and customers of the union at the same time. Thus, while they join the union as customers in search of products and services with advantageous interest rates compared to other options in the market, they are also owners who can exercise control over the managers they elect so that they take decisions aimed at meeting their needs as customers. To become members, individuals must purchase a certain amount of quotas as stipulated in the union's bylaws. Unlike bank shares, which are tradable and can be issued at the managers' discretion, albeit with shareholder approval, union quotas are not tradable and have their value stipulated in the bylaws, and can be acquired by any individual who meets the requirements for membership also stipulated in the bylaws. Traditionally, credit unions have imposed occupational and territorial requirements for those interested in joining, but since 2003 they have been able to remove occupational requirements, in the so-called free admission of members. Since then, the amount of members in credit unions has been increasing (Canassa et al., 2022; Pinheiro, 2008; Hansmann, 1996).

Like any company, the capital structure of financial institutions is made up of third party capital, also known as leverage or indebtedness, and own capital, represented by shareholders' equity. It is noteworthy that in the Accounting Plan for Institutions of the National Financial System (Banco Central do Brasil, 2022) there is no separation between short- and long-term operations in liabilities, which leads to conceptualizing capital structure based on the totality of the accounts that belong to the right side of the balance sheet.

The capital structure of credit unions is usually measured by the ratio of total third party capital to total assets (Oliveira, 2018; Zancan, 2021), revealing how much of the assets are being financed by non-equity resources. On the one hand, the higher the indebtedness, the greater the risk assumed by the union. On the other hand, the lower the indebtedness, the greater the financial security in the long term. Furthermore, the capital structure of credit unions includes deposits and this differentiates them from non-financial companies. Thus, it is important to also consider leverage from deposits and non-deposit liabilities, as proposed by Gropp and Heider (2010), and also applied by Hoque and Pour (2018) and Oliveira and Raposo (2021).

2.2 Trade-off, pecking order and the case of credit unions

Since the seminal works of Modigliani and Miller (1958, 1963), difficult-to-reconcile theories have competed in trying to clarify the decisions made about capital structure. The trade-off and pecking order theories stand out in many empirical works (Rahman, 2019; Guizani, 2021; Khan et al., 2021), assuming that managers implement capital structures and have incentives to determine the amount of capital, whether third party or own capital.

The trade-off theory reports the existence of an optimal capital structure, in which a firm's value is maximized by debt through its tax benefit, restricted to not being large enough to increase the probability of causing financial distress. Thus, the optimal point is one at which the marginal benefit of debt equals its marginal cost. The trade-off theory assumes that a firm's capital structure would therefore reflect the search for this value-maximizing optimal point. Contestations exist because little consideration is given to intrinsic characteristics of firms in financing decisions, which has contributed to the literature focusing on issues such as the role of information asymmetry, transaction costs, and agency costs. According to Albanez et al. (2012, p. 78), in information asymmetry it is assumed that "managers or insiders have private information about the flow of returns of the company or its investment opportunities, which characterizes the informational difference (or asymmetry)." That is, managers who have inside information about the company have their own interests and have the authority to implement the capital structure, and may determine it as different from the optimal one.

The pecking order theory indicates that managers have distinct preferences as to the sources of corporate financing, with there being a hierarchy in which internally generated capital from retained earnings is preferred to third party capital, which is preferred to external capital from the sale of shares (Myers, 1984; Myers & Majluf, 1984). The preference for internal over external financing is due to the security of this type of capital, which has no cost and offers little information to stakeholders. The preference for debt over share issuances is also due to security, as creditors receive a fixed return for the capital invested. Only after the

debt capacity is exhausted would shares be issued. It can be observed that this order of preferences reflects both the preference for information released to stakeholders and the search to minimize transaction costs for the manager. Implications of the pecking order theory are the absence of a capital structure target, as opposed to what is proposed by the trade-off theory, making the choice of funding source dependent on the moment and situation, and that more profitable companies have less debt, preferring financial slack, while for the trade-off theory the profitability of a company would reduce the risk of the marginal cost of debt and allow more indebtedness.

