

Determinants of the profitability of credit unions in Ecuador

Carlos Gabriel Parrales Choez¹, Fernando José Zambrano Farías^{1,2,*}, María del Carmen Valls Martínez³

¹ Faculty of Administrative Science, University of Guayaquil, Guayaquil 090510, Ecuador

² Business School, International University of Ecuador (UIDE), Quito 170411, Ecuador

³ Department of Economics and Business, CIMEDES, University of Almería, 04120 Almería, Spain

* **Corresponding author:** Fernando José Zambrano Farías, fezambranofa@uide.edu.ec

CITATION

Parrales Choez CG, Zambrano Farías FJ, Valls Martínez MdC. (2024). Determinants of the profitability of credit unions in Ecuador. *Journal of Infrastructure, Policy and Development*. 8(8): 6287. <https://doi.org/10.24294/jipd.v8i8.6287>

ARTICLE INFO

Received: 8 May 2024

Accepted: 29 May 2024

Available online: 8 August 2024

COPYRIGHT



Copyright © 2024 by author(s).

Journal of Infrastructure, Policy and Development is published by EnPress Publisher, LLC. This work is licensed under the Creative Commons Attribution (CC BY) license. <https://creativecommons.org/licenses/by/4.0/>

Abstract: This study analysed the behaviour of both economic and financial profitability of credit unions belonging to segment 1 in Ecuador, as well as its determinants. For this purpose, data from the financial statements of a sample of 30 credit unions between 2016 and 2022 were used by means of a multiple linear regression methodology using panel data with fixed effects after applying the Hausman test. The findings of this research showed that current liquidity and non-performing loans have a negative and significant effect on both economic and financial profitability while the past due portfolio has a positive and significant impact on the generation of profitability of the financial institutions under study. In addition, it was revealed that the rate of outflow absorption has a negative relationship with economic profitability but a positive relationship with financial profitability. Unlike previous research in the Ecuadorian context, this research is pioneering in presenting results that indicate that the determinants traditionally considered for nonfinancial institutions and banks are also valid for credit unions, even though they are organisations with different characteristics from the rest.

Keywords: economic profitability; financial profitability; liquidity; panel data; credit union

1. Introduction

The financial system plays an important role in the current context, as it contributes significantly to a country's economic development, especially in emerging economies such as Ecuador. Economic development comprises all those activities carried out to increase the economic prosperity and standard of living of its population (Purmiyati et al., 2022). Indeed, providing financial inclusion facilities to entrepreneur, micro, small and medium-sized enterprises is a way to improve welfare. In this regard, Lal (2018) argues that financial inclusion through credit unions has a direct and significant impact on poverty alleviation. Thus, participation as a member of a credit union increases household income and substantially reduces poverty in rural areas (Park and Mercado, 2018; Purohit and Saravanan, 2018).

The literature defines a credit union as a people-centred organization, that is controlled and managed by and for its members with the aim of satisfying their common economic, social and cultural needs and aspirations (Martínez-Campillo et al., 2017; Unda et al., 2019). In this regard, Amoah et al. (2018) and Mckillop and Wilson (2011) agree that the existence of credit unions is based on the purpose of providing their members with financial services that, although also offered by other financial institutions, these entities are oriented to achieve economic and social objectives of their members and local communities in general. Likewise, Da Silva et al. (2017) state that credit unions aim to provide financial services, such as loans, to individuals who are generally excluded from the traditional banking system, so this

activity allows them to expand their social mission.

In Ecuador, savings and credit unions have emerged as a response to social inclusion, the purpose of which is to allow groups of people excluded from traditional banking to access sources of financing that will enable them to escape from poverty (Guallpa Guamán and Urbina-Poveda, 2021). These financial entities are an alternative to satisfy the demand for market credit, given that one-fifth of the country's cantons lack bank branches. Although the participation of credit unions in the financial system is still smaller compared to the banking system, their sustained growth demonstrates their importance in the Ecuadorian economy.

However, like any other type of company, the main objective of these financial institutions is to maximize their profits without neglecting financial and social inclusion. To achieve these benefits, it is necessary to evaluate the results obtained regarding their profitability and compare them with those proposed at the beginning of the fiscal year (Zambrano Farías et al., 2022). The literature points out that achieving the desired profitability depends on multiple factors, which are classified into three categories: i) factors specific to the company, such as financial ratios, seniority and number of employees; ii) factors associated with the environment, including the geographical location of the organization, the size of the industry and macroeconomic variables, and; iii) factors associated with the management capacity of the owner or shareholders (Parra, 2011; Romero Espinosa, 2013; Zambrano Farías et al., 2021). Indeed, previous research (Almaqtari et al., 2019; Madugu et al., 2020; Nimer et al., 2015; Qehaja-Keka et al., 2023) highlight factors that are frequently used in profitability analysis. These include liquidity, the size of the financial institution, the capital adequacy ratio, the default level, inflation, and the GDP of the country where the credit union operates, among others.

This study aims to contribute to the literature in two ways. First, it highlights the factors that significantly affect the financial performance of credit unions in Ecuador that belong to Segment 1, considering variables traditionally used to explain the economic and financial profitability of nonfinancial entities and banks. Second, this research responds to the need for the financial institutions under study to understand both the internal and external environment in order to achieve sustainable profitability in the medium term, which will allow them to avoid scenarios of financial insolvency and subsequent business failure.

The research is structured as follows. Section 2 contains a literature review of studies related to the profitability of financial institutions. Section 3 explains the sample selection and describes the variables used in the proposed model. Section 4 shows the results obtained, and finally, section 5 presents the discussion and conclusions derived from this research.

Literature review

The profitability of companies belonging to the financial system has been extensively researched in different countries worldwide. The studies have focused mainly on a specific country or countries belonging to a region (Almaqtari et al., 2019; Knezevic and Dobromirov, 2016). In this way, research conducted in countries such as Indonesia stands out (Hersugondo et al., 2021), Somalia (Sheikhdon, 2016), Jordan

(Nimer et al., 2015), Kenya (Esokomi and Mutua, 2018) and Canada (Almehdawe et al., 2021); or in regions such as the Balkan countries (Radovanov et al., 2023) and countries of the Middle East and North Africa (Abdelmoneim and Yasser, 2023).

