



Financial performance explained through the cooperative principles. A study in the Ecuador savings and credit cooperatives

*El rendimiento financiero explicado a través de los principios cooperativos.
Un estudio en las cooperativas de ahorro y crédito del Ecuador*

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Abstract

The aim of the article is to analyze the influence that the application of the cooperative principles of the International Cooperative Alliance (ACI) has on the financial performance of the savings and credit cooperatives in the central zone of Ecuador in 2017. For this purpose, a survey of cooperative members and financial information was obtained from the Superintendency of Popular and Solidarity Economy. For data analysis, the nonparametric binary logistic regression technique was used to evaluate the impact of cooperative principles as determinants of the financial performance of said entities in the period under study. It is evident that with the greater economic participation of partners the profitability will improve. On the other hand, the activities of self-management and independence can generate high costs assumed by the cooperatives, diminishing patrimonial sufficiency.

JEL code: M14, P13, P31

Keywords: Cooperative principles; Financial performance; Savings and credit cooperatives; Social responsibility

Resumen

El objetivo del artículo es analizar la influencia que tiene la aplicación de los principios cooperativos de la Alianza Cooperativa Internacional (ACI) en el rendimiento financiero de las cooperativas de ahorro y crédito de la zona centro del Ecuador en el 2017. Para ello se aplicó una encuesta a los socios de las cooperativas y la información financiera se obtuvo de la Superintendencia de Economía Popular y Solidaria. Para el análisis de datos se utilizó la técnica no paramétrica de regresión logística binaria para evaluar el impacto de los principios cooperativos como determinantes del rendimiento

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financiero de dichas entidades en el periodo objeto de estudio. Se evidencia que con la mayor participación económica de socios la rentabilidad mejorará. En cambio, las actividades de autogestión e independencia pueden generar altos costos asumidos por las cooperativas, disminuyendo la suficiencia patrimonial.

Código JEL: M14, P13, P31

Palabras clave: Principios cooperativos; Rendimiento financiero; Cooperativas de ahorro y crédito; Responsabilidad social

Introduction

Presently, a new socioeconomic model is replacing the traditional business model known as the economic model. This new model highlights the importance of Social Responsibility, where companies create value for society as a whole—especially for those involved—to become socially responsible companies, thus trying to consolidate their position in the market and generate greater profits under this socioeconomic current (Nieto & Fernández, 2004).

Consequently, Ecuador promotes the economic model known as the social and solidarity economy (SSE). This social and solidarity economy is an associated and cooperative way of producing, distributing, circulating, and consuming goods and services, without the objective of private profit. It seeks to solve basic needs and improve the quality of life of all those who participate in it (Case & Stanescua, 2013). For this reason, savings and credit cooperatives—being part of the popular and solidary financial sector—have a differentiating factor compared to the capital sector, which is to provide financial services to segments of the population whose financing needs are not met by the private banking sector (Ruiz & Egüez, 2014).

In this context, cooperative principles stand out as drivers of corporate social responsibility (CSR) in savings and credit cooperatives in the social and solidarity economy sector. Cooperative principles guide the development of these organizations, such as open and voluntary membership, democratic control of members, economic participation of members, self-management and independence, education, training and information, cooperation between cooperatives, and commitment to the community (Chitarroni, 2013). These types of organizations operate socially responsible activities directly linked to values and principles oriented to the social, economic, environmental, and cultural environment, promoting the sustainable development of the communities where they work (Server & Capó, 2009; Belhouari Buendía, Lapointe & Tremblay, 2005; Chaves & Soler, 2004).

However, organizations such as cooperatives and savings banks, among others, are non-profit, and their main objective is the generation of social benefits. The importance of the results lies in analyzing how these organizations can be sustainable over time in economic, financial, and social aspects (Server & Villalonga, 2008; Agirre, 2001). The cooperative enterprise—although it has to watch over its economic efficiency to ensure its survival—must be more vigilant about the service it provides to its members and to the society in which it operates (Carrasco, 2005). Credit cooperatives, by their very nature and the essence of their cooperative principles, are closer to the values and dimensions of sustainability than any other credit institution and have the greatest capacity to contribute to its economic, environmental, and social objectives (Castro & Romero, 2011).

For this reason, this article aims to analyze how cooperative principles influence financial performance. To this end, the study considers the literature on the importance of complying with cooperative principles in social organizations and how to measure said principles. Earlier studies, which emphasize the importance of the financial results that these types of organizations must have for their sustainability not to be affected, have also been reviewed. With these premises, the cooperative principles with a significant impact on financial performance were correlated and measured.

Theoretical framework

Premises of Cooperative Principles

Within a global context, cooperative principles represent the fundamental pillar in the operational activity of organizations. The cooperative system has come a long way since the Statement on Cooperative Identity by the International Co-operative Alliance (ICA, 2008), and it is now possible to formulate a general framework that defines more clearly the nature of cooperative values and principles and their effects on cooperative regulation (Belhouari *et al.*, 2005).

The International Co-operative Alliance (2008) mentions that the cooperative principles expressed constitute the ideal common denominator of the cooperative movement on a global scale. The practice of cooperative principles may be regarded as part of the alternatives for achieving business growth and sustainable development, as long as the organizations express their commitment to their stakeholders (Gallego & Juliá, 2003). Furthermore, Marcuello and Saz (2008) mention that the principles put organizational values into practice, i.e., that values are the cornerstone of cooperative principles as criteria for assessing behavior and executing decisions.

