Banking regulatory framework in Ecuador and its impact on SME financing

Marco regulatorio bancario en Ecuador y su impacto en el financiamiento a pymes

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Abstract: the research, with a quantitative epistemological approach and the positivist paradigm, aims to define the relationship between the regulatory framework of the Ecuadorian financial sector and the financing conditions for SMEs. This was of a descriptive-correlational type, allowing a descriptive and factorial analysis of variables linked to the knowledge and application of laws and regulatory codes of 54 credit officers from the banking sector of El Oro, Ecuador. Two dimensions were identified: one related to the monetary regulatory framework and another with organic codes. Surveys indicate that the most applied laws are: General Law of Financial Sector Institutions and Companies Law. The first regulates the creation, operation and closure of private financial institutions to protect the population and ensure financial stability; Its compliance is supervised by the Superintendency of Banks. The second simplifies the business incorporation process, allowing various types of companies and flexibility in their structure. Ecuadorian banking regulations have undergone reforms to strengthen the soundness and transparency of the system, such as the Securities Market Law and the Law of Institutions of the Private Insurance System, which contribute to stability, regulation, financial consumer protection and promotion of competition, generating favorable financing conditions, which include confidence, competitive interest rates and broad financial options.

Keywords: regulatory framework, financial system, financing for SMEs, financial consumer, latent variable.

Resumen: la investigación, con enfoque epistemológico cuantitativo y el paradigma positivista, tiene como objetivo definir la relación entre el marco regulatorio del sector financiero ecuatoriano y las condiciones de financiamiento a las pymes. Esta fue de tipo descriptivo-correlacional, permitiendo realizar un análisis descriptivo y factorial de variables vinculadas al conocimiento y aplicación de leyes y códigos regulatorios de 54 oficiales de crédito del sector bancario de El Oro, Ecuador. Se identificaron dos dimensiones: una relacionada con el marco regulatorio monetario y otra con códigos orgánicos. Las encuestas señalan que las leyes más aplicadas son: Ley General de Instituciones del Sector Financiero y Ley de Compañías. La primera regula la creación, funcionamiento y cierre de instituciones financieras privadas para proteger a la población y asegurar la estabilidad financiera; su cumplimiento es supervisado por la Superintendencia de Bancos. La segunda simplifica el proceso de constitución de empresas, permitiendo diversos tipos de compañías y flexibilidad en su estructura. Las regulaciones bancarias ecuatorianas han experimentado reformas para fortalecer la solidez y transparencia del sistema, como la Ley de Mercado de Valores y la Ley de Instituciones del Sistema de Seguros Privados, que contribuyen a la estabilidad, regulación, protección al consumidor financiero y promoción de la competencia, generando condiciones de financiamiento favorables, que incluyen confianza, tasas de interés competitivas y amplias opciones financieras.

Palabras clave: marco regulatorio, sistema financiero, financiamiento a pymes, consumidor financiero, variable latente.

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Introduction

The most common financing options for small businesses in Ecuador include bank loans, investment funds, business accelerators, and government programs. However, accessing is a challenge, especially for start-ups or those with high risk profiles. For Feijó *et al*. (2023), these companies are crucial for the development of countries, and face challenges in accessing external credits due to the asymmetry of information between lenders and borrowers. The authors raise five trust profiles among 1,033 financial institution entrepreneurs, which influence their financing decisions. The five behavioral models are "skeptical," "complacent," "bold," "improvised," and "weak," with distinct attitudes toward financing, highlighting limitations in traditional financial approaches. Given the political implications, it is crucial to provide entrepreneurial training and encourage collaboration between entrepreneurs and companies.

Espinoza (2020) highlights the importance of Small and Medium Enterprises (SMEs) for Ecuador, the behavior of bank credit and its limitations, such as lack of guarantees, informality and high financing costs. It exposes the dominance of private banking in the financial system and that credit is destined for large companies; it also indicates that there is an increase in the amount of productive credit, but low participation of SMEs. Commercial credit is increasing, although companies do not have access to it. On the contrary, public banks allocate more funds to SMEs, but access is limited. Loans have attractive interest rates and convenient repayment plans, yet the amount of their active operations is low compared to GDP.

Promoting financial inclusion at the global level is a key objective of the Sustainable Development Goals set out in the 2030 Agenda (Acosta, 2019). According to the author, more than 2 billion adults lack access to banking services, and more than 200 millions of micro, small and medium-sized enterprises face difficulties in obtaining financing. In Ecuador, in 2014, only 46.2% of the population over the age of 15 had a bank account. The financial institutions examined demonstrate a commitment to corporate social responsibility and use financial inclusion as a strategy to differentiate themselves and gain competitive advantage, which has contributed to improving access to and use of financial products and services during 2016.