Authors such as de Leon (2020) consider that profitability is an essential indicator of the performance of financial institutions. Most researchers use return on equity and return on assets as a measure of profitability, as it reflects the efficiency of companies in managing their equity and resources (Priharta and Gani, 2024).

The first studies that analyzed the determinants of the profitability of financial institutions were conducted in the U.S. banking sector (Angbazo, 1997; Berger, 1995; Neely and Wheelock, 1997). In this regard, the results of these investigations showed that banks' capital ratio had a direct and significant impact on financial profitability (Berger, 1995). It was also demonstrated that the net interest margin earned by commercial banks, reflects the non-payment risk premium and the interest rate premium (Angbazo, 1997), while Neely and Wheelock (1997) showed that the presence of establishments in particular states and particular state banking laws influence the variation of profits received by these banks according to the state where they conducted their operations. In recent decades, with the increase in economic activity and thanks to globalization, which has allowed the development of international financial markets, researchers have been interested in the financial systems of emerging economies.

The literature points out that factors specific to financial entities, such as credit risk (Arif and Anees, 2012; Derbali, 2023), size (Derbali, 2023; Sobol et al., 2023), their level of liquidity (Knezevic and Dobromirov, 2016; Radovanov et al., 2023), revenue growth (Obamuyi, 2013), control of expenditures, portfolio default (Muhammad et al., 2020; Takahashi and Vasconcelos, 2024) and the capital adequacy ratio (Sobol et al., 2023) have an impact on their financial performance. Likewise, previous research (Abdelmoneim and Yasser, 2023; Bittencourt et al., 2017; Milojević et al., 2023; Zheng et al., 2023) conclude that, in addition to factors specific to the financial system, there are factors associated with the environment such as geographic location, market size and certain macroeconomic variables such as inflation and gross domestic product that affect the financial and economic performance of banks and credit unions. The size of financial institutions is one of the factors most frequently used in studies and is usually defined as the natural logarithm of the total assets held by banks and credit unions (Abdul Hasan et al., 2020; Radovanov et al., 2023). For Priharta and Gani (2024), the size of banks is one of the main drivers of profitability because, thanks to their economy of scale, they have greater access to ample sources of financing and more precise cost management techniques, which allows them to be more profitable. In contrast, small entities such as savings and credit unions are less profitable, operating at higher costs (Derbali, 2023).

Despite this, the literature results in this regard are inconclusive, as some studies have shown a positive relationship while others have shown the opposite. Thus, Priharta and Gani (2024) and Zancan et al. (2023) point out that the size of banks has a positive relationship with their financial performance; however, Saleh and Paz (2023) conclude that this relationship is negative.

Authors such as Radovanov et al. (2023) and Saleh and Paz (2023), consider that the capital adequacy ratio is a factor frequently used in the literature to explain the

profitability of financial institutions since it measures the ability of a bank or credit union to cover all the risks inherent in its earning assets. Because adequate capital is considered the basis for avoiding bank failure, several studies have analyzed the significant impact on the profitability of banks and other financial institutions (Subbarayan et al., 2017). Thus, Almaqtari et al. (2019), Abdelmoneim and Yasser (2023) and Saleh and Paz (2023) conclude that this ratio has a positive and significant impact on the profitability of banks, while for Hersugondo et al. (2021) and Madugu et al. (2020) the existing relationship between profitability and the net capital ratio is negative. On the other hand, Frihardina et al. (2023) and Saleh and Paz (2023) argue that there is no significant relationship between the two variables.

Banks' liquidity level affects profitability (Parvin et al., 2019). A higher liquidity ratio implies that banks have a greater capacity to meet their short-term liabilities. Conversely, a decrease in this indicator may affect firms' short-term profitability (Durrah et al., 2016; Gaur and Mohapatra, 2021). Previous studies agree that the profitability and liquidity of financial institutions have a positive relationship (Abdelmoneim and Yasser, 2023; Rani and Zergaw, 2017). In contrast, Al-Jafari and Alchami (2014) showed that liquidity and profitability have a negative and significant relationship.

Variables associated with the financial institution's environment, such as the level of inflation experienced by the economy, impact its financial performance (Arif and Anees, 2012). Some authors (Abdelmoneim and Yasser, 2023; Knezevic and Dobromirov, 2016) consider the relationship between inflation and profitability of banks and financial institutions to be negative, while other studies, such as that of Milojević et al. (2023) show that this relationship is positive for Serbian banks. For their part, Almaqtari et al. (2019) and Rani and Zergaw (2017) claim that inflation has no significant impact on the profitability of financial institutions.

Based on the above, the following hypotheses were proposed in this research:

Hypothesis 1 (H1): Credit unions' liquidity positively impacts profitability.

Hypothesis 2 (H2): The level of total default negatively affects profitability.

Hypothesis 3 (H3): The degree of expenditure absorption positively impacts profitability.

Hypothesis 4 (H4): The amount of portfolio past due positively impacts profitability generation.

2. Materials and methods

2.1. Sample selection and data collection

The sample obtained for this study consists of 30 savings and credit unions belonging to Segment 1 (with a total volume of assets greater than US\$80 million) operating in Ecuador between 2016 and 2022. Information gathered from the financial statements that the credit unions under study reported to the Superintendency of Popular and Solidarity Economy (SEPS) was used.

2.2. Description of variables

The study has focused on analyzing the variables that explain the profitability of

credit unions belonging to Segment 1. For this analysis of credit union performance, the indicators that are frequently used are ROA (return on assets—economic profitability) and ROE (return on equity—financial profitability), given their capacity and scope for measuring investments in terms of assets and equity (Abou Elseoud et al., 2020; Alarussi and Alhaderi, 2018; Almaqtari et al., 2019; Alshatti, 2014; Knezevic and Dobromirov, 2016; Zambrano Farías et al., 2022). As in most previous studies (Almaqtari et al., 2019; Jiunn et al., 2018; Shahnian et al., 2020; Teixeira Trindade et al., 2010), in this research has used ROA and ROE as dependent variables. Both variables are continuous quantitative variables.