Given the above, an attempt is made to understand how these theories can be applied to credit unions. First, credit unions are financial institutions and most of their debt is composed of deposits. However, Guizani (2021) and Khan et al. (2021) indicate that both theories are amenable to application to financial institutions because managers may pursue policies of growing deposits, increasing investment potential, with the security of own capital, balancing the marginal benefit of the risk assumed in deposits with its cost in a trade-off, or they may prefer the financial slack of retaining a surplus in a pecking order. Also, unions have no income tax, making the marginal benefit of debt non-existent and limiting the application of the trade-off theory to reducing costs, strengthening the hypothesis of a preference for equity capital to balance the risk of deposits and for non-existent cost. Finally, quotas in credit unions are not issued like shares in equity firms, because any individual who meets the requirements for membership in the unions can become a member. For the trade-off theory, this would limit the use of equity capital in order to achieve the optimal capital structure; however, this can be balanced by the use of retained earnings, as unions do not have an upper limit on their reserves (Brasil, 1971). For the pecking order theory, one has to consider that capital calls to members are allowed. However, as in listed companies, managers would tend to avoid this decision because it would signal bad information to stakeholders due to the suggestion of bad management.

2.3 Determinants of capital structure in credit unions

The preceding discussion addressed possible adaptations for applying the trade-off and pecking order theories to credit unions, as well as limitations. Within these theories, studies have sought to identify the determinants of capital structure for financial institutions (Sharpe, 1995; Abildgren, 2017; Oliveira & Raposo, 2021; Guizani, 2021), with the study by Gropp and Heider (2010) standing out, which was based on the literature on non-financial companies to identify the determinants for the capital structure of banks, such as: (i) profitability; (ii) size; (iii) tangibility; and (iv) risk. These are the determinants investigated in this paper.

(i) Profitability: The trade-off theory predicts a positive relationship between capital structure and profitability, since more profitable companies would have more taxable income to protect, promoting greater use of debt due to the tax benefits of deducting financial expenses from the income tax base. The pecking order theory, on the other hand, predicts a negative relationship between capital structure and profitability, since the more profitable the company is, the greater the margin for using internal resources to make investments. Studies developed in non-financial companies provide evidence for the negative association between profitability and capital structure, confirming the pecking order theory (Rajan & Zingales, 1995; Frank & Goyal, 2009; Albanez et al., 2012; Aybar et al., 2023). In financial institutions, the same relationship has also been identified (Gropp & Heider, 2010; Sheikh & Qureshi, 2017; Hoque & Pour, 2018; Silva et al., 2019; Khan et al., 2021; Guizani, 2021), which reinforces the idea of managers' predisposition to retaining profits as proposed in the pecking order theory. As discussed in the previous section, the same association would be expected in the case of credit unions, as the higher share of deposits in the capital structure brings greater risk to the union without there being a tax benefit from the debt. In addition, the surplus retained in reserves has no capital cost, providing security to the cooperative's management, which would prefer it over deposits and capital calls. Thus, Hypothesis 1 states that:

H1: The higher the profitability of credit unions, the less debt is maintained in the capital structure.

(ii) Size: According to the trade-off theory, there would be a positive association between capital structure and size, because larger companies are more diversified,

are less prone to financial difficulties and usually have greater debt power. On the other hand, according to the pecking order theory, there would be a negative association between capital structure and size, since larger companies would have enough internal resources to make investments. The literature for non-financial firms provides evidence that predominantly confirms the trade-off theory (Rajan & Zingales, 1995; Frank & Goyal, 2009; Ramli et al., 2019; Aybar et al., 2023). Other studies for financial institutions also point out that the association is positive (Gropp & Heider, 2010; Sheikh & Qureshi, 2017; Bukair, 2019; Budagaga, 2020; Oliveira & Raposo, 2021; Rahman, 2019). The justification for the positive association in financial institutions would lie in the logic of too big to fail, in which size would bring security to increase deposits relative to equity, "alleviating" the need to retain reserves or call for capital. While the discussion in the preceding section suggests a preference for and benefits of retaining earnings for credit union managers, it is plausible to assume that the same too-big-to-fail logic applies, which is reinforced by the fact that larger unions tend to be more protected from financial distress by regulatory authorities (Nan et al., 2019). Therefore, Hypothesis 2 states:

H2: The larger credit unions are, the more debt is maintained in their capital structure.

