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Incidence of credit risk in the liquidity levels of savings and credit mutuals in Ecuador

Incidencia del riesgo de crédito en los niveles de liquidez de las mutualistas de ahorro y crédito del Ecuador

Incidência de risco de crédito nos níveis de liquidez de poupança e mútuos de crédito no Equador

Daniela Rodríguez Gavilanes¹* iD

¹Facultad de Empresa y Comunicación, Universidad Internacional de la Rioja
Logroño 26006, Spain
*Corresponding author: E-mail: dan.yrog@hotmail.com

Abstract

Loans within a financial institution enable its economic growth and business expansion. However, some clients cannot pay these loans, which puts the organization's monetary stability at risk. Therefore, this paper is oriented to analyze the credit risk and its impact on the liquidity levels of savings and credit mutual societies in Ecuador from 2013-2018. Savings and credit mutual societies carried out a diagnosis of default control and monitoring processes. There is a mixed approach, which begins with an interview with the managers/administrators of the head offices of the entities under study to collect direct information on these processes. On the other hand, the consolidated financial statements published by the "Superintendencia de Bancos" (SB) and the "Superintendencia de Economía Popular y Solidaria" (SEPS) were analyzed, considering the transition period. The results indicate a positive and statistically significant relationship between the variables under study and a weak negative correlation between liquidity and delinquency of the total portfolio. It is possible to prove that credit risk impacts the liquidity levels of the savings and credit mutual societies for housing in Ecuador during this period.

Keywords: *Liquidity, Non-performing loans, Credit risk, Mutual society, Credit risks.*

Resumen

Los créditos dentro de una institución financiera permiten su crecimiento económico y su expansión empresarial. Sin embargo, hay clientes que no están en condiciones de pagar dichos créditos y ponen en riesgo la estabilidad monetaria de la organización. Por ello, el presente documento está orientado a analizar el riesgo de crédito y su incidencia en los niveles de liquidez de las mutualistas de ahorro y crédito del Ecuador en el período 2013-2018. Se efectuó un diagnóstico de procesos de control y seguimiento de mora llevado a cabo por las mutualistas de ahorro y crédito. Existe un enfoque mixto, que inicia con una entrevista a los gerentes/administradores de las oficinas matriz de las entidades objeto de estudio, para recaudar información directa sobre estos procesos. Por otro lado, se analizaron los estados financieros consolidados publicados por Superintendencia de Bancos (SB) y la Superintendencia de Economía Popular y Solidaria (SEPS), considerando el periodo de transición. Los resultados indican una relación positiva y estadísticamente significativa entre las

variables de estudio y una correlación negativa débil entre liquidez y morosidad de la cartera total. Se logra comprobar que el riesgo de crédito incide en los niveles de liquidez de las mutualistas de ahorro y crédito para la vivienda del Ecuador en este periodo.

Palabras claves: *Liquidez, Morosidad, Mutualistas, Riesgos de crédito.*

Resumo

Os créditos dentro de uma instituição financeira permitem seu crescimento econômico e expansão de negócios. Entretanto, há clientes que não estão em condições de reembolsar esses empréstimos e colocar em risco a estabilidade monetária da organização. Por este motivo, este documento tem por objetivo analisar o risco de crédito e seu impacto sobre os níveis de liquidez das instituições mútuas de poupança e crédito no Equador durante o período 2013-2018. Foi feito um diagnóstico dos processos de controle e monitoramento padrão realizados pelas cooperativas mútuas de poupança e crédito. Foi utilizada uma abordagem mista, começando com uma entrevista com os gerentes/administradores das sedes das instituições em estudo, a fim de coletar informações diretas sobre esses processos. Por outro lado, foram analisadas as demonstrações financeiras consolidadas publicadas pela "Superintendência de Bancos" (SB) e pela "Superintendência de Economia Popular e Solidária" (SEPS), considerando o período de transição. Os resultados indicam uma relação positiva e estatisticamente significativa entre as variáveis em estudo e uma fraca correlação negativa entre a liquidez e a delinquência total da carteira. É possível provar que o risco de crédito tem um impacto sobre os níveis de liquidez das instituições mútuas de poupança e de crédito habitacional do Equador durante este período.