Ecuadorian SMEs face difficulties in obtaining credit. Companies in the chemical and pharmaceutical industries need to develop innovation to thrive in a global competitive environment, and access to credit is vital to finance working capital (Anzules and Novillo, 2023). Being able to adapt to market changes is essential to boost innovation, implementing public policies that promote investment in R&D in SMEs, and the protection of intellectual property.

The technical efficiency of the banking sector is paramount; Proaño and Feria (2022) analyzed 24 Ecuadorian financial institutions during 2015-2019, using data envelope analysis (DEA) to determine efficiency in two scenarios: interest income and other operating income. The average technical efficiency was 84.26% under interest income, and 73.22% under other operating income. Large banks show higher efficiency levels than medium and small banks; 80% of banks have room to improve their efficiency. A 1% increase in efficiency would increase the size of the sector by USD 605 million (Proaño and Feria, 2022).

In this context, social entrepreneurship as part of the dynamics in which SMEs operate is a topic to explain how to increase social wealth through the creation and management of innovative companies with social impact (Bacuilima *et al*., 2023), which are affected by lack of financing. It is emphasized that, in most of the social enterprises studied, impact investing has no role, although social entrepreneurs know the concept.

Moreover, Manaces *et al*. (2023) suggest that, during the post-COVID era, the state develop public policies to foster the popular and solidarity economy, provide job and financial opportunities to marginalized communities and sectors, and decentralize corporate power. This economy is constitutionally recognized in Ecuador as a viable alternative to promote sustainable development, which meets needs and generates income, and prioritizes solidarity and cooperation, over monopoly and capitalist corporatism.

Literature review

When examining the impact of voluntary external audits on SMEs in Argentina, Brazil, Colombia and Mexico, Briozzo and Albanese (2020) show that the financial statements are positive for accessing to bank financing, fixed asset investment and percentage of working capital financed with suppliers, for companies not subject to mandatory audits. The results contribute to the policy debate on the importance of voluntary audit for SMEs in emerging economies, with weaker institutions and greater information asymmetries. The relevance of audit quality review systems is highlighted, which suggest investigating the perceptions and limitations of the reports for external users.

For their part, Corredera . (2021) highlight the relevance of SMEs in the global economy, especially during the COVID-19 pandemic. They analyze the Spanish guarantee model and the actions of regional governments and mutual guarantee societies (MGSs) to address the economic problems arising from the pandemic. These guarantee schemes allow public administrations to improve SMEs' access to finance without increasing the burden on the public budget.

In the Ecuadorian business scenario, SMEs are governed by the Organic Law of Entrepreneurship and Innovation (2021), which establishes three categories:

- Micro-enterprises: up to nine workers. Net annual income less than $100,000.
- Small businesses: between 10 and 50 employees. Net annual sales between $100,001 and $1,000,000.
- Medium-sized enterprises: from 51 to 200 workers. Net annual sales between $1,000,001 and $5,000,000.

This classification provides a clear legal framework for the business sector, facilitating regulation and appropriate support to SMEs.

Zhavoronok . (2022) investigate the regulatory framework of the banking sector in Ecuador and its impact on SME financing. They provide deep insights into the factors that contribute to unpaid loans and lay valuable theoretical foundations. They highlight the development of the credit market and how crises in the sector affect stability and financing conditions. In the Ecuadorian context, regulatory reforms have strengthened the banking system and promoted competition.

In many economies, SMEs are key because of their contribution to employment and Gross Domestic Product (GDP), as Mpofu and Bongani (2022) put it. Yet in African countries, these firms have been systematically excluded from the formal financial system. Given this, the informal financial sector emerges as a source of financing, especially when they cannot access formal finance because of information asymmetry, lack of collateral, and high default rates. It is noted that some entrepreneurs prefer informal financing because of its flexibility and simpler administrative procedures.

Although informal financing has advantages because of high lender interest rates, it has constraints on available resources that prevent it from serving companies with large amounts that do not qualify for formal financing. It is suggested to establish regulations for the informal financial sector; in addition, that SMEs improve their risk management practices and use FinTech platforms to access credit (Mpofu and Bongani, 2022).

In this regard, Amadasun and Mutezo (2022) investigated the factors related to access to financing that influence the growth of SMEs in Lesotho. Entrepreneurs and managers perceive the requirements of guarantees, access to financial information and banking support services as critical barriers that limit their competitiveness; they also depend on the use of financial technologies and other non-bank sources that improve their financial situation.