(iii) Tangibility: the trade-off theory predicts a positive association between capital structure and tangibility, because companies with more tangible assets can request more loans, since these tangible assets serve as collateral and retain value in liquidation processes. In fact, evidence from studies for non-financial firms reinforces the dominance of the trade-off theory regarding tangibility, identifying a positive association with capital structure (Rajan & Zingales, 1995; Frank & Goyal, 2009; Graham et al., 2015; Aybar et al., 2023). For financial institutions, a positive association has also been identified (Gropp & Heider, 2010; Bukair, 2019; Rahman, 2019; Oliveira & Raposo, 2021). The rationale behind this factor is that tangible assets are easy to collateralize and therefore reduce the agency costs of debt. Also, collateral can be offered to creditors in the event of insolvency, through the sale of assets and subsequent payment to them. It can also be said that the definition of bank guarantees includes liquid securities that can be used as collateral when borrowing from central banks. Most Brazilian credit unions are affiliated with a clearing house maintained by one of the credit union systems, which act as apex organizations and exert regulatory influence on affiliates, seeking sectoral robustness (Pinheiro, 2008). It would be expected, therefore, that the greater the tangibility of a credit union, the greater the security to take risks with deposit growth. Hypothesis 3 states:

H3: The greater the tangibility of credit unions, the more debt is maintained in their capital structure.

(iv) Risk: The trade-off theory predicts a negative association between capital structure and risk, since riskier firms would be more exposed to financial difficulties and therefore tend to be less indebted (Myers, 1984; Myers & Majluf, 1984). That is, the probability of default is higher, reducing the ability to raise debt and leading to a negative relationship between risk and leverage. Studies for non-financial firms have predominantly identified this negative relationship (Rajan & Zingales, 1995; Booth et al., 2001; Nakamura et al., 2007; Frank & Goyal, 2009; Ramli et al., 2019). In financial institutions, the same relationship has also been identified (Gropp & Heider, 2010; Oliveira & Raposo, 2021), reinforcing the logic of the trade-off theory. In the case of credit unions, it is important to emphasize that the risk is not associated with the performance of the quotas in the capital market, because they are not tradable. However, one can consider the financial risk, based on the volatility of earnings, which tends to generate financial difficulties. Therefore, it is suggested that under higher financial risk, union managers seek to increase the proportion of equity capital in the capital structure. Hypothesis 4 states:

H4: The greater the risk of credit unions, the less debt is maintained in their capital structure.

3 Methodological procedures

3.1 Data and sample

The data used are from the balance sheets of the individual credit unions available on BACEN's website, whose values were updated to December 2022 by the General Market Price Index. Data were collected for the years between 2004 and 2021, with 2004 being the first year after permission was given for unions to adopt free admission of members. However, it is important to point out that the analyses in this work were carried out on the period from 2008 to 2021, because model (1), to be presented in the next subsections, involves variables lagged by one year, including one whose construction required data from three years before. All procedures, from the database construction to the results, were carried out in the Stata 14 software, following the do-file in Appendix A (Supplementary Data 1- Stata do-file).

The final sample was selected using a number of criteria. Unions characterized as loan capital were disregarded, as they do not receive deposits and would naturally bias a study on capital structure in financial institutions (Pinheiro, 2008). Also, to minimize the effects of extreme values, we excluded unions with negative net equity in the period and those with only one year of observation. In addition, previous analyses of the variables that represent capital structure allowed for the identification of outliers in the sample, which gave rise to heteroscedasticity in preliminary regressions of model (1). The outliers include values greater than one for leverage. In this case, potential measurement error was considered and the unions were removed from the sample. Other observations with outliers were excluded following the rule of three standard deviations around the mean leverage. Thus, we arrived at a panel with 10,132 annual observations of 889 unions between 2008 and 2021. The unions are listed in Appendix A (Supplementary Data 2 - Names of unions), which also contains the final database (Supplementary Data 3 - Database).

3.2 Definition of the variables

The determinants of capital structure identified by Gropp and Heider (2010) were adapted for individual credit unions. Thus, the dependent variable leverage (LEV) was calculated as one minus the ratio of net equity to assets. The calculation of leverage from deposits (DEP) and non-deposit liabilities (LIAB) was also considered. This consideration is mainly due to the difference in the composition of the financial institutions' debt, composed of loans and financing taken out with creditors. The formula for leverage, as well as the determinants considered in this paper, is shown in Table 1.

The shares of the unions are not tradable, so only the book value leverage was considered, since there is no market value.