Palavras-chave: *Liquidez, Empréstimos improdutivos, Mutuals, Riscos de crédito.*

1. Introduction

The participation of the mutual societies is quite discreet within the sector since, during the last ten years, there has always been a total of 4 mutual societies. The total assets of the mutual societies amount to USD 845 million, representing only 1.9% of total assets in the sector. According to the bulletin issued by the Superintendencia de Bancos y Seguros or Superintendencia de Economía Popular y Solidaria (SEPS): the popular and solidarity economic sector is composed of 645 financial sector entities and 13,206 organizations [1].

If the collections management process is not well defined and does not have an excellent plan to recover the portfolio, the loaned capital plus the interest generated will be lost [2]. Not having good liquidity during deposit withdrawals can cause all clients to enter into a financial panic and start withdrawing their money, leaving the institution bankrupt [3]. Defaulting on payments generates problems for the credit rating of delinquent clients. It produces consequences for financial institutions, and in general, for the whole system if this behavior becomes a trend.

The risk level of each loan is written off with provisions set by SEPS. For this reason, an increase in delinquency level reflects an increase in credit risk and impacts the institutions' liquidity. Portfolio recovery in financial institutions is a frequent problem since clients are not committed to meeting their payment obligations, which affects liquidity levels. Giving money to those supposed to pay interest implies the risk of losing the capital provided to the applicant [4].

As time goes by, the relationship between loans and the economic cycles faced by a financial institution becomes evident [5], [6]. It is essential to mention that macroeconomic factors affect these institutions' portfolio groups since, initially, the lender is analyzed, but its future behavior is unknown [7]. The credit policies of each organization are significant for granting credit since they will help provide a solution in the event of nonpayment by the debtors [8]. Risk measures can be based on the delinquency rates of each country so that the inherent risks and losses can be analyzed [9].

Considering the importance of the financial sector in the Ecuadorian economy, it is essential to analyze the issue of delinquency due to its impact on the population's confidence through its intermediation activities [10]. In the article published in the Telegraph by Acosta[1], it is mentioned that as of May 2019, the delinquency rate of private banks was 3.2%, which translates into $ 827 million of an overdue portfolio. In 2017, the private banking rate was 3.6%, i.e., 0.4 percentage points have been reduced. That amount is the balance that the bank could potentially fail to collect.

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[1] https://www.eltelegrafo.com.ec/noticias/economia/4/sin-educacion-financiera-deudas-desbordan-creditos-consumo-comerciales-ecuador

Liquidity indicators show the level of cash available to the company; in the case of a financial institution, this is one of the main control indexes [11]. Inadequate management of the collections area causes an imbalance in deposits and placements, and this affectation can increase the level of uncollectible accounts. The present research aims to determine credit risk and its impact on the liquidity levels of savings and credit mutual societies for housing in Ecuador from 2013-2018. This is the alternative hypothesis raised and will be analyzed in this paper.

This study consists of four sections, where the introduction is section 1. The materials and methods are described in section 2, and the results in section 3. Finally, the discussion is presented in section 4.

2. Materials y methods

2.1.   Type of research

Primary bibliographic and documentary research is conducted by reviewing scientific and technical documents. There is also an analysis of the public consolidated financial statements available on the SB website, economic system, balance sheets, statistical products, financial bulletins, and others. There is also a high descriptive level since the characteristics and elements of the financial system, credit risk, liquidity, and other terms are shown.

2.2.   Approach

This study has a mixed approach; on the one hand, it is qualitative because of the elaboration of interviews (primary information) with the managers/administrators of the mutual societies. On the other hand, the quantitative analysis allows us to know the current situation of the four savings and credit mutual societies regarding credit control. This is done through the public financial statements available on the web portal of the Superintendency of Banks and the SEPS (secondary information). We can analyze whether the working hypothesis is fulfilled through statistical correlations with these data.

2.3.   Population-sample

The population of this study has not been established by a number but by a group of companies whose data is obtained directly from the SEPS web portal. Table 1 shows the offices owned by Ecuador's savings and credit mutual societies.

Table 1. List of Mutualists nationwide.

Item	Institution	Head Office	Branches
1	Mutualista Imbabura	Ibarra	Atuntaqui y Otavalo
2	Mutualista Ambato	Ambato	-
3	Mutualista Azuay	Cuenca	Azogues
4	Mutualista Pichincha	Quito	Cuenca, Azogues, Riobamba, Ambato, Latacunga, Guayaquil, Ibarra, Loja, Quevedo, Manta y Santo Domingo

2.4.   Data collection techniques and instruments

The technique to being used in this research will be the interview, which consists of a guide that will be applied to the managers of the head offices of the mutual societies. The purpose of this instrument is to measure the knowledge of how the control of delinquency and liquidity levels is carried out in mutual companies. It comprises 16 questions related to the research topic, which a group of university professors validated.