Cooperatives all over the world are trying to solve a fundamental question: how to interact with the new social, economic, and technological reality of the environment without threatening cooperative principles and without jeopardizing the particularity of their objectives? (Agirre, 2001). However, it stands out that the development and application of cooperative principles help generate competitive advantages in cooperatives (Vargas, 2004). Cooperatives, as democratic organizations supervised by their members, become policymakers and decision-makers, while remaining accountable to their members (Huertas, 2005). The relevance of an appropriate application of cooperative principles lies in ensuring the sustainability of this type of organization over time. A fundamental role played by cooperatives is financial inclusion and greater stakeholder participation, which allows them to develop competitive advantages that generate profits (Carreras & Bastida, 2015). The foregoing is due to prioritization in a certain type of portfolio that can be considered as a differentiating aspect of these organizations compared to the private capital sector (Ruiz & Egüez, 2014).

Previous studies highlight that compliance with cooperative principles serves as an instrument to achieve the survival and competitiveness of the cooperative enterprise (Pedrosa & Hernández, 2011; Marcuello & Saz, 2008). Several of these studies emphasize the importance of demonstrating the application of the principles in cooperatives, since the purpose of these is not so much to maximize of profit for the owners, but to offer them quality financial services (Carrasco, 2005). Cooperatives, like other companies, must integrate CSR into their strategies in a utilitarian sense, as this provides them with competitive advantages related to reputation, improved accounting and transparency, risk management, or the improvement of human capital (Carrasco, 2005).

Credit unions must demonstrate compliance with values and principles, such as ethical banking (Sanchis & Pascual, 2016), in order to have an opportunity to consolidate and grow, offering financial products and services that meet the needs of the population at risk of exclusion and facilitate investment in a socially responsible manner (Castro & Romero, 2011; Soler & Melián, 2012).

Synergy between cooperative principles and Corporate Social Responsibility criteria

Going deeper and comparing the cooperative principles mentioned above with the principles proposed by the European Commission for the promotion of Corporate Social Responsibility, it is possible to see the similarities between cooperative principles and those of Social Responsibility (Server & Capó, 2009). Table 1 below illustrates the relationship between the principles established by the International Co-operative Alliance (ICA), the Principles of the European Community, and the

Organic Law on Popular and Solidarity Economy (Spanish: *Ley Orgánica de Economía Popular y Solidaria*, LOES; 2011).
Seven macro-dimensions emerge from this analysis:

Table 1
Comparison of principles

Macro-dimensions	International Alliance	Co-operative	Organic Law on Popular and Solidarity Economy	Social Responsibility (European Commission)
Priority of work over capital	No comparative reference		The search for well-being and the common welfare The priority of work over capital and of collective interests over individual interests	No comparative reference
Social, community, and environmental commitment			Fair trade and ethical and responsible consumption	
Voluntary and equitable partnership and respect for cultural identity	Open and voluntary membership Democratic control of members		Gender equality Respect for cultural identity	Voluntary nature of CSR No comparative reference
Self-management and Autonomy	Self-management and independence		Self-management	Transparency and credibility of CSR activities Location of Community action in activities where Community intervention brings real added value
Social, community, and environmental commitment	Commitment to the community		Social and environmental responsibility, solidarity and accountability	Balanced approach to Corporate Social Responsibility in the economic, social, and environmental spheres, as well as to the interests of consumers Attention to the specific needs of SMEs. Respect for existing international agreements and instruments
Economic and solidary participation and equitable distribution of profits	Economic participation of the members		Equitable and solidary distribution of surpluses	No comparative reference
Cooperation and integration of the popular and solidary economic sector	Cooperation between cooperatives		No comparative reference	No comparative reference
Education, training, and community	Education, training, and information		No comparative reference	Transparency and credibility of Corporate Social Responsibility activities Balanced approach to Corporate Social Responsibility in the economic, social, and environmental spheres, as well as to the interests of consumers

Source: own elaboration based on Server and Capó (2009)

Table 1 demonstrates that some cooperative principles have some similarity to the principles of the European Commission. The relationship between these principles lies in the need for cooperatives to be managed responsibly and efficiently through ethical behavior, respecting human rights, workers' rights, and having a balance in the economic, social, and environmental spheres (Paniagua, 2011).

The cooperative principles are also related to the Organization for Economic Cooperation and Development (OECD) statements for the purpose each pursues. The principle of training, education, and information correlates with fostering human capital formation, as cooperatives focus on being accountable in everything relevant to worker rights for efficient management (Chitarroni, 2013). There is another similarity between the principle of cooperation between cooperatives and the guideline of encouraging business partners, including suppliers and subcontractors, to apply principles of business conduct. Finally, the seventh cooperative principle, called community interest, relates to four statements in the OECD Guidelines, which are concerned with achieving sustainable development, respecting human rights, and stimulating capacity building through close cooperation with the local community (Chitarroni, 2013).

Although these principles may imply ethical behavior, that is not always evident. Under this premise, Jácome and Páez (2014) demonstrate that the development of the social economy has many weaknesses; on the contrary, some obstacles put these postulates to the test. For example, in the case of savings and credit cooperatives, the amounts they offer are insufficient to satisfy demand, meaning the interested parties must resort to private banking, generating a shallow impact on the solution of the problems of the community (Castro & Romero, 2011).

Financial performance in savings and credit cooperatives

Cooperatives are societies of a markedly social nature whose objective is to provide their members with certain goods or services at the best price or to pay for their services as much as possible (Carmona, Martínez, & Ponzuelo, 2012). In Ecuador, the Organic Law on Popular and Solidarity Economy (2011) requires savings and credit cooperatives to include compliance with cooperative principles in their management reports to accredit their social objectives.