3.3 Econometric model and procedures

The association between the determinants proposed by Gropp and Heider (2010) and the capital structure of Brazilian credit unions was tested using model 1.

$$CS_{it} = \beta_1 PROF_{it-1} + \beta_2 SIZE_{it-1} + \beta_3 TANG_{it-1} + \beta_4 RISK_{it-1} + \theta + \alpha_i + e_{it} \quad (1)$$

where *CSit* is the capital structure of credit union *i* in year *t*, represented by leverage (LEV), deposits (DEP) or non-deposit liabilities (LIAB). PROF is profitability, SIZE is size, TANG is tangibility, and RISK is financial risk, all of which are considered in *t-1* as it is understood that it was their values in the previous year that led to the observed capital structure in *t* (Rajan & Zingales, 1995; Gropp & Heider, 2010). θ is a set of dummy variables for the year of observation to control for time effects, α is the effect specific to union *i*, and *e* is the idiosyncratic error term of the observation.

The use of panel data is important because it recognizes that the capital structure of the firms is determined primarily by specificities of the unions, such as core banking service and the market in which they operate, institutional factors such as the system and the clearing house with which they are affiliated, which do not vary over time, and other characteristics such as management skill (Lemmon et al., 2008; Gropp & Heider, 2010). Time-associated factors, on the other hand, are controlled by the set of dummy variables θ. The specification as to fixed effects or random effects in each regression of model (1) was determined by results of Hausman tests, whose null hypothesis suggests that random effects estimators are efficient and consistent, thus preferable over those specified with fixed effects. It is tested whether there is a correlation between the specific effects α_i and the regressors, in this case the determinants. If there is, fixed effects are preferable due to the endogeneity

Table 1
Description of the study variables

Variable	Description	Equation	Authors in the context of banks or companies
Leverage (LEV)	One minus the ratio of equity to total assets	$1-\frac{Net\ Equity}{Total\ Assets}$	Banks: Gropp and Heider (2010), Hoque and Pour (2018) and Oliveira and Raposo (2021).
Deposits (DEP)	Ratio of total deposits to total assets	$\frac{Total\ Deposits}{Total\ Assets}$	Banks: Gropp and Heider (2010), Hoque and Pour (2018) and Oliveira and Raposo (2021).
Non-deposit liabilities (LIAB)	Leverage minus total deposits	$LEV - Total\ Deposits$	Banks: Gropp and Heider (2010), Hoque and Pour (2018) and Oliveira and Raposo (2021).
Profitability (PROF)	Ratio between Earnings Before Interest and Taxes (EBIT) and total assets	$\frac{EBIT}{Total\ Assets}$	Banks: Hoque and Pour (2018). Companies: Booth et al. (2001).
Size (SIZE)	Natural logarithm of total assets	$ln(Total\ Assets)$	Banks: Sheikh and Qureshi (2017) and Hoque and Pour (2018). Companies: Lemmon et al. (2008) and Frank and Goyal (2009).
Tangibility (TANG)	Relationship between fixed assets and total assets	$\frac{Fixed\ Assets}{Total\ Assets}$	Banks: Gropp and Heider (2010) and Silva et al. (2019). Companies: Rajan and Zingales (1995) and Lemmon et al. (2008).
Risk (RISK)	Ratio of standard deviation of EBIT to total assets	$\frac{Standard\ Deviation\ of\ EBIT}{Total\ Assets}$	Banks: Oliveira and Raposo (2021). Companies: Booth et al. (2001) and Lemmon et al. (2008).

Source: elaborated by the authors.

between α_i and the determinants; otherwise α_i is assumed to be random for the regressors (Cameron & Trivedi, 2005; Wooldridge, 2002).

Some tests were performed to assess the validity of the results of the estimations of (1), in addition to Hausman tests to specify fixed effects or random effects. Correlation analysis, not tabulated, checked for possible collinearity among the determinants. A weak correlation (< 0.40) was identified for all combinations, and the possibility of multicollinearity in the determinants could be ruled out. Histogram analysis of the regressions' residuals suggests that their distributions are similar to that of a normal distribution. As for heteroscedasticity, it is understood that the removal of outliers solved the problem.

4 Results

Table 2 contains the descriptive statistics for the variables that make up model (1).

The mean leverage of the credit unions was 0.741. For the unions, deposits correspond to 0.548 of the size of total assets, on average, while non-deposit liabilities correspond to 0.193, on average. The mean leverage in the unions was below the mean found (92%) by Gropp and Heider (2010) for banks in developed countries, indicating that they are more leveraged than Brazilian credit unions. Deposits and non-deposit liabilities for these banks are also higher than those found in Brazilian unions (68% and 24%, respectively).