In this line, Łasak (2022) points out the financing gap in the traditional financial system and highlights the use of financial technologies as a stimulus to finance SMEs in developing countries. They underline the importance of microfinance and crowdfunding. It provides inputs for policy support in the post-pandemic era and provides information on corporate financing. It also explores the impact of FinTech-based entities in developing countries, a subject under-researched.

The study by Liu *et al*. (2022) analyzes the relationship between business environment, economic growth and financing sources of Chinese SMEs, determining their relevance for technological SMEs. They indicate that financing (formal and informal), under the banking structure and fiscal regulation, can boost standard credit options and reduce informal credit options, impacting GDP growth. This study is the first to examine asymmetric information and institutional theory in relation to SME financing in China. It highlights the importance of improving data collection on these companies, to develop policies to support economic challenges, such as those of the COVID-19 pandemic (Liu *et al*., 2022).

A study of 856 SMEs in Vietnam by Lam *et al*. (2022) found that credit quality, supply chain integration, exchange, and information technology affect supply chain financing. Market responsiveness and innovation act by mediating the relationship between supply chain financing and financing performance, which is crucial in an export economy like Vietnam. The government should develop policies to access capital and increase participation in global supply chains. The banking sector should improve transparency and the ability to finance them, while companies should focus on optimizing them and strengthening cooperation with partners.

Van *et al*. (2021) and Bakhtiari *et al*. (2020) highlight the role of agency theory and information asymmetry in SME financing in Vietnam, as well as the relevance of financial infrastructure and tax regulations. They also emphasize the importance of SMEs in OECD economies, and address challenges related to access to credit and its impact on employment, productivity and wages.

In examining the effects of access to credit and fiscal structures on the performance of manufacturing SMEs in Malaysia, Cheong *et al*. (2020) apply the Momentum Generalized Method of Dynamic Panel System to monitor business and macroeconomic effects. It was found that debt financing does not benefit SMEs, while access to non-bank credit sources and tax incentives do improve their performance by reducing the opportunity costs of riskier but lucrative projects. Tax policies in Malaysia hinder SME growth and can incentivize misleading accounting practices to reduce tax liabilities, leading investors to prefer companies with more conservative approaches to accounting and tax status.
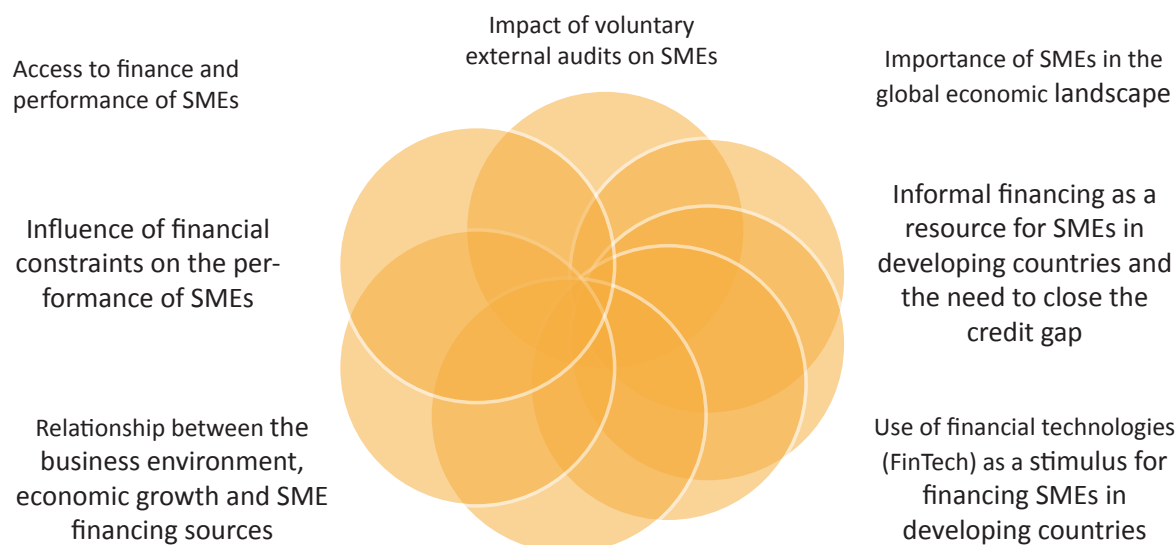
Furthermore, Motta and Sharma (2019) highlight that in the hotel sector in Brazil, lack of access to financing limits participation in the local economy, as does the asymmetry of information between borrowers and lenders. It examines the impact of fixed-asset-backed loans (preferred technology), and financial-statement-based loans, and how these mitigate information asymmetries and increase the likelihood of financing.

Financial innovation, technological adaptation and government support are important for the growth of SMEs; the cessation of their operations negatively affects employment. In that regard, Pu *et al*. (2021) cite current challenges, such as limited market demand, supply constraints, financial incapacity and capital constraints.