These types of organizations are governed by a series of principles or characteristics that make them different from mercantile or capitalist companies (variable capital and remuneration, the distribution of the result according to the operations carried out by each partner and the obligatory assignment of part of this result to the education, training, and promotion of partners and workers). The financial return in this type of organization is the return on the investment made by the partners in the use of resources generating surpluses. These results can be analyzed a priori or a posteriori and attest to the performance of the social economy in a country (Gratenol, Alizo, & Molero, 2010).

In this sense, within the business environment, it is essential to evaluate the economic and financial performance, so that the development of the entity is appreciated in terms of liquidity, solvency, indebtedness, and profitability in order to facilitate decision-making (Correa, Castaño, & Ramirez, 2010). Moreover, the application of the cooperative principles generates a competitive advantage that allows a better financial performance in the long term, it being necessary that the actions performed come from a strategic vision (Vélez, 2010).

On the other hand, it is necessary to identify which performance measures are used to measure financial performance in cooperatives. The study carried out in Colombia-Antioquia evaluated the financial performance of cooperatives through financial indicators such as liquidity, solvency, and indebtedness. These indicators were selected because they allow companies to make appropriate decisions that contribute to growth and, therefore, to the benefit of their members (Castaño, Gallego, Quintero, & Vergara, 2016). Similarly, the indicators used in various cooperative studies to evaluate financial performance have been liquidity, solvency, indebtedness, profitability, and the ability to generate surpluses (Graterol, Alizo, & Molero, 2010; Krause & Konzen, 2002).

In the research carried out on Spanish cooperatives (Carmona, Martínez, & Pozuelo, 2012), indicators to analyze their economic evolution, such as financial profitability, economic profitability, solvency, activity, indebtedness, and tax revenue, were used. This study demonstrates that profitability and the other ratios analyzed have worsened as a result of the effects of the economic crisis in Spain. On the other hand, Da Silva, Leite, Guse, and Gollo (2017) used the CAMEL model when analyzing the largest cooperatives in Brazil. Their results indicate that the higher the rates of the economic and financial performance of CAMEL, the better the performance directed at the growth capacity of credit activity for member customers. They also confirm that, in Brazil, cooperatives have a more conservative position, as they prefer not to risk the capital of associate members. Similarly, Diaz, Coba, Hidalgo, and Valencia (2017), using the same CAMEL model to analyze one of the largest cooperatives in Ecuador, observed that Capital Adequacy and the Delinquency rate were some of the indicators that presented better results; the portfolio, on the other hand, performed poorly, confirming that the entity would have the minimum capacity to generate profits for partners in the economic period.

There are studies in the literature where the level of indebtedness and liquidity of cooperatives measures cooperative performance. Thus, the research carried out in the state of Zulia determined that a high percentage of cooperatives could cover their financial obligations and the surpluses of members. At the same time, a high percentage of cooperatives generate an operating surplus capable of covering interest and the rest of the fixed obligations to be paid (Graterol, Alizo, & Molero, 2010). Krause and Konzen (2002) state that overall liquidity in the Brazilian cooperatives studied was positive. They also present evidence that points to better development when the cooperatives register surpluses at the end of the year, of which the General Assembly will allocate the majority.

In contrast, Lara and Pérez (2015) used financial indicators such as total assets, total portfolio, total attraction, and the delinquency rate to establish whether savings and loan cooperatives become isomorphs of formal banking in Mexico. These authors demonstrate the existence of some similarities between cooperatives and banks, as in the case of total portfolio and fundraising indices. As for the delinquency rate, the resemblance is slight since it depends on the level of formalization in the financial entities that can have a positive impact on reducing the delinquency of their clients.

However, as Belhouari *et al.* (2005) state in the case of cooperatives, their principles, structure, and specific dynamics have been constant limitations to their business evaluation, when the same indicators are applied as to other business organizations. It is therefore necessary to consider other factors such as the purpose and satisfaction of the members, democracy as a criterion in decision-making processes, and fairness in the distribution of surpluses from the perspective of all those benefits that cooperatives transfer to their groups of influence. Therefore, the ethical conduct—along with efficient management—of cooperatives is what ensures long-term stability (Carrasco, 2005).

Given the variety of indicators used to measure performance in financial intermediation cooperatives—whose ultimate purpose is social—this research uses the financial indicators of total profitability, portfolio profitability, delinquency rate, capital adequacy, and liquidity, which are of interest in financial intermediation institutions. It is noteworthy that the impact of appropriate management of the cooperative model can be measured in terms of both financial and social profitability. However, in this type of organization, the application of solid cooperative principles is also necessary so that entities can be sustainable over time, implicitly having a consistent financial performance and at the same time, improving the quality of life of their members. In terms of social economy, the appropriate application of cooperative principles could be the main precursor of development in conditions of sustainability, integration, and social welfare (Zubiaurre, Andicoechea, & Saitua, 2016).

Methodology

Two segments comprise this section. First, a survey was carried out among members of savings and credit cooperatives in segment 1 of zone 3 of Ecuador, which, as of December 2017, consisted of five cooperatives in this segment. Authorization was sought in writing from the management of each of the cooperatives for permission to apply a survey to their members. Four surveys were authorized. In order to obtain a representative sample of each cooperative and given the number of branches that each has in the center of the country, thirty surveys were applied in each of the twenty-five agencies of the four cooperatives (750 surveys total). The response rate obtained was 75%, equivalent to 563 valid surveys.