In general terms, the literature groups the explanatory variables into three different categories: i) company-specific variables, such as the organization’s seniority in the market, financial variables such as the level of assets, indebtedness, total revenues, asset turnover, average collection period, average payment period, its legal form and the growth of the company in terms of its personnel employed, its level of revenues or the volume of its assets; ii) variables associated with its environment, such as country of residence, region and macroeconomic variables such as gross domestic product and inflation; iii) variables associated with the management capacity of the agent or manager, considering in this group the variable gender, academic level of the owner or manager, previous experience in the position, among others (Parra, 2011; Romero Espinosa, 2013; Zambrano Farías et al., 2023).

The following explanatory or independent variables were considered for this study: The investments made by the credit unions, the amount of their accounts receivable, the length of time they have been in the financial system, the current liquidity ratio, the percentage of their productive assets about their total assets, the level of operating expenses to the financial margin, total default, past due portfolio, net capitalization index, level of indebtedness and inflation.

Table 1 shows the description of all the variables used in this study.

Table 1. Definition of variables.

Abbreviation	Variable	Definition
ROE	Financial profitability	Net income divided by stockholders’ equity
ROA	Economic profitability	Net income divided by total assets
CurLiq	Current liquidity	Current assets divided by current liabilities
Default	Total default	Non-performing portfolio divided by gross portfolio
Absorp	Absorption of expenses	Operating expenses divided by financial margin
Portf	Portfolio to mature	Credit granted
LnInvest	Investments	Natural logarithm of investments made by the credit union
LnReceiv	Accounts receivable	Natural logarithm of accounts receivable
Age	Credit union age	Age of credit union in years
NPA	Net productive assets	Percentage of productive assets divided by total assets
CAR	Capital adequacy ratio	Net capital divided by current assets subject to risk and current liabilities
Debt	Indebtedness	Total debts divided by total assets
Inflat	Inflation	Inflation for the year in the country

Source: Own elaboration.

2.3. Methodology

Following the methodology of Zambrano Farías et al. (2022), a linear correlation analysis was first carried out to identify factors significantly correlated with performance and rule out multicollinearity cases. Next, a multiple linear regression model was applied to determine the variables that explain the profitability behavior of credit unions (Priharta and Gani, 2024; Rani and Zergaw, 2017).

A panel data methodology was used to eliminate possible unobservable heterogeneity among the credit unions in the sample and to consider the effects of omitted variables in the empirical study (Hausman, 1978). The fixed effects estimation model is recommended when there is heterogeneity among firms, and it is correlated with the regressors. Otherwise, a random effects model is recommended. In this research, we used the Hausman test (Hausman, 1978) to determine which model provides the most consistent estimators.

The F statistic and the adjusted R^2 were used to evaluate the model’s goodness of fit. Finally, a comparison between the different models was made, taking into account the Akaike information criterion (AIC) and the Bayesian information criterion (BIC), considering that smaller values indicate better models (Akaike, 1974; Schwarz, 1978).

3. Results

3.1. Descriptive statistics and correlation

The main statistics of the variables used to explain the profitability of credit unions belonging to segment 1 in Ecuador during the period 2016–2022 are shown in **Table 2**.

Table 2. Descriptive statistics.

Variable	Media	Standard deviation	Minimum	Maximum
ROE	0.0622	0.0413	-0.0132	0.1945
ROA	0.0086	0.0061	-0.0016	0.0249
CurLiq	42.1337	17.1795	19.9952	159.3269
Default	0.0399	0.0180	0	0.0992
Absorp	-	-	-	-
Portf	-	-	-	-
LnInvest	19.3915	0.7431	18.2357	21.8499
LnReceiv	-	-	-	-
Age	40.4799	15.6270	7.2959	59.6411
NPA	-	-	-	-
CAR	0.1359	0.0411	0	0.2581
Debt	0.8551	0.0376	0.7388	0.9364
Inflat	0.8662	1.3737	0.3389	3.4662

Source: Own elaboration.

The financial profitability of credit unions, on average, is 6.22%, a value that is well above averages presented in India, Pakistan, Bangladesh, and Kenya, i.e., -1.09%, -0.043%, 0.194%, and 1.40%, respectively (Esokomi and Mutua, 2018; Qayyum and

Ahmed, 2018). However, this indicator is far below compared to financial institutions in Kosovo and Albania (19.52%) (Qehaja-Keka et al., 2023) and Brazil (13.01%) (Bittencourt et al., 2017).

The average economic performance of credit unions in Ecuador is 0.86%. This value is slightly higher than the one found in Tunisia (0.84%) (Derbali, 2023), Brazil (0.61%) (Bittencourt et al., 2017) and in Balkan countries such as Bosnia, Herzegovina, and Albania (0.74%) (Radovanov et al., 2023). However, in Islamic countries, the economic profitability is higher (1.28%) (Qabajeh et al., 2023), as well as in Indonesia (2.78%) (Priharta and Gani, 2024).

Similar to what has been considered in previous research (Derbali, 2023; Milojević et al., 2023; Radovanov et al., 2023; Sobol et al., 2023; Zheng et al., 2023), this study defines the credit union's size as the natural logarithm of its assets, which, for the period under study, has a mean of 19.39.

The average age of the credit unions in the financial system was 40.48 years, while in countries such as Palestine, they are much younger (23.45%) (Saleh and Paz, 2023). In Indonesia, however, the average age of financial institutions is slightly older (41.80%) (Hersugondo et al., 2021). Because Ecuador has a dollarized economy, inflation levels during the period under study have been maintained with little volatility. Thus, the average was 0.86%, in contrast to economies like Tunisia and Serbia, where average inflation was higher (3.20%) (Derbali, 2023), (2.00%) (Milojević et al., 2023).

The capital adequacy ratio was 13.59%, in contrast to Indonesia and Palestine, which have a higher ratio, i.e., 18.41% and 21.24%, respectively (Priharta and Gani, 2024; Saleh and Paz, 2023). Finally, the average level of indebtedness of the credit unions belonging to segment 1 was 85.51%, while current liquidity was USD 42.13 to cover their short-term obligations. In other countries, the liquidity levels of the credit unions were lower than those of Ecuador (40.65%) (Abdelmoneim and Yasser, 2023), (22.56%) (Radovanov et al., 2023).