The mean profitability of the unions was 0.023 of assets, which may qualify such institutions as not very profitable compared to banks, although it is important to consider that the latter aim for profit, unlike unions. As for the mean size, the natural logarithm of total assets is 18.280, which represents about R$87 million. The mean tangibility of the unions is 0.019, which corroborates the understanding that the unions have low tangible asset ratios. In addition, the unions have a risk of 0.015, suggesting that they hold less collateral than non-financial companies.

Next, it is interesting to analyze the profile and evolution of the capital structure of Brazilian credit unions, before the regression results. Thus, Figure 1 contains the percentages of each component account of the capital structure of the unions in the sample between 2008 and 2021, differentiating liabilities between deposits and non-deposit liabilities, and equity between equity capital and reserves.

The share of deposits increased by 5.53% over the 14 years of analysis, going from 55.02% in 2008 to 60.55% in 2021. The growth reflects the increasingly strong contribution of these operations, which represent the main source of financing for the credit portfolio, besides being

Table 2
Descriptive statistics of leverage and determinants

	Mean	Median	Standard deviation
Leverage (LEV)	0.741	0.798	0.163
Deposits (DEP)	0.548	0.574	0.201
Non-deposit liabilities (LIAB)	0.193	0.142	0.170
Profitability (PROF)	0.023	0.022	0.045
Size (Size)	18.280	18.263	1.609
Tangibility (TANG)	0.019	0.014	0.022
Risk (RISK)	0.015	0.008	0.035
Observations	10,132	10,132	10,132

Source: elaborated by the authors.

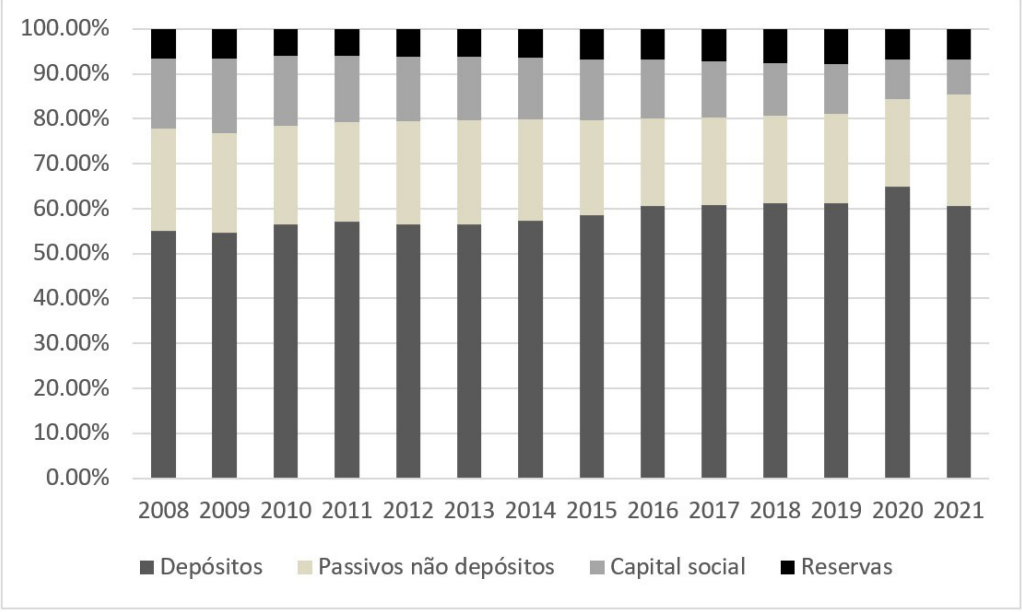

Figure 1. Breakdown of the capital structure of the credit unions over the years

Note: Depósitos = Deposits; Passivos não depósitos = Non-deposit liabilities; Capital social = Equity capital; Reservas = Reserves

Source: elaborated by the authors

a safer investment for the member, since it is guaranteed up to a limit of R$250 thousand by the Credit Union Guarantee Fund (Banco Central do Brasil, 2020). This increase in deposits may also reflect the free admission of members, who after joining the union, through the minimum payment of the share, can make any amount of deposits, with the data showing an increasing number of new members, totaling 11.9 million in 2020 (Banco Central do Brasil, 2020). There was an oscillation in the share of non-deposit liabilities, which over the 14 years increased by 2.13%, a smaller increase than deposits, with balances of 22.79% and 24.92% for 2008 and 2021, respectively. The growth in non-deposit liabilities may suggest greater intervention by regulatory authorities and systems based on clearing houses to protect unions that become larger and more complex with the entry of new members. Also, net equity decreased 7.65% over the 14 years, from 22.19% in 2008 to 14.54% in 2021. It can be identified that, of the accounts that compose the net equity of the credit unions, equity capital shows a decrease of 7.94%, which may be related to the fact that the member only pays the minimum amount to

become a member, and there is no longer any payment of equity capital. However, there was an increase in reserves of 0.29%, which may mean that the search to maintain surpluses remained.