Second, financial information, derived from the Superintendence of Popular and Solidarity Economy (Spanish: *Superintendencia de Economía Popular y Solidaria*, SEPS) for the year 2017, was obtained. The aim is to identify the cooperative principles that contribute to or have an impact on financial performance measured by profitability, delinquency rate, portfolio performance, capital adequacy, and liquidity.

The survey consisted of six sections of questions related to the level of compliance with the cooperative principles recommended by the ICA. The questions used a Likert scale (1 “Disagree” to 5 “Strongly agree”). Table 2 details the number of items used in each dimension (principle) and the general description of the questions.

Table 2
Summary table of study dimensions and items

Independent Variables	Code Variables	Number of Items	Description Variables
Open and voluntary membership	VM	10	Democratic elections of representatives, inclusion of women, indigenous sector, personnel support
Democratic control of members	DM	3	Democratic management, ethics, justice, honesty
Economic participation of members	EP	15	Membership satisfaction, credit benefits, appropriate interest rates, quality of working life
Self-management and independence	SI	11	Quality of virtual banking services, call center, health, communication, efficiency, prestige
Commitment to the community	CC	18	Fulfillment of promises, laws, contribution to the community, environment, programs for children, disabled, elderly, pregnant women
Cooperation between cooperatives	Cco	2	Fair trade, transparency
Dependent Variables	Code variables	Valuation	Variables Description
Profitability	Prof	Net Income/Average Capital	Measures the level of return generated by the equity invested by the partners of the financial institution.
Delinquency rate	DelRa	Unproductive Portfolio/Gross Portfolio	Measures the percentage of unproductive portfolio versus total portfolio (proportion of the portfolio that is in default). The delinquency rates are calculated for the total gross portfolio.
Portfolio Performance	PortPer	Portfolio Interest/Average Portfolio to Expire	Refers to the performance of the portfolio of each type of loan, subject to maturity, that is,

			based on the range of the future maturity of the transactions
Capital adequacy	CapAd	(Capital + Profit) / Fixed Assets	Refers to the percentage ratio of coverage of a financial institution of the possible weighted risks of its asset items
Liquidity	Liq	Funds Available/Short Term Deposits	Reflects the liquidity that each entity possesses, with the use of two key accounts, the amount of funds available on short-term deposits. This measures the capacity to respond to immediate obligations.

Source: own elaboration and SEPS (2017).

Table 3 displays the corrected homogeneity index (cHI - correlation between the element and the total of the scale without the element) and the value of Cronbach's Alpha for the total of the scale if the element is omitted. In general, the individual reliability of each of the items is significant, given that they exceed, in most cases, the value of 0.50. The items of the extent of cooperation between cooperatives (0.936 with two items), democratic control of members (0.88 with three items), followed by commitment to the community (0.87 with eighteen items), stand out. On the other hand, the lowest scores correspond to the items of the open and voluntary membership dimension (0.65 with 10 items) that would seem to be less consistent with the rest of the scales, although their elimination does not seem to entail a significant increase in the overall consistency of the instrument, which has a value of 0.972%.

Table 3
Descriptions of the elements of the abbreviated scale

Items	Corrected element- total correlation	Cronbach's alpha if the element is removed
EP Economic Participation of Members		
EP1 Is socially responsible due to the treatment of employees	.417	.787
EP2 Is socially responsible due to the satisfaction of members	.367	.790
EP3 Social responsibility means the improvement of credits	.199	.799
EP4 Social responsibility means the lowering of interest rates	.207	.799
EP5 Social responsibility means the quality of working life	.274	.795
EP6 What was the benefit of consumer credit?	.490	.779
EP7 What was the benefit of home credit?	.636	.764
EP8 What was the benefit of mortgage credit?	.554	.773
EP9 What was the benefit of vehicle credit?	.521	.776
EP10 What was the benefit of microenterprise credit?	.430	.785
EP11 What was the benefit of educational credit?	.606	.767
EP12 Must focus on workers	.157	.801
EP13 Must focus on partners	.160	.801
EP14 The relationship between the credits requested and the interest paid is...	.459	.785
EP15 You consider the interest paid by the credit union on your demand deposits and term deposits to be...	.489	.781
Total Cronbach's Alpha		.798
SI Self-management and independence		
SI1 There is medical service	.389	.711
SI2 There is dental service	.397	.710
SI3 There is a call center	.290	.720
SI4 There is virtual banking	.233	.726
SI5 There is auto banking service	.127	.735
SI6 Is socially responsible due to its good service	.516	.686
SI7 Is socially responsible in the media	.545	.680