On the impact of the global financial crisis on SMEs and unlisted companies, Demirguc *et al*. (2019) found that these experienced significant changes in their capital structure, while large and listed companies had moderate changes. More indebted and less productive firms were hit harder. This suggests that SMEs and unlisted companies are more vulnerable to a financial crisis, because they depend on selective banking relationships and their intrinsic opacity. The authors suggest implementing better policies to access finance and increase transparency and financial reporting.

Figure 1 shows the theoretical categories drawn from the literature. The impact of voluntary external audits on SMEs in developing countries can improve investor and lender confidence, increasing the chances of accessing formal financing and closing the credit gap.

Figure 1

Theoretical categories drawn from the literature review

Access to finance and performance of SMEs

Impact of voluntary external audits on SMEs

Importance of SMEs in the global economic landscape

Influence of financial constraints on the performance of SMEs

Informal financing as a resource for SMEs in developing countries and the need to close the credit gap

Relationship between the business environment, economic growth and SME financing sources

Use of financial technologies (FinTech) as a stimulus for financing SMEs in developing countries

Páez *et al*. (2021) explore the regulatory framework of the Ecuadorian financial sector and its deregulation, showing that deregulation leads to greater financial sector concentration, mass migration, and affects the productive structure and financial stability. The authors advocate a methodological shift, incorporating alternative economic theories such as those of Schumpeter and Marx.

Mejía-Escobar *et al*. (2020) compare the regulatory framework of the banking sector and the financing conditions for SMEs. They analyze how government regulations affect financial practices, and highlights their importance in the stability and transparency of the financial system. The experience of other Latin American countries offers alternatives to assess the impact of the regulatory framework on SMEs in Ecuador, and can serve as models to strengthen the framework, especially in stability, regulation and financial consumer protection.

Meanwhile, Ahmed *et al*. (2021) highlight factors such as capital adequacy, asset quality, credit standards, and effective monitoring processes to reduce unpaid loan risks. In this context, the Ecuadorian regulatory framework establishes capital requirements, guidelines for lending policies, monitoring regulations, and operational efficiency. It is suggested that effective government and comprehensive regulation minimize unpaid loans, which influence risk management in the banking sector and financing of Ecuadorian SMEs.

Figure 2 shows the elements that influence SME financing, according to the literature. Financial technology and innovation improve access to finance, thanks to FinTech platforms that offer innovative and efficient solutions. On the other hand, information asymmetries affect the decision-making of lenders and investors, generating greater perception of risk; financial transparency is key to reduce them.

Figure 2
Elements that influence SME financing, according to the literature review

According to Beck (2008), the "Access to Financing Theory", is influenced by factors such as: economic situation, credit risk and regulation. Favorable credit conditions support investment, employment and economic growth. A strong regulatory framework and appropriate policies to access finance are key to promoting financial competition and would stimulate the creation of new businesses and start-ups, also vital for innovation and growth. Well-funded companies can invest in technology, training, and in expanding their operations. This reflects the importance of this theory in the economic field, highlighting the relationship between access to credit, entrepreneurship, innovation and economic growth (Contractor , 2021).

Materials and methods

This research, from a quantitative epistemological view and a positivist paradigm (Hurtado, 2012), studies a causal relationship between two or more variables. It is descriptive-correlational, supported by a transectional, correlational, field and documentary design (Hernández *et al*., 2016), which identifies patterns, trends and possible relationships; it is flexible, unstructured and does not seek to test a specific hypothesis, but to obtain initial understanding of the phenomenon (Bruner, 2018). Associative and dependent relationships were sought between the latent variables: access to credit requirements, financing conditions, monetary regulatory framework and organic codes.

A tool (survey) was designed and applied to 54 credit officers of the province of El Oro, during the first half of 2023, out of 62 accessible. For this purpose, the sample size for finite populations was calculated, with 5 % error and 95 % confidence level, following the criterion of maximum variance (Kumar, 2022), using the following equation:

$$n = \frac{Nt^2pq}{e^2(N-1) + t^2pq} =$$

$$\frac{62(1,96)^2(0,5)(0,50)}{0,05^2(62-1) + (1,96)^2(0,50)(0,50)} = 53,59 \approx 54$$

The survey consisted of 48 items of combined scale. A qualitative evaluation of 16 indicators (observable variables) covering four dimensions (latent variables) was performed. These were identified through factor analysis (Table 1), which revealed the joint variation of the observed variables, contributing to reduce their complexity and describe their underlying structure (Sellbom and Tellegen, 2019).