The information collection instruments include the financial statements published and available in the Superintendencia de Bancos web portal and the SEPS. This information is used to analyze the existing correlation, i.e., the degree of variations suffered by one factor due to the influence of the other.

2.5.   Procedure

Based on the review of the financial information of each institution, a summary and separate calculations are made. Microsoft Excel and the statistical program Eviews are used for data processing and analysis of the information or data obtained. Excel allows grouping, filtering, and analysis of the historical data of the most relevant accounts in the financial statements, using average data for the sector analyzed. A correlation study is applied to determine the extent to which two variables correlate. Correlation attempts to establish the relationship or dependence between the two variables involved in a two-dimensional distribution. To determine whether changes in one of the variables influence changes in the other, it is concluded that the variables are correlated. With this panel data, the space and time dimensions of the pooled data are omitted, and multiple linear regression on credit risk is calculated. This is generated using EViews, which offers forecasting and statistical modeling tools through a user-friendly interface that can create graphs and charts.

3. Results

To determine the relationship between the delinquency indicator and the liquidity levels of savings and credit mutual societies for housing, correlational analysis and a panel data pooled regression are performed.

3.1.   Correlaciones

Below are detailed correlation-dispersion diagrams between the liquidity indicator (Available Funds) and different proxies for the level of delinquency, tested for different portfolio segments registered by the savings and credit mutual societies for housing.

The results found that liquidity and commercial loan portfolio delinquency were not as expected since an inversely proportional relationship was considered. As shown in Figure 1 (a), this correlation is positive since the dispersion shows that delinquency depends on the institution's liquidity. While Figure 1 (b) shows a weak negative correlation, where the dispersion shows that as liquidity increases, there is a tendency for consumer loan portfolio delinquency to decrease, and other causes of dependence exist. Figure 1 (c) shows a weak negative dispersion since when liquidity grows, delinquency decreases.

Figure 1(d) shows a weak positive correlation, where the dispersion indicates that the higher the liquidity, the higher the delinquency, i.e., a linear relationship. Since if one variable is increasing, the other will also take the same direction as in this case. Figure 1 (e) shows a weak negative correlation between the variables since, with an increase in liquidity, there is a tendency for the total portfolio to decrease.

The correlation between liquidity and provisions was also analyzed and is weakly positive. The dispersion shows that the higher the liquidity, the higher the provisioning reserve, i.e., it depends on liquidity; therefore, there is a linear relationship (Figure 2(a)). Figure 2 (b) shows the weak positive correlation between liquidity and problem portfolio coverage. The dispersion indicates that the higher the liquidity, the higher the coverage, i.e., coverage depends on liquidity, so there is a linear relationship.
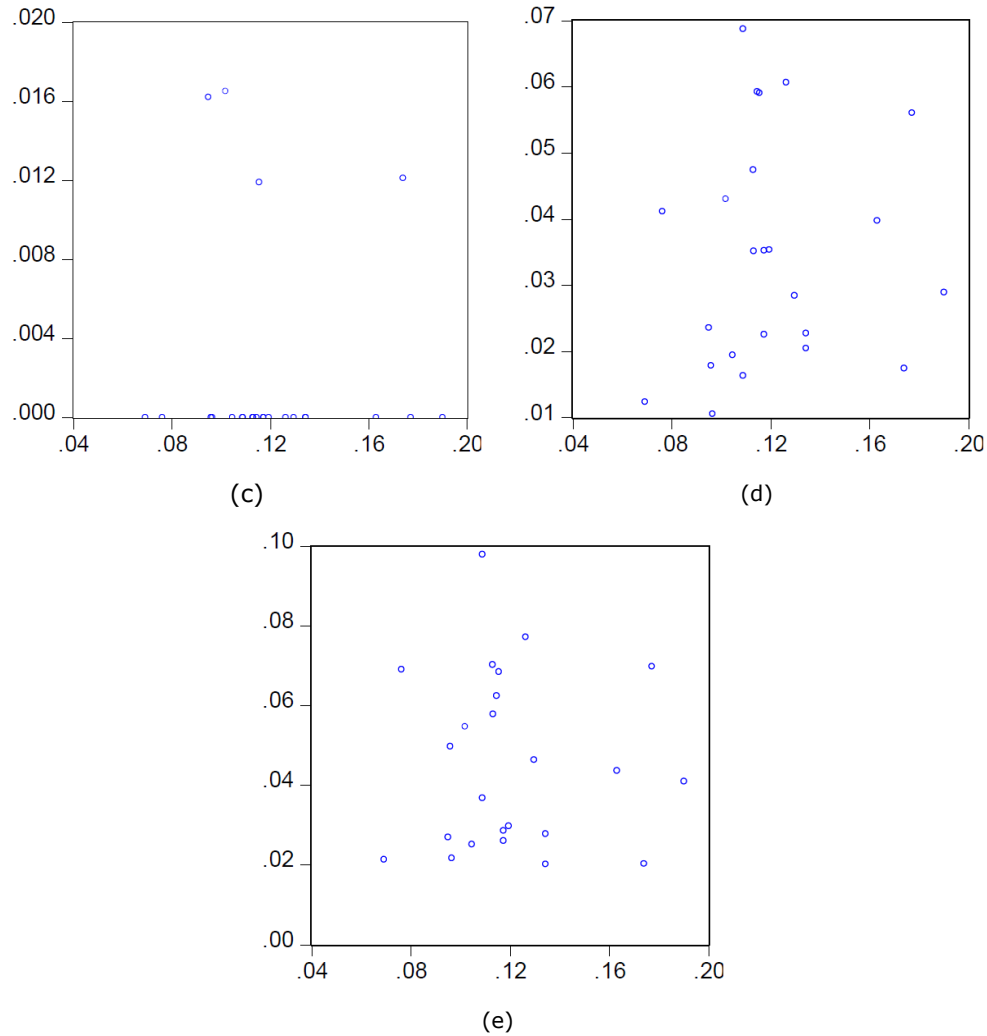