Table 3 shows the Pearson correlation matrix between the variables used in this research. All the regressors significantly correlate with the explained variables (ROE and ROA). Specifically, the natural logarithm of investments, net productive assets, portfolio maturing, and net capitalization index positively and significantly correlate with ROE and ROA. In contrast, the logarithm of accounts receivable, aging, inflation, current liquidity, outflow absorption, total default, and level of indebtedness have a negative and significant relationship with ROE and ROA.

Table 3. Pearson correlations.

	ROE	ROA	CurLiq	Default	Absorp	Portf	LnInvest	LnReceiv	Age	NPA	CAR	Debt
ROA	0.9154*** (0.0000)	-	-	-	-	-	-	-	-	-	-	-
CurLiq	-0.1818*** (0.0057)	-0.3116*** (0.0000)	-	-	-	-	-	-	-	-	-	-
Default	-0.2310*** (0.0004)	-0.1938*** (0.0032)	-0.1070 (0.1047)	-	-	-	-	-	-	-	-	-
Absorp	-0.7235*** (0.0000)	-0.7292*** (0.0000)	0.0310 (0.6388)	0.4463*** (0.0000)	-	-	-	-	-	-	-	-
Portf	0.1325** (0.0447)	0.0928 (0.1605)	-0.4454*** (0.0000)	0.3709*** (0.0000)	0.0982 (0.1378)	-	-	-	-	-	-	-
LnInvest	0.1108* (0.0980)	0.0023 (0.9725)	0.1241* (0.0632)	-0.1129* (0.0911)	-0.1395** (0.0366)	-0.2503*** (0.0002)	-	-	-	-	-	-
LnReceiv	-0.2558*** (0.0001)	-0.3747*** (0.0000)	0.1102* (0.0946)	-0.0657 (0.3198)	0.1593** (0.0154)	-0.1002 (0.1297)	0.4657*** (0.0000)	-	-	-	-	-
Age	-0.2421*** (0.0002)	-0.2288*** (0.0005)	-0.0881 (0.1821)	0.1106* (0.0935)	0.2891*** (0.0000)	-0.0997 (0.1316)	0.1784*** (0.0073)	0.1753*** (0.0076)	-	-	-	-
NPA	0.4242*** (0.0000)	0.4611*** (0.0000)	-0.0873 (0.1860)	-0.2439*** (0.0002)	-0.4885*** (0.0000)	-0.1041 (0.1154)	0.2901*** (0.0000)	-0.3485*** (0.0000)	-0.0575 (0.3847)	-	-	-
CAR	0.2641*** (0.0001)	0.5462*** (0.0000)	-0.2659*** (0.0000)	0.0713 (0.2808)	-0.3255*** (0.0000)	-0.1037 (0.1169)	-0.2400*** (0.0003)	-0.4115*** (0.0000)	-0.1466** (0.0259)	0.1635** (0.0129)	-	-
Debt	0.2398*** (0.0002)	0.2456*** (0.0002)	0.3185*** (0.0000)	-0.1056 (0.1095)	0.2456*** (0.0002)	0.1090* (0.0991)	0.2294*** (0.0005)	0.4077*** (0.0000)	0.0654 (0.3226)	-0.2398*** (0.0002)	-0.8787*** (0.0000)	-
Inflat	-0.2640*** (0.0001)	-0.2584*** (0.0000)	0.0706 (0.2851)	0.0952 (0.1494)	0.1557** (0.0179)	0.0134 (0.8393)	-0.0036 (0.9573)	-0.0231 (0.7271)	0.0401 (0.5442)	-0.1143* (0.0830)	-0.0957 (0.1469)	0.1072 (0.1041)

p-value in parentheses. ***, ** and * denote a significance level below 1%, 5% and 10%, respectively. Number of observations: 231. Source: Own elaboration.

3.2. Multivariate analysis

Table 4 shows the results of the ordinary least squares and panel data regression analysis for economic profitability, while **Table 5** shows the results for financial profitability. In both cases, the Hausman test yielded a p -value of less than 0.05, indicating that the fixed effects model (reported) was better than the random effects model (not reported). Also, the p -value of less than 0.05 for the Breush-Pagan test and the AIC and BIC values confirmed that the fixed-effects model outperformed the least-squares model.

Table 4. ROA regression analysis.

Variable	MCO	EF
CurLiq	-0.0003*** (0.009)	-0.0005** (0.021)
Default	-0.0084 (0.565)	-0.07348*** (0.000)
Absorp	-0.0158*** (0.000)	-0.0143*** (0.000)
Portf	0.0478*** (0.002)	0.0796** (0.010)
LnInvest	0.0007*** (0.001)	-0.0004ns (0.193)
LnReceiv	-0.0012*** (0.000)	-0.0022*** (0.000)
Age	-0.0004ns (0.318)	-0.0044ns (0.251)
NPA	-0.0075ns (0.357)	0.0493*** (0.000)
CAR	0.0044ns (0.688)	0.0098ns (0.375)
Debt	-0.0596*** (0.000)	-0.0240ns (0.231)
Inflat	-0.0005*** (0.000)	-0.0003** (0.026)
Observations	224	224
R^2 adjusted	0.7547	0.8559
F	63.39*** (0.000)	54.64*** (0.000)
Breush-Pagan	-	4.46 (0.000)
Hausman test	-	106.22 (0.000)
AIC	-1952.69	-2122.52
BIC	-1911.75	-2081.58

p -value in parentheses. ***, ** and * denote a significance level below 1%, 5% and 10%, respectively. ns not significant. AIC and BIC smaller is better. Source: Own elaboration.

The results show that the credit unions' economic and financial profitability have a negative relationship with the current liquidity ratio. Since H1 postulates a positive relationship, this hypothesis is rejected. Non-performing loans show a significant inverse relationship in both cases, with a probability of 99%, which confirms H2. The degree of absorption of outflows shows a significant relationship with the opposite sign to that postulated in H3 for economic profitability, while for financial profitability, although the sign is positive in the panel data model, it is negative in the OLS model; consequently, H3 is not confirmed. Finally, for both types of profitability, the amount of portfolio to maturity shows a significant positive relationship, thus confirming H4.

On the other hand, concerning the control variables, it is noteworthy that the logarithm of accounts receivable presents a significant negative relationship with profitability in all models. The rest of the variables are not significant or do not present

stable results worth mentioning.

Table 5. ROE regression analysis.