To ensure the reliability of the sample, Cronbach's Alpha coefficient was used. Regarding the validity of the instrument, a discriminant analysis of items was performed using the t-Student test, which verified its relevance (Johnson and Wichern, 2022).

Table 1

Research Instrument (2022) and development 2023, version 26 of the SPSS software.

Latent variables	Observed variables	No. items
Monetary Regulatory Framework	Banks Act	3
	Companies Act	3
	Organic Law of Entrepreneurship and Innovation	3
Organic Codes	Organic Monetary and Financial Code	3
	Organic Code of Planning and Public Finance	3
	Organic Code of Production, Trade and Investment	3
Financing conditions	Interest rates	3
	Timelines	3
	Amortization	3
Credit access requirements	Strategic planning	3
	Results Statements	3
	Overall balance	3
	Cash flow statements	3
	Statement of changes in equity	3
	Income tax return	3
	Value-added tax declaration	3

Note. Research Instrument (2022) and development 2023, version 26 of the SPSS software.

Table 2 contains the definition of the latent variables for SMEs, as consulted by the above sources.

Table 2

Definition of the latent variables of the banking sector in Ecuador related to SMEs

Latent variable	Definition
Monetary Regulatory Framework	A set of laws, regulations, and guidelines that govern the monetary and financial activities of the Ecuadorian banking sector. It encompasses the legal framework that establishes rules for the creation, operation and closure of financial institutions, as well as regulations related to currency issuance, reserve requirements, monetary policy and prudential standards. It reflects the legal and institutional foundation that ensures the stability, transparency and proper functioning of the monetary and financial system in the country (Asamblea Nacional del Ecuador, 2018).
Organic Codes	It represents the compilation of several organic codes that regulate specific aspects of economic and financial activities in Ecuador. They cover laws related to entrepreneurship, innovation, planning, public finance, production, trade and investment. It reflects the legal and regulatory framework that guides the banking sector in its practices and procedures related to credit assessment, risk management and lending activities based on the principles of these organic codes (Asamblea Nacional del Ecuador, 2018).

Latent variable	Definition
Financing Conditions	Terms, conditions and criteria for financing SMEs by the banking sector. It covers interest rates, collateral requirements, payment terms and eligibility criteria for companies seeking loans or credit facilities. It reflects the overall picture of available financial opportunities, including favorable conditions for the access to finance (Feijó *et al.*, 2023).
Credit Access Requirements	It involves SMEs' requirements and criteria for obtaining credit or loans. It covers factors such as documentation, financial history, credit worthiness, business plans, and regulatory compliance. It captures the challenges and barriers that these companies face when seeking bank loans, and reflects how the credit granting process of the banking sector aligns with their needs and capabilities (Álvarez *et al.*, 2023).

Results and discussion

On average, 55.86% of credit executives surveyed know the laws and organic codes considered, of which 48.08% use them in their work and 70.02% of them are useful, i.e., 18.81% of the total (Table 3).

Table 3
Knowledge and application of laws and codes by the credit executives surveyed

Laws or codes	Know the laws (%)	Uses the laws in his functions (%)	Knowing the laws is useful (%)
Organic Law of the Financial System (Law of Banks)	72.22	66.70	83.10
Companies Act	64.81	55.00	74.00
Organic Monetary and Financial Code	62.96	53.70	75.90
Organic Law of Entrepreneurship and Innovation	44.44	31.50	59.30
Organic Code of Planning and Public Finance	40.74	33.30	59.20
Organic Code of Production, Trade and Investment	50.00	48.30	68.60
Average	55.86	48.08	70.02

Note. Research instrument (2022).

The analysis of correlations and covariances indicates that the latent variable *Monetary Regulatory Framework* shows no degree of linear association or dependence with the rest of the factors, but it does show correlation and covariation between them (table 4). However, all the latent variables were considered in the analysis of structural equation models (SEM) that analyzes relationships between observed and unobserved variables. However, its construction and estimation require adequate planning and data due to its complexity and computational use (Karakaya-Ozyer and Aksu-Dunya, 2018).

Table 4
Correlations and covariances between latent variables

		Credit access requirements	Financing conditions	Monetary Regulatory Framework	Organic Codes
Credit access requirements (F4)	Pearson correlation	1	.538**	0.036	.598**
	Sig. (Bilateral)		0.000	0.795	0.000
	Covariance	1.000	0.538	0.036	0.598
	N	54	54	54	54