Table 3 contains the results for the estimations of (1) for each leverage. Below the coefficients, in parentheses, are their respective standard errors.

The tests performed indicate overall model significance, validating the application of model (1). An R^2 of 20.6% was found for LEV (1). The breakdown of leverage into DEP (2) and LIAB (3) made it possible to identify that the determinants explain less of the leverage components, which can be verified by the drop in the R^2 to 18.3% and 6.7% in the regressions of DEP (2) and LIAB (3), respectively. Gropp and Heider (2010) also identified for banks a drop in the R^2 from 58% (LEV) to 30-40% in the DEP and LIAB regressions.

The variance in leverage due to union-specific effects was 88.4% for LEV (1), 89.6% for DEP (2), and 86.9% for LIAB (3), suggesting that their intrinsic characteristics are more relevant than the determinants themselves, even if they are significant. The same occurs with firms and banks (Lemmon et al., 2008; Gropp & Heider, 2010). Hausman tests indicate fixed effects for LEV (1) and DEP (2), but random effects for LIAB (3), suggesting that union-specific effects on non-deposit liabilities are exogenous to the determinants. Since these liabilities are mostly comprised of transfers from regulatory authorities, it could be suggested that the validity of the random effects stem mainly from factors external, in this case regulation, but still associated with the union. The fact that the regression for LIAB was the one with the lowest R^2 contributes to this suggestion. The specific effects in LEV (1) and DEP (2), on the other hand, may be due to the characteristics of each union, such as its area of activity and type of service it usually provides, which are correlated to factors such as size, profitability and risk.

As for the determinants, a negative association was identified between PROF and capital structure calculated in the three ways: -0.239 in LEV (1), -0.156 in DEP (2), and -0.088 in LIAB (3), with p-values < 1%. These findings can be understood as managers' preference to reinvest earnings instead of using other sources of capital, according to the assumption of the pecking order theory. It is noteworthy that reserves have no cost of capital and represent a safe form of financing compared to others, and being unprofitable means less surpluses to reinvest. This may be associated with the LIAB, which have the lowest coefficient for PROF, and refer mainly to transfers from regulatory authorities. As the lower the PROF, the higher the portion of the LIAB, it is possible that these transfers occurred to provide security to unions with difficulties generating surpluses.

This relationship with the pecking order theory has been found in studies on non-financial firms (Rajan & Zingales, 1995; Frank & Goyal, 2009) and financial firms (Hoque & Pour, 2018; Sheikh & Qureshi, 2017; Guizani, 2021), most notably that of Gropp and Heider (2010), who also reported the negative relationship, corroborating Hypothesis 1, that the higher the PROF of credit unions, the lower the debt maintained in the capital structure.

As for SIZE, it has a positive coefficient for LEV (1) and LIAB (3) (0.011 and 0.026), but the coefficient for DEP (2) (-0.021) was negative, with p-values < 1%. Overall, SIZE leads to higher LEV (1), as it would bring security to increase deposits relative to equity, reducing the need to hold reserves or call for capital. Also, the logic of too big to fail can be applied due to the fact that larger unions tend to be more protected from financial distress by regulatory bodies (Nan et al., 2019), and can still pursue a target level of debt. However, as for DEP (2), it is observed that the larger the union, the more the management would avoid deposit funding as it is a riskier source of financing. This is related to the issue of profitability, which always decreases the capital structure, suggesting a preference of managers to use internally generated capital, avoiding, whenever possible, capital that brings risk. Still, the LIAB (3) in the capital structure increase with increases in the size of the union, given their nature, which are mostly interfinancial liquidity operations often carried out with central unions, which may mean that the larger the union, the greater the protection received from these bodies. In other words, the union grows and naturally deposits increase, and with this increase managers have a preference to try to contain their participation in the capital structure and regulators try to reduce risk through interfinancial operations, which are less risky than deposits.