(a)   (b)
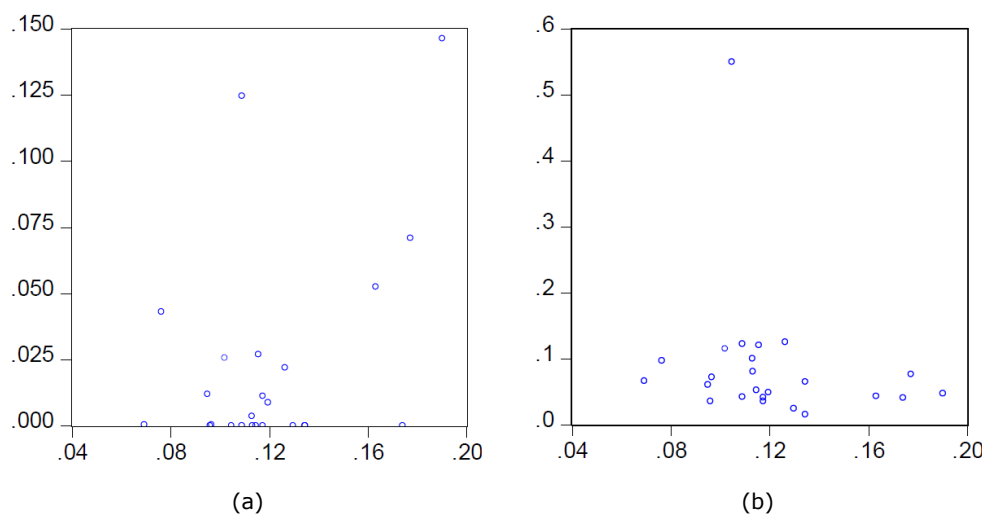
Figure 1. Correlation between liquidity (horizontal axis) and portfolio delinquency (vertical axis): (a) commercial loans (b) consumer loans (c) ordinary consumer loans (d) housing loans (e) total.
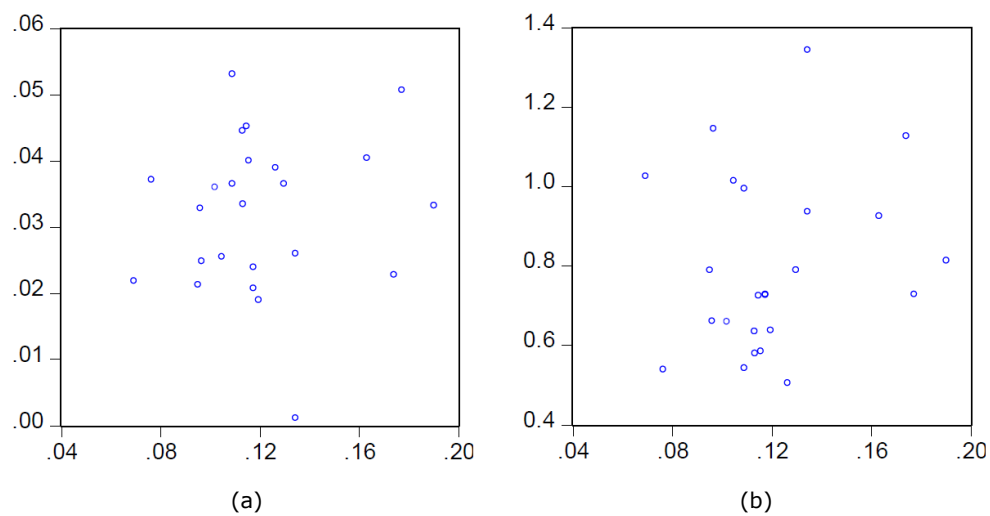