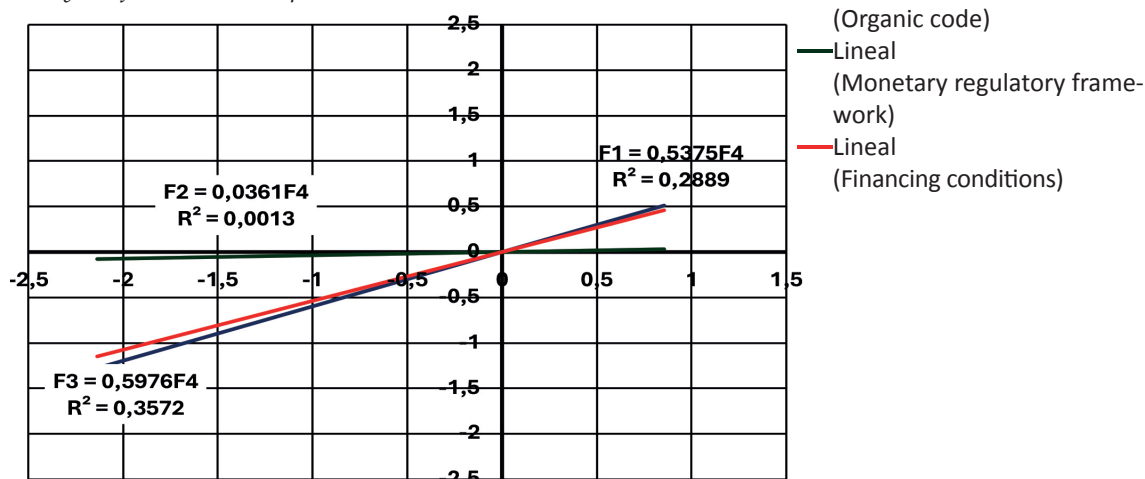|		Credit access requirements	Financing conditions	Monetary Regulatory Framework	Organic Codes
Financing conditions (F3)	Pearson correlation	.538**	1	-0.013	.460**
	Sig. (Bilateral)	0.000		0.925	0.000
	Covariance	0.538	1.000	-0.013	0.460
	N	54	54	54	54
Monetary Regulatory Framework (F2)	Pearson correlation	0.036	-0.013	1	0.000
	Sig. (Bilateral)	0.795	0.925		1.000
	Covariance	0.036	-0.013	1.000	0.000
	N	54	54	54	54
Organic codes (F1)	Pearson correlation	.598**	.460**	0.000	1
	Sig. (Bilateral)	0.000	0.000	1.000	
	Covariance	0.598	0.460	0.000	1.000
	N	54	54	54	54

Note. Research Instrument (2022) and development 2023, version 26 of the SPSS software.

Figure 3 shows a positive relationship between the rest of the factors and the latent variable explained by the SEM model (*Credit Access Requirements*), to the extent that credit executives have greater knowledge and applicability of laws and codes, financing conditions and credit access requirements that conform the regulatory legal framework.

Figure 3
Analysis of the relationship between latent variables

Note. Research Instrument (2022) and development 2023, version 26 of the SPSS software.

The following scale was used to characterize the latent variables (Table 5):

Table 5

Escala de interpretación de las variables latentes

Rank	Qualification
(5-4,2)	Excellent
(4,2-3,4)	Good
(3,4-2,6)	Regular
(2,6-1,8)	Poor
(1,8-1)	Very Poor

Note. Research Instrument (2022) and Development Instrument (2023), SPSS version 26.

Table 6 shows that variables F4, F2 and F1 qualified as Regular, and F3 as Good. The goal is to achieve levels of excellence, which requires greater knowledge and application by credit executives.