Variable	MCO	EF
CurLiq	-0.0002ns (0.172)	-0.0003* (0.063)
Default	0.0251ns (0.840)	-0.5773*** (0.000)
Absorp	-0.1241*** (0.000)	0.1195*** (0.000)
Portf	0.3769*** (0.003)	0.7929*** (0.001)
LnInvest	0.0067*** (0.001)	-0.0028ns (0.301)
LnReceiv	-0.0100*** (0.000)	-0.0190*** (0.000)
Age	-0.0045ns (0.247)	0.0101ns (0.744)
NPA	-0.0732ns (0.293)	-0.3789*** (0.000)
CAR	-0.0847ns (0.372)	-0.0157ns (0.861)
Debt	-0.0886ns (0.393)	0.1199ns (0.459)
Inflat	-0.0051*** (0.000)	0.0028** (0.017)
Observations	224	224
R ² adjusted	0.6193	0.7986
F	33.97*** (0.000)	42.19*** (0.000)
Breush-Pagan	-	5.39 (0.000)
Hausman test	-	181.87 (0.000)
AIC	-993.14	-1186.54
BIC	-952.20	-1145.60

p-value in parentheses. ***, ** and * denote a significance level below 1%, 5% and 10%, respectively. ns not significant. AIC and BIC smaller is better. Source: Own elaboration.

4. Discussion

Descriptive analysis showed that Ecuadorian credit unions have a higher average financial profitability than those located in Pakistan, Bangladesh, and Kenya (Esokomi and Mutua, 2018; Qayyum and Ahmed, 2018). This could be due to the fact that in Ecuador, these entities have better administrative management with better governance practices. Also, the fact that the Ecuadorian economy is dollarized makes the environment in which credit unions operate favourable; this includes factors such as macroeconomic stability, low interest rates, and government police that strengthen this sector. In contrast, this average is lower than that presented in Brazil, Kosovo, and Albania (Bittencourt et al., 2017; Qehaja-Keka et al., 2023).

Despite the fact that the Ecuadorian economy is considered emerging, financial institutions, both banks and credit unions, have invested in resources and technology, which has allowed them to manage their assets more efficiently. This has led to a slightly higher average return on asset for these financial institutions than those found in previous studies in economies such as Tunisia, Brazil, and Balkan countries, including Bosnia and Herzegovina (Bittencourt et al., 2017; Derbali, 2023; Radovanov et al., 2023). In contrast, in Islamic countries and Indonesia, the economic profitability is higher (Priharta and Gani, 2024; Qabajeh et al., 2023).

The size of the credit union, on average, is larger than that reported by Tunisian financial institutions (Derbali, 2023) and Palestine (Saleh and Paz, 2023), but it is

smaller compared to those in Indonesia (Abdul Hasan et al., 2020; Priharta and Gani, 2024), Serbia (Milojević et al., 2023) and Brazil (Zancan et al., 2023).

The findings of this study indicate that the level of the past due portfolio has a positive and significant impact on both economic and financial profitability. In other words, a healthy past due portfolio is crucial for credit unions to generate profitability, implying that the larger the portfolio, the higher the interest income, the lower the risk of default losses, the higher the operational efficiency, and the higher the investor confidence. These results coincide with those obtained by Mora Riofrío (2017), Servin et al. (2012) and Torres-Inga et al. (2022). In contrast, the relationship that accounts receivable, total delinquency level, and current liquidity have is significantly negative with both returns; these results are the opposite of those found by Abdelmoneim and Yasser (2023) and Esokomi and Mutua (2018), Nimer et al. (2015) and Sheikhdon (2016).

Regarding liquidity, it could be thought that, although a certain level is necessary to avoid short-term default problems, it is no less true that having idle funds undermines profitability. In this sense, the credit unions under study are recommended to invest their cash surpluses to obtain a return on them. Similarly, higher levels of accounts receivable and default can tie up assets and increase the risk of uncollectibility, while higher levels of default increase operating costs and bad debt provisions, thus decreasing profitability levels.

In addition, it was found that certain factors have a significant impact but show a different relationship with one or the other type of profitability. For example, inflation and the level of absorption of expenses have a direct effect on financial profitability but an inverse effect on economic profitability. On the other hand, the impact of unproductive assets on economic profitability is positive but negative on financial profitability, implying that effective management in inflationary environments is crucial to maintain the profitability and solvency of credit unions. Finally, as in previous studies (Hersugondo et al., 2021; Priharta and Gani, 2024; Saleh and Paz, 2023), there is no significant evidence that the net capitalization ratio or capital adequacy ratio affects the profitability of these financial system institutions.

5. Conclusion

The role played by savings and credit unions within the Ecuadorian economy is fundamental because they integrate into society groups that have traditionally been marginalized from the financial system, becoming agents of dynamism with an outstanding social impact (Campoverde Campoverde et al., 2018; Torres-Inga et al., 2022). Three objectives stand out in the vocation of credit unions: economic, business, and social, the latter being greater transcendence and strength in the rural sectors of the economy, showing the solidary and integrating nature of these entities.

This study analyzed the variables affecting the profitability of 30 savings and credit unions belonging to segment 1 in Ecuador, with 231 observations, after cleaning the data obtained from the SEPS (Superintendency of Popular and Solidarity Economy). The study explains the factors affecting economic (ROA) and financial (ROE) profitability through a regression analysis with panel data. We used the factors found in the literature that are specific to the financial system (Brown, 2006; Maia et

al., 2016; Pille and Paradi, 2002), such as the degree of absorption of outflows, the net capitalization index, the level of past-due portfolio, total delinquency and net productive assets. Financial ratios were taken, such as the current liquidity level, the percentage of indebtedness, and the macroeconomic variable of inflation.

Based on the results of this research, it can be concluded that credit unions in Ecuador perform better, both financially and economically, than other contexts analysed in previous research, probably due to a combination of efficient management, a favourable economic and regulatory environment, greater economies of scale, better technology, and a stronger culture of member participation.

The positive and significant relationship between the past due loan portfolio and the profitability of credit unions suggests that effective loan management improves short-term interest income. This reflects increased efficiency in loan recovery and improved credit quality, which implies higher economic and financial profitability.

On the other hand, the negative impact of accounts receivable, default, and current liquidity on credit unions' profitability suggests that credit unions must effectively manage these factors in a way that balances operational needs and investment opportunities.