Figure 2. Correlation between liquidity (horizontal axis): (a) provisions (b) problem portfolio coverage (vertical axis).

All previous information is corroborated by the correlation matrix provided in Table 2. The correlation of liquidity with some delinquency indicators and coverage of problem portfolios and provisions was analyzed. The correlation matrix explains how each variable is related to another variable. Its diagonal will always contain the value of 1. If it has a value of 0, it indicates that it has no relationship with that variable, at least not linear; i.e., it may have a quadratic or another degree of relationship.

Table 2. Matrix of correlations of liquidity with delinquency indicators, problem portfolio coverage, and provisions.

	L	MCCC	MCCS	MCCO	MCCV	MCT	CCP	P
L	1	0.4410	-0.1935	-0.0381	0.1311	-0.0238	0.1817	0.1092
MCCC	0.4410	1	-0.0259	-0.0719	0.4526	0.4765	-0.2846	0.4679
MCCS	-0.1935	-0.0259	1	-0.0081	0.0295	0.0343	0.0137	0.0639
MCCO	-0.0381	-0.0719	-0.0081	1	0.0301	-0.0663	-0.0355	-0.0803
MCCV	0.1311	0.4526	0.0295	0.0301	1	0.8822	-0.7093	0.7247
MCT	-0.0238	0.4765	0.0343	-0.0663	0.8822	1	-0.7593	0.8538
CCP	0.1817	-0.2846	0.0137	-0.0355	-0.7093	-0.7593	1	-0.6262
P	0.1092	0.4679	0.0639	-0.0803	0.7247	0.8538	-0.6262	1

Notes: L = Liquidity, MCCC = Commercial loan portfolio delinquency, MCCS = Consumer loan portfolio delinquency, MCCO = Ordinary consumer loan portfolio delinquency, MCCV = Housing loan portfolio delinquency, MCT = Total portfolio delinquency, CCP = Problem portfolio coverage, P = Provisions.

Before performing the regression to test the hypothesis of this study, the unit root test is performed for each of the variables considered in the analysis, which helps build a better-behaved model and obtain more relevant conclusions.

3.2. Unit root test

The evaluation criteria are as follows: level 1% (-3.460300); 5% (-2.929400) and 10% (-2.638950). The stationarity tests of the series used in the regression were carried out, and it was determined that the series related to delinquency is stationary; therefore, we work with the first differences to facilitate the modeling of the data. The unit root test performed for the liquidity, total delinquency, and provisions variables is detailed below.

Table 3. Summary of unit root test results.

Variable	Statistic	Prob. **	Cross-sections	Obs
Liquidity	-3,3793	0,0004	4	20
Total portfolio delinquency	-1,1222	0,1309	4	20
Provisions	-1,5186	0,0644	4	20

Table 3 shows the unit root test for liquidity, which is analyzed and determined by the value of the t-statistic, which gave a result of -3.3793. This value is less than one of the levels described above. Therefore, it is concluded that the series is stationary and has no unit root. In the case of total portfolio delinquency, the result is -1.1222, which is greater than the levels described above, showing a unit root. In the case of provisions, the results were similar to the previous one (-1.5186), i.e., there is a unit root.