Thus, the study's findings for LEV (1) and LIAB (3) are in line with the positive relationship with SIZE, according to the trade-off theory, for the context of non-financial firms (Rajan & Zingales, 1995; Frank & Goyal, 2009; Ramli et al., 2019; Aybar et al., 2023) and financial firms (Sheikh & Qureshi, 2017; Bukair, 2019; Rahman, 2019; Budagaga, 2020; Khan et al., 2021;

Table 3
Credit union characteristics and leverage with fixed effects model

	LEV (1)	DEP (2)	LIAB (3)
PROF	-0.239***	-0.156***	-0.088***
	(0.015)	(0.020)	(0.017)
SIZE	0.011***	-0.021***	0.026***
	(0.002)	(0.002)	(0.002)
TANG	-0.181***	-0.031	-0.156
	(0.038)	(0.050)	(0.043)
RISK	-0.320***	-0.325***	-0.011***
	(0.030)	(0.039)	(0.032)
Dummy (2009)	-0.003	-0.000	-0.002
	(0.003)	(0.003)	(0.003)
Dummy (2010)	0.009***	0.018***	-0.007***
	(0.003)	(0.004)	(0.003)
Dummy (2011)	0.010***	0.024***	-0.012***
	(0.003)	(0.004)	(0.003)
Dummy (2012)	0.007**	0.025***	-0.014***
	(0.003)	(0.004)	(0.003)
Dummy (2013)	0.011***	0.031***	-0.016***
	(0.003)	(0.004)	(0.003)
Dummy (2014)	0.009***	0.040***	-0.026***
	(0.003)	(0.004)	(0.003)
Dummy (2015)	0.014***	0.054***	-0.034***
	(0.003)	(0.004)	(0.004)
Dummy (2016)	0.021***	0.079***	-0.052***
	(0.003)	(0.004)	(0.004)
Dummy (2017)	0.022***	0.086***	-0.056***
	(0.003)	(0.005)	(0.004)
Dummy (2018)	0.027***	0.096***	-0.060***
	(0.004)	(0.005)	(0.004)
Dummy (2019)	0.031***	0.097***	-0.058***
	(0.004)	(0.005)	(0.004)
Dummy (2020)	0.056***	0.136***	-0.070***
	(0.004)	(0.005)	(0.004)
Dummy (2021)	0.063***	0.108***	-0.035***
	(0.004)	(0.005)	(0.004)
Constant	0.532***	0.888***	-0.247***
	(0.029)	(0.038)	(0.029)
Observations	10,132	10,132	10,132
Unions	889	889	889
Panel specification	Fixed effects	Fixed effects	Random effects
R^2 between observations	0.206	0.183	0.067
Variance due to specific effects	0.884	0.896	0.869
Overall significance (F[d.f.] or χ^2[d.f.])	140.88*** (17.9226)	121.86*** (17.9226)	620.18*** (17)
Hausman test (χ^2[d.f.])	7229.35*** (17)	180.21*** (17)	8.76 (17)
Correlation between α_i and the determinants	0.220	-0.238	0 (assumed)

Source: elaborated by the authors.
Note: LEV is leverage calculated as 1 minus equity divided by total assets, DEP is the ratio of deposits to total assets, and LIAB is the ratio of non-deposit liabilities to total assets. PROF is profitability, SIZE is size, TANG is tangibility, and RISK is risk. In the test statistics, d.f. stands for degrees of freedom. ***p-value<1%; **p-value<5%.

Oliveira & Raposo, 2021), especially with the study by Gropp and Heider (2010), corroborating Hypothesis 2, which states that the greater the SIZE of credit unions, the more debt is maintained in their capital structure.

For TANG, only the coefficient of LEV (1) showed significance, being negative (-0.181), with p-values < 1%. For DEP (2) and LIAB (3) it was not significant. The relationships found were quite the opposite of Hypothesis 3, which expected a positive relationship of TANG with debt maintenance, supporting the trade-off theory. The opposite relationship identified for TANG may be related to the free cash flow theory (Jensen, 1986), in which it would not be tangibility that determines capital structure, but the large proportion of fixed assets arising from excessive investments by management, aiming at private benefits, achieved through the retention of surpluses.

As for RISK, a negative association was found for LEV (1), DEP (2) and LIAB (3) (-0.320, -0.325, -0.011), with p-values < 1%. In the case of credit unions, when financial risk is considered, volatility to generate earnings tends to cause financial difficulties. Thus, it is suggested that under higher financial risk, union managers seek to increase the proportion of equity capital in the capital structure. The result for LIAB (3) also reinforces the idea that unions with higher operational risk receive transfers from regulatory authorities.