Table 6

Descriptive statistics of latent variables

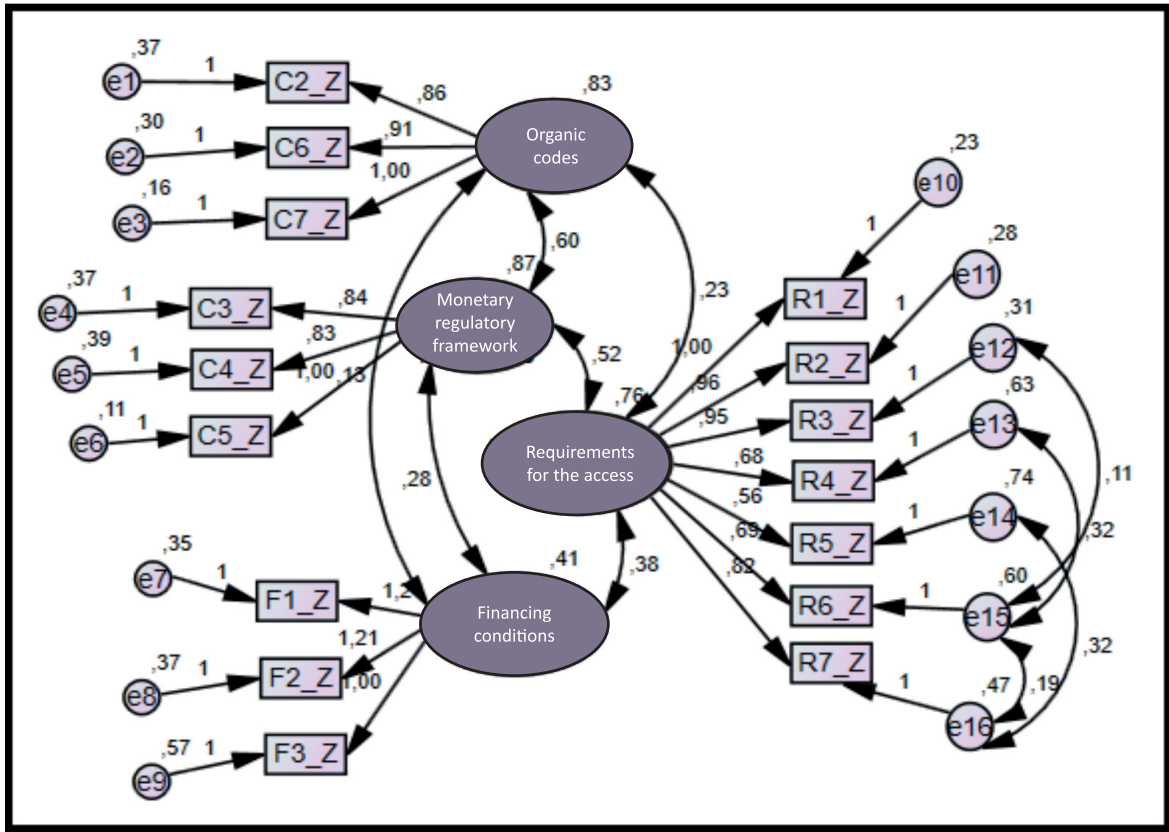|	N	Average	Standard deviation	Qualitative assessment
Financing conditions (F3)	54	3,5185	1,05938	Good
Organic Code (F1)	54	3,3815	1,05938	Regular
Monetary Regulatory Framework (F2)	54	3,3815	1,04142	Regular
Requirement for accessing to credit (F4)	54	3,3259	0,90286	Regular
N valid (per list) 54				

Note. Research instrument (2022) and elaboration (2023), SPSS software version 26.

A model of structural equations was created with the sixteen observable variables to analyze which significantly influences variable F4. Figure 4 shows the measurement model, which is recursive, and comprises four explanatory latent variables along with their observable variables. These represent the links between the model indicators and their latent constructs, as well as the covariance relations between the latent variables (Vogt, 2015).

Figure 4

Measurement model for the covariance analysis of latent variables and their dependence relations

Note. Data analyzed with AMOS IBM SPSS (Byrne, 2021).

Table 7 presents the validation of the measurement model built using AMOS. The absolute adjustment indicators PClose and RMSEA rank Excellent, based on Byrne (2021) criteria, as do the absolute adjustment indicator, the parsimony indicator (CMIN/DF) and the incremental adjustment indicator (IFC).

Table 7

Validation of the adjustment of the measurement model with respect to the latent variables and their dependency relations

Measurement	Estimate	Threshold	Interpretation
CMIN	108,726	--	--
DF	94	--	--
CMIN/DF	1.157	Between 1 and 3	Excellent
IFC	0.972	> 0.95	Excellent
RMSEA	0.054	< 0.06	Excellent
Pclose	0.423	> 0.05	Excellent

Note. Research Instrument (2022) and Development Instrument (2023), SPSS version 26.

The analysis focuses on a model of structural equations (SEM) that has been adjusted using the "FIT" criterion, which evaluates the congruence between the observed data and the theoretical model (Henseler *et al.*, 2021).

The Chi-square value (108,726) suggests significant differences between the observed data and those predicted by the model. The degrees of freedom (DF=94) show the number of adjustable values according to the model. The Chi-square/ degrees of freedom ratio (CMIN/DF = 1.157) indicates that the fit might not be optimal, deviating from ideal (about 1). Meanwhile, the Comparative Fit Index (CFI=0.972), which compares the model fit with one without relationships between variables, suggests a good fit compared to null.