SI8	Is socially responsible due to its prestige	.584	.672
SI9	Is socially responsible due to its efficiency	.569	.675
SI10	Do you agree that cooperatives practicing social responsibility should make this known through mass publicity campaigns?	.119	.734
SI11	What is your opinion of the cooperative?	.267	.731
Total Cronbach's Alpha			.798
CC Commitment to the community			
CC1	Is socially responsible due to its contribution to the community	.512	.863
CC2	Is socially responsible because it fulfills its promises	.588	.859
CC3	Is socially responsible because it complies with the law	.648	.858
CC4	Is socially responsible because it does not harm the environment	.593	.859
CC5	People do not notice	.494	.864
CC6	How important is mutual aid?	.553	.861
CC7	How important is self-effort??	.437	.865
CC8	How important is social respect?	.475	.864
CC9	Social responsibility is helping the community	.438	.865
CC10	Social responsibility means dealing with the problems of society	.432	.866
CC11	Social responsibility means taking care of the environment and the surroundings of the cooperative	.459	.865
CC12	Must focus on the community	.440	.865
CC13	Must focus on people with disabilities	.503	.863
CC14	Must focus on seniors	.531	.862
CC15	Must focus on children	.401	.867
CC16	Must focus on the environment	.448	.865
CC17	Provides good service to the elderly	.432	.866
CC18	Provides good service to pregnant women	.422	.866
Total Cronbach's Alpha			.870
DM Democratic control of its members			
DM1	How important are justice and honesty?	.771	.828
DM2	How important is democratic management?	.753	.846
DM3	How important is ethics?	.782	.818
Total Cronbach's Alpha			.880
Cco Cooperation between cooperatives			
Cco1	How important is fair trade?	.759	.939
Cco2	How important is transparency?	.759	.937
Total Cronbach's Alpha			.936
VM Open and voluntary membership			
VM1	Provides good service to indigenous people	.220	.676
VM2	Provides good service to women with babies	.378	.614
VM3	The attitude of the personnel is important when granting a credit	.561	.569
VM4	The behavior of the personnel is important when granting a credit	.564	.576
VM5	Would you be a member of another cooperative for its social practices?	.096	.659
VM6	Has your cooperative conducted democratic voting for the election of representatives?	.080	.661
VM7	Do you believe that as a member, you can influence the way the cooperative is socially responsible?	-.030	.669
VM8	Have you considered withdrawing your money from the cooperative for NOT being socially responsible?	.159	.651
VM9	The treatment given by the personnel is important when granting a credit	.545	.577
VM10	The speed of the personnel when granting a credit is important	.507	.581
Total Cronbach's Alpha			.651
Total items Cronbach's Alpha			.972

Source: own elaboration

In order to study the validity of each construct on the scale, the reliability of the six constructs with the composite reliability index (CRI) was calculated using PLS software, which is interpreted as Cronbach's alpha but takes into account the interrelationships of the extracted constructs. Werts, Linn, and Jöreskog (1974) developed the composite reliability, which is calculated as follows:

$$CRI = \frac{[SUM (aij)]^2}{[SUM (aij)]^2 + SUM Var(Eij)} \quad (1)$$

Where:

aij = standardized factorial load of each of the i indicators that load on factor j

$Var(Eij)$ = variance of the error term associated with each of the i indicators of factor j . Bearing in mind that this error (Eij) can also be calculated as $1 - aij^2$

As Table 4 indicates, the composite reliability for each construct is higher than 0.70, implying that each set of items explains part of the variation of the concept with the measurement of the error.

Table 4
Composite Reliability Index

Variables	Composite reliability
Self-management and Independence	0.757
Community Commitment	0.892
Democratic Control	0.926
Cooperation between Cooperatives	0.936
Voluntary Open Membership	0.739
Economic Participation	0.824

Source: own elaboration

Once the validity of the items and of each construct was obtained, the result of each cooperative principle (construct) was weighted between 0 and 1, through the quotient between the sum of the values of the items and the maximum score of the total of items contained in each principle (n). Each value obtained was assigned a linguistic value and its respective membership function. The membership values have five diffuse sets predefined above, which are: less than 0.4, Very Low; up to 0.6, Low; up to 0.7, Moderate; up to 0.8, High; and 0.9 onwards, Very High.

Table 5 presents a descriptive analysis, showing the mean, standard deviation, minimum, maximum, and median values for each of the study variables.

Table 5
Descriptive statistics of the variables

Statistics	Mean	Median	SD	Minimum	Maximum
Open and voluntary membership (VM)	3.69	4.00	1.04	1.00	5.00
Democratic control of members (DM)	2.99	3.00	1.27	1.00	5.00
Economic participation of members (EP)	2.91	3.00	0.95	1.00	5.00
Self-management and Independence (SI)	3.22	3.00	0.98	1.00	5.00
Commitment to the Community (CC)	3.40	3.00	1.00	2.00	5.00
Cooperation between Cooperatives (Cco)	2.87	3.00	1.18	1.00	5.00
Capital Adequacy (CapAd)	17.64	11.83	13.38	1.52	33.06
Profitability (Prof)	0.11	0.11	0.03	0.05	0.15
Delinquency Rate (DelRa)	0.06	0.07	0.01	0.04	0.07
Portfolio Performance (PortPer)	0.18	0.19	0.01	0.16	0.19
Liquidity (Liq)	0.89	0.44	1.24	0.25	3.82

Source: own elaboration

As seen in Table 5, the average annual profitability (Prof) of cooperatives is 11%, and the standard deviation is 0.03. Furthermore, the maximum and minimum were 5% to 15%. In general, the cooperatives in the sample present considerable profitability and growth opportunities, since the variable (PortPer) presents a mean of 18%, a median of 19%, and a standard deviation of (0.01). Regarding the delinquency rate (DelRa), the average is 6%, and the standard deviation is 0.01. Similarly, the minimum and maximum range from 4% to 7%, exhibiting better control of the portfolio, which allows cooperatives to have an acceptable credit growth in central Ecuador and improve results for their members.

In order to have a better approximation of the contribution in the actions of cooperatives through compliance with their principles, the following analyses—which will make it possible to be more conclusive in the financial impact—are presented.