3.3. Multiple linear regression

A multiple linear regression analysis was performed to determine credit risk's impact on liquidity levels. Thus, the significance of each of these variables concerning liquidity was determined, taking "liquidity" as the dependent variable and "total portfolio delinquency" and "provisions" as independent variables. The available fund's indicator is a proxy for liquidity, while provisions and the total portfolio delinquency indicator are proxies for loan portfolio delinquency. Using EViews software, equation (1) is obtained, and the results are shown in Figure 3.

$$Liquidity = 0,4176(Provisions) - 1,2247(Delinquency\ of\ the\ total\ portfolio) + \varepsilon \qquad (1)$$

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.1120	0.01796	6.2372	0.0000
D(MOROSIDAD_DE_LA_CARTERA_TOTAL)	-1.2247	0.3953	-3.0981	0.0065
PROVISIONES	0.4176	0.5131	0.8138	0.4270
R-squared	0.3650	Mean dependent var		0.1227
Adjusted R-squared	0.2903	S.D. dependent var		0.0324
S.E. of regression	0.0273	Akaike info criterion		-4.2263
Sum squared resid	0.0123	Schwarz criterion		-4.0769
Log likelihood	45.2630	Hannan-Quinn criter.		-4.1972
F-statistic	4.8865	Durbin-Watson stat		1.3401
Prob(F-statistic)	0.0211			

Figure 3. Multiple linear regression output in EViews.

Figure 3 shows the coefficient of determination (R2) with a value of 0.3650. This coefficient measures which part is explained in a given variant, i.e., which can be predicted by the variation of the other. It is a measure between 0 and 1, "0" meaning non-representativeness and "1" a perfect fit. The R2 demonstrates a functional relationship between the analysis variables for this case study. Subsequently, the coefficients are analyzed, which indicate the variation in the number of units of the dependent variable.

As seen in Fig. 3, the coefficient of delinquency of the total portfolio yielded -1.2247; this coefficient has a probability of less than 99% confidence level. Therefore, the null hypothesis is rejected, and the alternative is accepted, and it turns out to be significant. Thus, it is evident that credit risk impacted the liquidity levels of the savings and credit mutual societies for housing in Ecuador in 2013-2018.

The Durbin-Watson coefficient represents the autocorrelation between the residuals corresponding to each observation. In the present case study, a Durbin-Watson coefficient of 1.3401 was obtained, which means that the variables are related and allow testing the hypothesis where the null hypothesis is rejected and the alternative is accepted. The t statistic represents that the parameters are statistically significant and explain the dependent variable's behavior.

3.4. Interviews

Given the length of this article, the responses obtained in the interviews are presented in Supplementary Material 1.

4. Discussion

When evaluating the liquidity and delinquency of the commercial loan portfolio, a directly proportional relationship was found since the granting of loans is not the only source of funding resources [12]. More money enters the institution by providing several services as a financial institution, which generates the possibility of granting new loans that may not be repaid, increasing delinquency levels. The correlation between liquidity and total portfolio delinquency is weakly negative, at -0.0238, indicating that the relationship between the data is fragile. While with the provisions account, there is a positive correlation which shows a strong relationship of 0.1092 between the data. In all the graphs', very scattered points are identified, which shows the existence of minor errors in the measurement or recording of the data obtained from the financial statements of the control entities.

Through the interview conducted with each of the managers of the head offices of the savings and credit mutual societies for housing, it was concluded that by current legal regulations and control mechanisms, the entities had defined policies and procedures that must be fully complied with by all members of the financial institution. Mutual societies have a comprehensive risk management manual that allows the Management Committee to manage the different risks [13].

Thanks to the calculation of delinquency through statistical tools and the application of the formulas established by the Superintendency of Popular and Solidarity Economy, it was possible to determine the delinquency levels

of each of the institutions analyzed. These have been varying according to the situations in the country and the control each has had. Mutual Society Azuay is positioned with the lowest percentage of delinquency, 2.38%. A multiple linear regression analysis was carried out to determine the impact of credit risk on liquidity levels to assess the significance of each of the variables under study. Finally, it was possible to test the working hypothesis regarding the impact of credit risk on delinquency levels in these organizations.

Savings and credit mutual societies for housing must opt for the performance measurement and early warning system for delinquency. The CAMEL methodology, which weighs five criteria and 13 indicators, is recommended to implement corrective actions accordingly. External companies could also be hired to help with portfolio recovery to reduce delinquency and increase liquidity levels, thus generating greater confidence and security for members.

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Conflicts of Interest

The author declares that they have no conflict of interest.

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