This study is not without limitations. First, the number of credit unions belonging to segment 1 is generally less than or equal to 30, and the permanence of these institutions in the category under study is not constant. Second, the data come from institutions mostly located in the Sierra region, so the results cannot be extrapolated to all credit unions in Ecuador. This research responds to the need for the financial institutions under study to understand both the internal and external environment in order to achieve sustainable profitability in the medium term, which will allow them to avoid scenarios of financial insolvency and subsequent business failure. Nevertheless, this research is one of the pioneers in this field since it deepens the analysis of the financial performance of institutions that integrate a group of society considered vulnerable and marginalized in the financial system.

Author contributions: Conceptualization, MdCVM and FJZF; methodology, FJZF; software, MdCVM; validation, CGPC, FJZF and MdCVM; formal analysis, CGPC; investigation, CGPC; resources, FJZF; data curation, MdCVM; writing—original draft preparation, FJZF; writing—review and editing, MdCVM; visualization, CGPC; supervision, MdCVM; project administration, MdCVM; funding acquisition, FJZF. All authors have read and agreed to the published version of the manuscript.

Conflict of interest: The authors declare no conflict of interest.

References

- Abdelmoneim, Z., & Yasser, M. (2023). The impact of bank performance and economic growth on bank profitability: CAMEL model application in middle-income countries. *Banks and Bank Systems*, 18(3), 205–220. [https://doi.org/10.21511/bbs.18\(3\).2023.17](https://doi.org/10.21511/bbs.18(3).2023.17)
- Abdul Hasan, M. S., Haymans Manurung, A., & Usman, B. (2020). Determinants of Bank Profitability with Size as Moderating Variable. *Journal of Applied Finance & Banking*, 10(1), 153–166.
- Abou Elseoud, M. S., Yassin, M., & Ali, M. A. M. (2020). Using a panel data approach to determining the key factors of Islamic banks' profitability in Bahrain. *Cogent Business and Management*, 7(1). <https://doi.org/10.1080/23311975.2020.1831754>
- Akaike, H. (1974). A new look at the statistical model identification. *IEEE Transactions on Automatic Control*, 19(6), 716–723.

- <https://doi.org/10.1109/tac.1974.1100705>
- Al-Jafari, M. K., & Alchami, M. (2014). Determinants of bank profitability: Evidence from Syria. *Journal of Applied Finance & Banking*, 4(1), 17–45.
- Alarussi, A. S., & Alhaderi, S. M. (2018). Factors affecting profitability in Malaysia. *Journal of Economic Studies*, 45(3), 442–458. <https://doi.org/10.1108/jes-05-2017-0124>
- Almaqtari, F. A., Al-Homaidi, E. A., Tabash, M. I., et al. (2018). The determinants of profitability of Indian commercial banks: A panel data approach. *International Journal of Finance & Economics*, 24(1), 168–185. <https://doi.org/10.1002/ijfe.1655>
- Almehdawe, E., Khan, S., Lamsal, M., et al. (2020). Factors affecting Canadian credit unions' financial performance. *Agricultural Finance Review*, 81(1), 51–75. <https://doi.org/10.1108/afr-06-2019-0065>
- Alshatti, A. S. (2014). The Effect of the Liquidity Management on Profitability in the Jordanian Commercial Banks. *International Journal of Business and Management*, 10(1), 62–71. <https://doi.org/10.5539/ijbm.v10n1p62>
- Amoah, B., Ohene-Asare, K., Bokpin, G. A., et al. (2018). Technical efficiency: The pathway to credit union cost efficiency in Ghana. *Managerial Finance*, 44(11), 1292–1310. <https://doi.org/10.1108/mf-10-2017-0431>
- Angbazo, L. (1997). Commercial bank net interest margins, default risk, interest-rate risk, and off-balance sheet banking. *Journal of Banking and Finance*, 21, 55–87.
- Arif, A., & Nauman Anees, A. (2012). Liquidity risk and performance of banking system. *Journal of Financial Regulation and Compliance*, 20(2), 182–195. <https://doi.org/10.1108/13581981211218342>
- Berger, A. N. (1995). The Relationship between Capital and Earnings in Banking. *Journal of Money, Credit and Banking*, 27(2), 432. <https://doi.org/10.2307/2077877>
- Bittencourt, W. R., Bressan, V. G. F., Goulart, C. P., et al. (2017). Profitability in Brazilian Multiple Banks and Credit Unions (Portuguese). *Revista de Administração Contemporânea*, 21, 22–40. <https://doi.org/10.1590/1982-7849rac2017150349>
- Brown, R. (2006). Mismanagement or mismeasurement? Pitfalls and protocols for DEA studies in the financial services sector. *European Journal of Operational Research*, 174(2), 1100–1116. <https://doi.org/10.1016/j.ejor.2005.03.025>
- Campoverde Campoverde, J. A., Romero Galarza, C. A., & Borenstein, D. (2018). Efficiency evaluation of credit unions in Ecuador: Application of the DEA Data Envelopment Analysis model (Spanish). *Contaduría y Administración*, 64(1), 87. <https://doi.org/10.22201/fca.24488410e.2018.1449>
- Da Silva, T. P., Leite, M., Guse, J. C., et al. (2017). Financial and economic performance of major Brazilian credit cooperatives. *Contaduría y Administración*, 62(5), 1442–1459. <https://doi.org/10.1016/j.cya.2017.05.006>
- de Leon, M. V. (2020). The impact of credit risk and macroeconomic factors on profitability: The case of the ASEAN banks. *Banks and Bank Systems*, 15(1), 21–29. [https://doi.org/10.21511/bbs.15\(1\).2020.03](https://doi.org/10.21511/bbs.15(1).2020.03)
- Derbalí, A. M. S. (2023). The factors determining the profitability of Tunisian banks. In: *Smart Strategies and Societal Solutions for Sustainable International Business*. Business Science Reference.
- Durrah, O., Rahman, A. A. A., Jamil, S. A., & Ghafeer, N. A. (2016). Exploring the relationship between liquidity ratios and indicators of financial performance: An analytical study on food industrial companies listed in Amman Bursa. *International Journal of Economics and Financial Issues*, 6(2), 435–441.
- Esokomi, E., & Mutua, M. (2018). Determinants of Financial Performance among savings and credit co-operative societies in Kakamega County Kenya. *International Journal of Finance and Accounting*, 3(1), 1–19. <https://doi.org/10.47604/ijfa.583>
- Frihardina, M., Adita, N., Marojahan, S. M., & Rosariandoko, W. (2023). Intellectual Capital and Performance in Indonesian Banking. *E3S Web of Conferences*, 426, 02103. <https://doi.org/10.1051/e3sconf/202342602103>
- Gaur, D., & Mohapatra, D. R. (2021). Non-performing Assets and Profitability: Case of Indian Banking Sector. *Vision: The Journal of Business Perspective*, 25(2), 180–191. <https://doi.org/10.1177/0972262920914106>
- Guallpa Guamán, A., & Urbina-Poveda, M. A. (2021). Determinants of financial performance of credit unions in Ecuador (Spanish). *Revista Economía y Política*, 34, 112–129.
- Hausman, J. A. (1978). Specification Test in Econometrics. *Econometrica*, 46(6), 1251–1271.
- Hersugondo, H., Anjani, N., & Pamungkas, I. D. (2021). The Role of Non-Performing Asset, Capital, Adequacy and Insolvency Risk on Bank Performance: A Case Study in Indonesia. *Journal of Asian Finance, Economics and Business*, 8(3), 319–329. <https://doi.org/10.13106/jafeb.2021.vol8.no3.0319>
- Jiunn, Y. P., Devinaga, R., Yen, Y. Y., et al. (2018). The macroeconomic determinants of foreign bank's profitability in Malaysia. *International Journal of Engineering and Technology (UAE)*, 7(3), 152–160. <https://doi.org/10.14419/ijet.v7i3.21.17153>
- Knezevic, A., & Dobromirov, D. (2016). The determinants of Serbian banking industry profitability. *Economic Research-*