The study findings for LEV (1), DEP (2) and LIAB (3) are in line with the negative relationship with RISK according to the trade-off theory, within non-financial firms (Rajan & Zingales, 1995; Booth et al., 2001; Nakamura et al., 2007; Frank & Goyal, 2009; Ramli et al., 2019) and financial firms (Oliveira & Raposo, 2021), especially with the study by Gropp and Heider (2010), corroborating Hypothesis 4, which states that the higher the RISK of credit unions, the less debt is maintained in their capital structure.

As a consolidation of the findings, it contributes to the knowledge that in the emerging Brazilian environment the regression model works best for LEV (1) in credit unions. Additionally, union managers tend to retain surpluses using internal capital rather than debt, as identified for banks (Gropp & Heider, 2010). Larger unions have a higher proportion of liabilities and the same is true for banks (Gropp & Heider, 2010). Furthermore, such unions may be protected from financial distress by regulators, suggesting systemic protection, perhaps due to the greater exposure to inherent risk by the massive entry of new members. Also, when faced with higher risk, managers seek to increase the proportion of equity capital in the capital structure, reducing debt. According to Gropp and Heider (2010), banks with higher risk have lower leverage and these correlations correspond to those typically found for non-financial companies. Alternatively, managers can resort to regulator transfers.

However, even though the determinants are important, it was identified that the specific effects of each union determine most of the variance of the capital structure of the credit unions. As for the theories, the pecking order theory may be better suited to explaining capital structure, given that managers tend to prefer internally generated capital, which may also be a reflection of the absence of the tax benefit of debt.

5 Conclusion

This study aimed to assess the determinants of the capital structure of Brazilian credit unions. To this end, regression models with panel data test the association of the determinants identified by Gropp and Heider (2010) for banks with the capital structure of 889 Brazilian credit unions over the period from 2008 to 2021. The results suggest that unions are increasingly leveraged by deposits, which is associated with the distinct nature of the activity of these institutions vis-à-vis non-financial firms.

The negative associations between profitability and capital structure align the case of credit unions more with the pecking order theory. For size, positive associations were found for leverage and non-deposit liabilities, in line with the trade-off theory. On the other hand, risk has negative associations for leverage, deposits and non-deposit liabilities, in accordance with the trade-off theory. Based on these results, the variables profitability, size and risk have an effect on the capital structure of credit unions. Finally, there is no clear association between tangibility and capital structure for credit unions.

It is believed that the results, in addition to filling a gap in the literature, contribute to the theory by pointing out that the determinants of non-financial companies and banks are also valid for credit unions, even though they are not profit-oriented financial institutions and have no market to trade their quotas, both important factors for raising funds. Furthermore, specific effects of each credit union, whether internal or external, correspond to most of the variation in capital structure, as identified in non-financial firms and banks. This implies that studies on capital structure should consider credit unions as well,

since they follow the same patterns as non-financial firms and banks. Also, it is suggested that managers have a preference for internally generated capital, especially by retaining surpluses. Thus, the theory that best fits the case of credit unions is the pecking order theory. This may also reflect the fact that there is no tax benefit of debt in credit unions.

In practice, it is believed that this study helps to provide an overview for union managers to understand factors that may affect their capital structure. Furthermore, regulatory authorities are external factors that affect credit unions, suggesting that they have an influence in determining their capital structures. Thus, identifying the determinants may contribute to the development of public policies aimed at protecting unions, promoting the growth of the sector, without them taking on too many risks.

As a limitation of the study, it was not possible to consider other forms of calculation for the dependent variable leverage, due to the unavailability of separate data on short- and long-term liabilities of credit unions on the BACEN website. To expand the frontiers of knowledge, future studies could explore the so-called union-specific effects. For example, studies could delve into how regulation affects the capital structure of credit unions, possibly through measures that reduce systemic risk. Also, given the suggestion of a preference for internally generated funds, studies could move towards the using the free cash flow theory proposed by Jensen (1986), which indicates that managers make poor investment decisions because excessively retained reserves allow them to do so.

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Supplementary Material

This article comes with supplementary data

APPENDIX A. Supplementary data.

Supplementary Data 1. Stata do-file.

Supplementary Data 2. Names of the unions.

Supplementary Data 3. Database.

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