Discussion and Results

Estimation of the model and its valuation

In order to avoid the drawbacks of previous assumptions required by linear regression or discriminant analysis models (Mures, García, & Vallejo, 2005), binary logistic regression was applied as a technique to propose a model whose response variable or dependent variable is a dummy variable with a zero (0) value when yield, capital adequacy, delinquency, portfolio performance, and liquidity are low, and a value of one (1) when they are high. The dummy variable was created from the average of each variable as the cut-off point. Those values lower than the cut-off point take the value of 0, and those higher take the value of 1.

The logistic regression model is:

$$\log \left(\frac{p}{1-p} \right) = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \cdots + \beta_k x_k \quad (3)$$

Where p is the probability of occurrence of the event of interest, in this case, high levels in the financial indicators. Given the value of the independent variables, the indicated probability can be calculated as follows (Wiginton 1980):

$$p = \frac{e^z}{1 + e^z} = \frac{1}{1 + e^{-z}} \quad (4)$$

$$Z = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \dots + \beta_k x_k \quad (5)$$

To achieve the objective of the study, five causal models that represent a general model for the four study cooperatives were devised using the binary logistic regression module of the SPSS software version 21. Each model was devised based on the determinants of financial performance: capital adequacy, profitability, delinquency rates, portfolio performance, and liquidity. In this way, each of the following cooperative principles explain the probability of low financial performance p (expression 4).

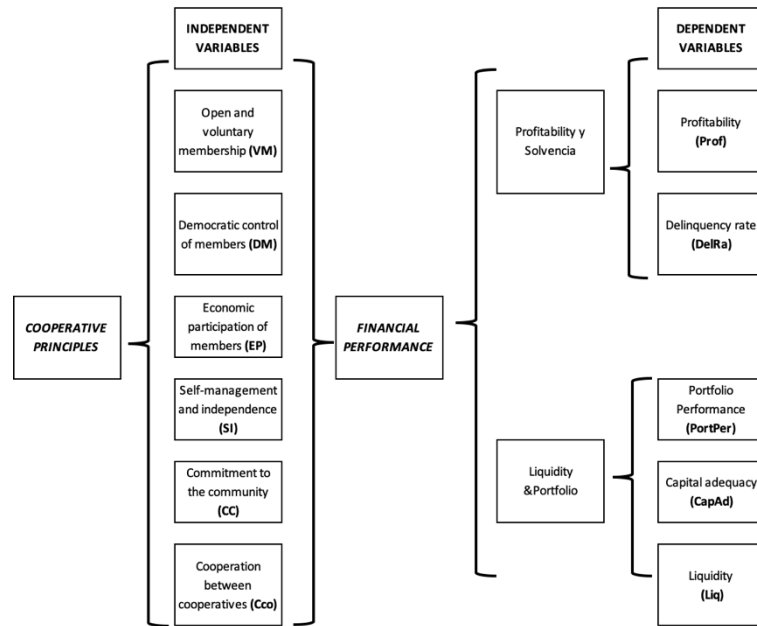


Figure 1. Proposed explanatory model of cooperative principles and their effect on financial performance

Source: own elaboration

Analysis of the results

Below are the results of the estimates of the study of the causality between the application of cooperative principles and the dependent variables of savings and credit cooperatives. Table 6 illustrates the results obtained.

Table 6
Equation variables

Variables	Dependent Variable: Capital Adequacy			Dependent Profitability			Variable:		
	B	Sig.	Wald	B	Sig.	Wald	B	Sig.	Wald
Constant	1.245	0.002*	9.925	0.445	0.246	1.344			
EP	0.355	0.002*	9.184	0.426	0.000*	13.596			
SI	-0.338	0.004*	8.449	-0.175	0.127	2.331			
CC	0.036	0.774	0.083	0.044	0.724	0.125			
DM	0.047	0.672	0.235	0.163	0.091	2.848			
Cco	-0.305	0.003*	8.991	-0.324	0.001*	10.470			
VM	-0.259	0.012*	6.370	-0.109	0.283	1.151			
Model Sig.		0.000*			0.000*				
Classification percentage		58.6							60.2

Variables	Dependent Variable: Portfolio Performance			Dependent Delinquency rates			Variable: Liquidity		
	B	Sig.	Wald	B	Sig.	Wald	B	Sig.	Wald
Constant	2.261	0.000*	20.314	2.716	0.000*	40.209	-4.043	0.000*	53.114
EP	0.526	0.000*	13.910	0.295	0.012*	13.668	0.111	0.409	0.683
SI	-0.370	0.008*	7.012	-0.438	0.000*	13.668	0.253	0.076	.3158
CC	0.124	0.404	0.696	0.082	0.517	0.420	0.009	0.954	0.003
DM	-0.264	0.020*	5.401	-0.305	0.002*	9.912	0.165	0.152	2.051
Cco	-0.219	0.064	3.432	-0.122	0.222	1.491	-0.048	0.692	0.157
VM	-0.029	0.821	0.051	-0.185	0.082	3.018	0.257	0.054	3.714
Model Sig.		0.000			0.000			0.000	
Classification percentage		79.9			61.1			81.2	

**. The relationship is significant at a level of 0.01 (bilateral).

*. The relationship is significant at a level of 0.05 (bilateral).

Source: own elaboration

First, the hypothesis was reviewed to see if all the coefficients of each model are statistically significant. As Table 6 demonstrates, only some variables of the cooperative principles were statistically significant at a significance level of 5% ($\alpha = 0.05$) for certain dependent variables considered as financial performance. For this reason, this logistic regression utilizes the Introduce method. This method made it possible to decide the variables that are introduced or extracted from the model to improve the analysis according to the results obtained. The selection of this method makes it possible to specify how the independent variables are entered in the analysis.