- Ekonomiska Istrazivanja, 29(1), 459–474. <https://doi.org/10.1080/1331677X.2016.1174390>
- Lal, T. (2018). Impact of financial inclusion on poverty alleviation through cooperative banks. *International Journal of Social Economics*, 45(5), 808–828. <https://doi.org/10.1108/IJSE-05-2017-0194>
- Madugu, A. H., Ibrahim, M., & Amoah, J. O. (2020). Differential effects of credit risk and capital adequacy ratio on profitability of the domestic banking sector in Ghana. *Transnational Corporations Review*, 12(1), 37–52. <https://doi.org/10.1080/19186444.2019.1704582>
- Maia, S. C., de Benedicto, G. C., do Prado, J. W., et al. (2016). Mapping the literature on credit unions: A bibliometric investigation grounded in Scopus and Web of Science. *Annals of Public and Cooperative Economics*, 18(2), 1–15. <https://doi.org/10.1007/BF02717304>
- Martínez-Campillo, A., Fernández-Santos, Y., & Sierra-Fernández, M. del P. (2017). Technical efficiency in Spanish credit unions: An approach to the impact of the crisis (Spanish). *Revista Espanola de Financiacion y Contabilidad*, 46(4), 484–506. <https://doi.org/10.1080/02102412.2017.1288951>
- Mckillop, D., & Wilson, J. O. S. (2011). Credit unions: A theoretical and empirical overview. *Financial Markets, Institutions and Instruments*, 20(3), 79–123. <https://doi.org/10.1111/j.1468-0416.2011.00166.x>
- Milojević, S., Milašinović, M., Mitrović, A., et al. (2023). Board Gender Diversity and Banks Profitability for Business Viability: Evidence from Serbia. *Sustainability (Switzerland)*, 15(13). <https://doi.org/10.3390/su151310501>
- Mora Riofrío, J. (2017). Efficiency Study of the Private Banking System, Popular and Solidarity System of Ecuador: Year 2011–2016 (Spanish). *Publicando*, 4(13), 274–293.
- Muhammad, N., Alwi, S. F. S., & Muhammad, N. (2020). Credit management in full-fledged Islamic bank and Islamic banking window: Towards achieving Maqasid Al-Shariah. *International Journal of Financial Research*, 11(3), 92–99. <https://doi.org/10.5430/ijfr.v11n3p92>
- Neely, M. C., & Wheelock, D. C. (1997). Why Does Bank Performance Vary Across States? ICPSR - Interuniversity Consortium for Political and Social Research. <https://doi.org/10.3886/ICPSR01174.V1>
- Nimer, M. Al, Warrad, L., & Omari, R. Al. (2015). The Impact of Liquidity on Jordanian Banks Profitability through Return on Assets. *European Journal of Business and Management*, 7(7), 229–233.
- Obamuyi, T. M. (2013). Determinants of Banks' Profitability in a Developing Economy: Evidence from Nigeria. *Organizations and Markets in Emerging Economies*, 4(2), 97–111. <https://doi.org/10.15388/omee.2013.4.2.14251>
- Park, C. Y., & Mercado, R. V. J. (2018). Financial Inclusion: New Measurement and Cross-Country Impact Assessment and economics working paper series Financial Inclusion: New Measurement and Cross-Country. *Asian Development Bank Working Paper Series*, 539, 1–36.
- Parra, J. F. (2011). Determinants of the probability of new company closures in Bogota (Spanish). *Revista Facultad de Ciencias Económicas*, 19(1), 27–53. <https://doi.org/10.18359/rfce.2259>
- Parvin, S., Chowdhury, A. N. M. M. H., Siddiqua, A., et al. (2019). Effect of Liquidity and Bank Size on the Profitability of Commercial Banks in Bangladesh. *Asian Business Review*, 9(1), 7–10. <https://doi.org/10.18034/abr.v9i1.219>
- Pille, P., & Paradi, J. C. (2002). Financial performance analysis of Ontario (Canada) Credit Unions: An application of DEA in the regulatory environment. *European Journal of Operational Research*, 139(2), 339–350. [https://doi.org/10.1016/S0377-2217\(01\)00359-9](https://doi.org/10.1016/S0377-2217(01)00359-9)
- Priharta, A., & Gani, N. A. (2024). Determinants of bank profitability: Empirical evidence from Republic of Indonesia state-owned banks. *Contaduría y Administración*, 69(3), 49–65.
- Purmiyati, A., Handoyo, R. D., & Wisudanto. (2022). Technical efficiency analysis: Management factor as determinants of saving and credit cooperatives' health. *Journal of Co-Operative Organization and Management*, 10(2), 100186. <https://doi.org/10.1016/j.jcom.2022.100186>
- Purohit, B. C., & Saravanan, S. (2018). Sustainability and Efficiency of Microfinance institutions in South Asia. *Theoretical and Applied Economics*, 25(4), 97–120.
- Qabajeh, M., Almajali, D., Natour, A. R. A., et al. (2023). The impact of operational risk on profitability: Evidence from banking sector in the MENA region. *Uncertain Supply Chain Management*, 11(4), 1459–1466. <https://doi.org/10.5267/j.uscm.2023.7.023>
- Qayyum, A., & Ahmed, M. (2018). Efficiency and Sustainability of Micro Finance Institutions in South Asia. *Research Journal Social Science*, 3(1), 1–34.
- Qehaja-Keka, V., Ahmeti, S., & Aliu, M. (2023). Bank Profitability Determinants: Evidence from Kosovo and Albania. *Journal of*

- Liberty and International Affairs, 9(2), 297–311.
- Radovanov, B., Milenković, N., Kalaš, B., et al. (2023). Do the Same Determinants Affect Banks' Profitability and Liquidity? Evidence from West Balkan Countries Using a Panel Data Regression Analysis. *Mathematics*, 11(19), 4072. <https://doi.org/10.3390/math11194072>
- Rani, S., & Zergaw, N. (2017). Bank Specific, Industry Specific and macroeconomic determinants of bank profitability in Ethiopia. *International Journal of Advanced research in Management and Social Science*, 6(3), 74–96.
- Romero Espinosa, F. (2013). Financial variables determinants of business failure for small and medium-sized enterprises in Colombia: analysis under Logit model (Spanish). *Pensamiento & Gestion*, 34, 235–277.
- Saleh, B. A., & Paz, V. (2023). Credit risk management and profitability: Evidence from Palestinian banks. *Banks and Bank Systems*, 18(3), 25–34. [https://doi.org/10.21511/bbs.18\(3\).2023.03](https://doi.org/10.21511/bbs.18(3).2023.03)
- Schwarz, G. (1978). Estimating the Dimension of a Model. *The Annals of Statistics*, 6(2), 461–464.
- Servin, R., Lensink, R., & van den Berg, M. (2012). Ownership and technical efficiency of microfinance institutions: Empirical evidence from Latin America. *Journal of Banking and Finance*, 36(7), 2136–2144. [https://doi.org/10.1016/0965-8564\(96\)00006-7](https://doi.org/10.1016/0965-8564(96)00006-7)
- Shahnia, C., Purnamasari, E. D., Hakim, L., & Endri, E. (2020). Determinant of profitability: Evidence from trading, service and investment companies in Indonesia. *Accounting*, 6(5), 787–794. <https://doi.org/10.5267/j.ac.2020.6.004>
- Sheikhdon, A. A. (2016). Effect of Liquidity Management on Financial Performance of Commercial Banks in Mogadishu, Somalia Ali. *International Journal for Research in Business, Management and Accounting*, 6(2), 1–24.
- Sobol, I., Dopierala, L., & Wysinski, P. (2023). Is the profitability of Islamic and conventional banks driven by the same factors?—A study of banking in the Middle East. *PLoS one*, 18(8), 1–32. <https://doi.org/10.1371/journal.pone.0289264>
- Subbarayan, A., Albert Antony Raj, S., & Jothikumar, J. (2017). Determinants of Public and Private Sector Bank's in India: A discriminant model. *International Journal of Applied Business and Economic Research*, 15(21), 143–153.
- Takahashi, F. L., & Vasconcelos, M. R. (2024). Bank efficiency and undesirable output: An analysis of non-performing loans in the Brazilian banking sector. *Finance Research Letters*, 59, 104651. <https://doi.org/10.1016/j.frl.2023.104651>
- Teixeira Trindade, M., Ferreira Filho, F. de A., & Bialoskorski Neto, S. (2010). Brazilian credit cooperatives and financial banks: a ten years performance comparison. *Journal of Cooperative Studies*, 43(1), 14–22.
- Torres-Inga, C. S., Velasco-Heras, C., Juana, A. J. A., et al. (2022). Technical Efficiency's Nonparametric Analysis of Ecuadorian Saving and Credit Cooperatives before and during the Pandemic. *Economies*, 10(4), 82. <https://doi.org/10.3390/economies10040082>
- Unda, L. A., Ahmed, K., & Mather, P. R. (2019). Board characteristics and credit-union performance. *Accounting & Finance*, 59(4), 2735–2764. <https://doi.org/10.1111/acfi.12308>
- Zambrano Farías, F., Rivera Naranjo, C. I., & Sánchez Pacheco, M. E. (2023). Profitability of MSMEs in the real estate sector in Ecuador (Spanish). *Revista Venezolana de Gerencia*, 28(103), 1021–1036. <https://doi.org/10.52080/rvgluz.28.103.7>
- Zambrano Farías, F. J., Martínez, M. del C. V., & Martín-Cervantes, P. A. (2022). Profitability determinants of the natural stone industry: Evidence from Spain and Italy. *PLOS ONE*, 17(12), e0276885. <https://doi.org/10.1371/journal.pone.0276885>
- Zambrano Farías, F. J., Sánchez Pacheco, M. E., & Valls Martínez, M. del C. (2021). Factors Explaining the Business Survival of MSMEs in Ecuador (Spanish). *Studies of Applied Economics*, 39(8). <https://doi.org/10.25115/eea.v39i8.4061>
- Zancan, F., José Canassa, B., & Ribeiro do Valle, M. (2023). Capital structure in Brazilian credit unions: which factors are really determinants? *Review of Business Management*, 25(2), 199–214. <https://doi.org/10.7819/rbgn.v25i2.4223>
- Zheng, C., Rahman, M. A., Hossain, S., et al. (2023). Does Fintech-Driven Inclusive Finance Induce Bank Profitability? Empirical Evidence from Developing Countries. *Journal of Risk and Financial Management*, 16(10), 457. <https://doi.org/10.3390/jrfm16100457>