Once each of the models were adapted by choosing the most influential independent variables, the fit was evaluated. The Hosmer-Lemeshow test (Hosmer & Lemeshow, 2004) is applied to obtain the goodness of fit of the logistic regression models. For the fit to be acceptable, unlike other tests, the requirement is to have no significance, and in this case, it complies in all the regressions, except for the liquidity model. Therefore, the regression with the liquidity dependent variable will no longer be evaluated due to the low reliability of the prediction.

Table 7
Hosmer-Lemeshow test

Models with each dependent variable	Chi-squared	Sig.
Capital Adequacy	9.925	0.270
Profitability	13.044	0.071
Portfolio Performance	10.178	0.253
Delinquency Rate	5.154	0.641
Liquidity	29.299	0.000

Source: own elaboration

These results demonstrate that the predicted probabilities do not deviate from the observed probabilities, i.e., the binary regression adequately predicts and adjusts the model to the data.

In this study, the value obtained in Nagelkerke's R² for capital adequacy was 9.4%; that is, the explanatory variable cooperative principles explain only 9.4% of the variance proportion of the Capital Adequacy dependent variable, and the model correctly classifies 62.3% of the cases. Profitability obtained 4.6% in Nagelkerke's R² and the model correctly classifies 59.9% of the cases. The portfolio performance achieved in Nagelkerke's R² was 8.8% and the model correctly classifies 80.5% of the cases. Finally, for the delinquency rate the value obtained in Nagelkerke's R² was 13.6% and the model correctly classifies 68.2% of cases.

The omnibus test evaluates the null hypothesis that states that the coefficients β_1 of all variables (except the constant) included in the model are zero. The statistical significance obtained in the Chi-squared test was $p < 0.000$ in all the models, which indicates that the models with the introduced variables improve the fit significantly.

Finally, the following tables present the equation variables, the regression coefficients with their corresponding standard errors (SE), the Wald statistical value to evaluate the null hypothesis, the associated statistical significance, and the OR value.

Table 8
Regression model with most influential variables in Capital Adequacy

Introduced Variables	B	SE	Wald	Sig.	Exp(B)
EP	0.369	0.115	10.360	0.001**	1.447
SI	-0.322	0.112	8.294	0.004**	0.725
Cco	-0.272	0.087	9.692	0.002**	0.762
VM	-0.244	0.099	6.115	0.013 *	0.784
Constant	1.262	0.387	10.629	0.001**	3.534

** . The relationship is significant at a level of 0.01 (bilateral)

* . The relationship is significant at a level of 0.05 (bilateral)

Source: own elaboration

Table 9
Regression model with most influential variables in Profitability

Introduced Variables	B	SE	Wald	Sig.	Exp(B)
EP	0.377	0.102	13.728	0.000**	1.457
Cco	-0.273	0.081	11.458	0.001**	0.761
Constant	0.116	0.308	0.141	0.708	1.122

** The relationship is significant at a level of 0.01 (bilateral)

* The relationship is significant at a level of 0.05 (bilateral)

Source: own elaboration

This study found the following results. In the first model, capital adequacy has an inverse relationship with the coefficients that accompany the variables SI, Cco, and VM. This inverse relationship means that when cooperatives increase their self-management by offering free services to their members such as online banking, medical services, better treatment and service to members, greater democracy, transparency, and fair competition among cooperatives, this causes an increase in their operating expenses with a negative impact on capital adequacy. The above is consistent with Castro and Romero (2011), who state that many credit unions continue to display a heavy and rigid cost structure based on proximity to the customer, which requires them to have, in relative terms, an extensive network of offices and a large staff. In the case of larger cooperatives such as those in this study, they require more sacrifice of resources for their proper operation, mainly to cover the welfare of their members, who are also many, with high operating costs (Castaño, Gallego, Quintero, & Vergara, 2016). Therefore, it is necessary to manage the cooperative balance sheet to compensate for possible falls in solvency and profitability, for example, by disinvesting in unprofitable assets or by improving the quantity and quality of the services provided. On the other hand, the principle of economic participation (EP) of members reflects a positive impact on capital adequacy. This impact demonstrates that cooperatives generate confidence in the financial operations of the cooperative—achieving favorable capital results—by providing their credit and investment services according to the needs of their members.

On the other hand, the profitability of cooperatives will increase if the cooperative principle of economic participation of its members (EP) is emphasized; and it will be affected when cooperation between cooperatives (Cco) increases their external links, generating operating costs. Economic participation includes appropriate treatment, satisfaction in credit processes, reasonable interests, and financial products according to the needs of members. Although cooperatives operate in the market under the same conditions as private banks, their business orientation and the destination of surpluses are a sample of the social concern of these entities (Chávez & Soler, 2005). The above promotes better economic participation, allowing the cooperative to have results that enable it to be sustainable and meet the expectations of its creation. For their part, Iturrioz and Dopacio (2009) state that in cooperative societies, the yield obtained goes to the members (cooperative return), not according to the social capital contributed, but to the participation of each one in attaining the result. This system means that the member who participates the most (the member that buys more, sells more or works more, depending on the case) has a higher remuneration. Thus, cooperative principles and their dynamics of operation could be a key element in obtaining greater profitability of these entities compared to commercial banks (Belhouari *et al.*, 2005). This is why cooperatives tend to participate in a greater dissemination of the application of their cooperative principles to increase public confidence and attract more members and thus improve their profitability (Mathuva; 2016).

Conversely, cooperation between cooperatives and other forms of solidarity can affect profitability when considering the operating costs that arise from the need to develop activities, alliances, and businesses that allow the offering of better services or access to better prices for members. As mentioned by Martínez (2012), inter-institutional links are strengthened, sacrificing the individual financial result for the cooperation of each institution towards a common end. The advantages of cooperation are projected more in the long term. They include achieving greater union representation and political pressure, obtaining financing, sharing difficulties, and, in short, competing better, not among themselves, but with their competitors in the markets.

Table 10
Regression model with most influential variables in Portfolio Performance

Introduced Variables	B	SE	Wald	Sig.	Exp(B)
EP	0.518	0.136	14.504	0.000**	1.679
SI	-0.379	0.130	8.512	0.004**	0.685
DM	-0.335	0.096	12.107	0.001**	0.715
Constant	2.196	0.440	24.929	0.000**	8.991

** . The relationship is significant at a level of 0.01 (bilateral)

* . The relationship is significant at a level of 0.05 (bilateral)

Source: own elaboration

Table 11
Regression model with most influential variables in Delinquency

Introduced Variables	B	SE	Wald	Sig.	Exp(B)
EP	0.249	0.112	4.950	0.026**	1.283
SI	-0.480	0.110	18.915	0.000**	0.619
DM	-0.363	0.082	19.696	0.000**	0.696
Constant	2.401	0.371	41.970	0.000**	11.031

** . The relationship is significant at a level of 0.01 (bilateral)

* . The relationship is significant at a level of 0.05 (bilateral)

Source: own elaboration

Portfolio performance has one positive EP coefficient; and two negative SI and DM coefficients. Like capital adequacy, EP and SI significantly affect the performance of cooperatives. Credit management should be seen as representing the commitment of cooperatives to the interests of members and also coincides with susceptibility to the cooperative principle of sharing risk and mutual responsibility (Da Silva *et al.*, 2017). This result is consistent with Diaz *et al.* (2017), where portfolio performance in cooperatives is low because they tend to prioritize the amount of credit rather than the profitability of credit. The reason for this is that cooperatives tend to finance their members at preferential interest rates that are lower in the financial market, even with excessive risk concentration, since they are likely to depend on a single segment of clients (Castro & Romero, 2011).

The delinquency rate is inversely related to the SI and DM principles. Those cooperatives that improve their self-management and independence have greater participation of their members in democratic governance, and their activities reflect values of fairness and honesty; the impact will be a lower delinquency rate. However, greater independence and self-management will have a negative effect on financial performance due to increased operating expenses in the management and social service they provide to their members. However, cooperatives are under pressure to incorporate credit risk

analysis and control among their management criteria. Through the improvement of their services, their image and reputation will be safeguarded, allowing better management of sustainability risk, mainly linked to credit activity (Castro & Romero, 2011).

Conclusions

This study highlights the importance of the application of cooperative principles in the social and solidarity sector of financial institutions in Ecuador, allowing them to obtain a collective benefit and at the same time, adequate financial results. The ICA is also highlighted as an organizational model at the international level, focusing on the promotion and defense of the cooperative identity. One of the main contributions of the ICA has been the Statement on Cooperative Identity with the formulation of Principles and Values. Thus, the application and deepening of the Cooperative Principles themselves would mean advancing the CSR of cooperatives.

A challenge for credit unions is to be sustainable over time. That is to say, that these organizations meet the social needs of their members by offering socially responsible financial products and services, and at the same time, can generate reasonable economic returns for reinvestment in the institution itself and its members. This is where this study analyzes the relationship of cooperative principles and their effect on the financial performance of these organizations.

In this sense, among the main results is that the principle that contributes to an improvement in total profitability is the prevalence of higher economic participation of members in the cooperative. This participation occurs through satisfaction with credit processes, reasonable interest rates, and financial products that meet the needs of members.

The profitability of the portfolio, as such, is also benefited by the economic participation of members and commitment to the community. However, the more self-managed and independent the cooperative, the lower the portfolio performance. Capital adequacy, as well as portfolio performance, can be affected by self-management and independence since this last principle can generate a heavy cooperative cost structure, as it tries to provide a large amount of financial services that require personnel and the opening of different branches that often originate costs that the cooperatives assume.

The delinquency rate tends to decrease if the self-management, independence, and democratic control of members increases. This increase denotes a more significant commitment of members to fulfill the obligation of their credits when the cooperative provides adequate financial services, and the values of justice, honesty, ethics, and democracy prevail in each cooperative action.

The results obtained are consistent with the expectations of the study since the actions of cooperatives are based on principles and values of cooperation, and therefore their objective is framed in the generation of economic and social value in favor of their interest groups. This means that they carry out profitable economic activities to obtain yields used for the benefit of the members and the community.

In general, the financial indicators of segment 1 in the central zone of Ecuador display a stable sector in the framework of cooperative principles. In recent years it has been strengthening its assets with positive results and generating social benefits for its members. This contribution is reflected both in the increase in credit, precisely because it is an alternative model that supplies resource needs under favorable conditions for its members, as well as in the low delinquency rates and the profitability indices obtained.

This study opens up new research possibilities in which a greater number of cooperatives can participate, considering the different segments classified by size of assets and number of members. Moreover, it would be relevant to study and compare the behavior of cooperatives with private banks that also carry out social responsibility activities, seeking to establish whether savings and credit cooperatives have a higher level of compliance with principles and values, placing themselves in the dilemma of the interaction between their institutional identity and the search for a better financial performance than banks.

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