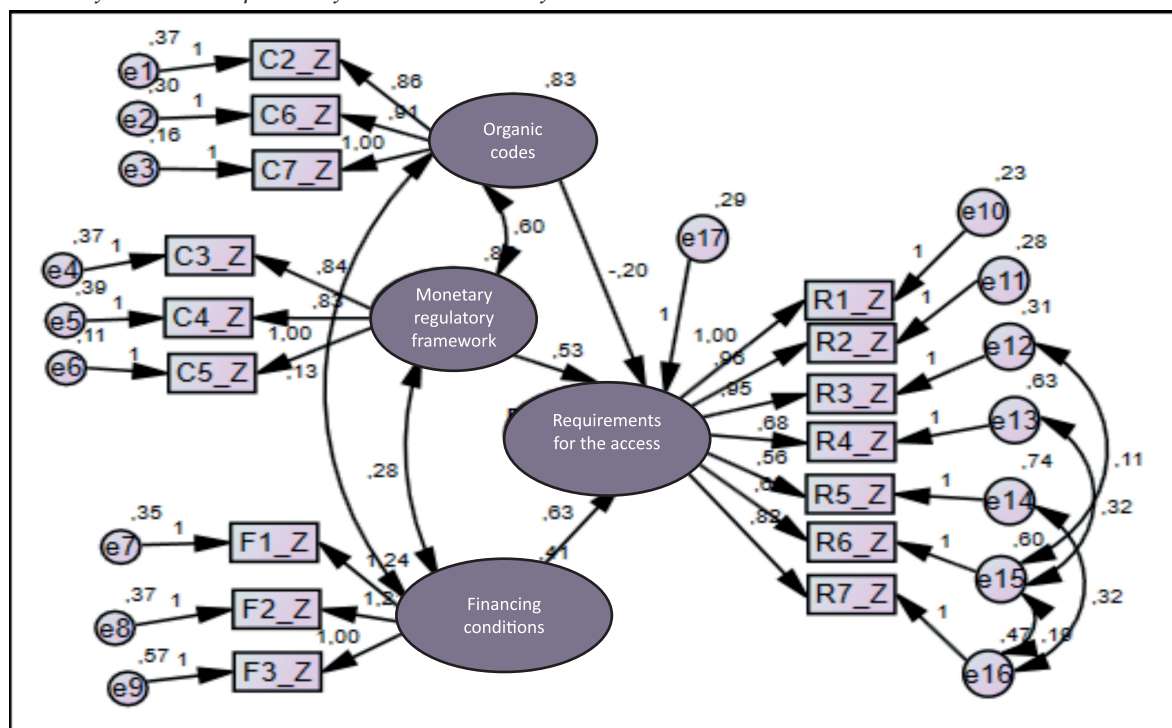According to Gana and Broc (2021), the Middle Square Root Approximation Error (RMSEA=0.054) measures the adjustment by degree of population freedom; its low value implies a reasonable adjustment. The Significance Test (Pclose=0.423), whose value is not significantly different from zero, suggests a reasonable adjustment. The results show a reasonable adjustment of the SEM model.

The SEM for estimating the latent variable F4, generated by the AMOS IBM SPSS software, shows a match between the implicit covariance matrix in the model, and the real covariance matrix derived from the empirical data (Figure 5).

Defined the model and established the empirical covariance matrix, a parameter estimation technique is selected (Byrne, 2021). When the estimate reaches a satisfactory convergence, it is essential to assess the adequacy of the model to measure the degree of agreement between the SEM and the actual data analyzed.

Figure 5

Model of structural equations for the estimation of the latent variable F4

Note. Based on the covariances of the identified latent variables. Data analyzed with AMOS IBM SPSS (Byrne, 2021).

Table 8 presents the respecification data of the structural equations model to estimate the latent variable F4, using the covariances of the latent variables, identified in the credit access levels

of the SMEs of the banking sector of El Oro. The amended Model 4 is the most appropriate adjustment after considering the amendment rates. Absolute adjustment measures, such as RMSEA and PCLOSE, indicate an acceptable adjustment of the model. In line with Hair *et al.* (2021), these metrics clarify the alignment of the structural equation model and the empirical data.

Table 8
Adjustment respecification of the structural equations model to estimate the latent variable F4 (credit access requirements)

Model	Absolute adjustment measures		Incremental adjustment measures			Parsimony adjustment measures				
	PClose	RMSEA	IFC	TLI	NFI	PGFI	NFIP	AIC	X2	X2/DF
Reference Model	0,004	0,107	0,886	0,891	0,755	0,527	0,617	233.866	157,87	1,61
MODEL 1 Re-specification e14 <-->e16	0,028	0,093	0,915	0,895	0,78	546	0,631	219.760	141,76	1,46
MODEL 2 Re-specification e13 <-->e15	0,148	0,075	0,945	0,931	0,906	0,562	0,645	204.997	124,99	1,3
MODEL 3 Re-specification e15 <-->e16	0,332	0,061	0,964	0,955	0,824	0,565	0,652	195.699	113,69	1,19
MODEL 4 Re-specification e12 <-->e15	0,423	0,054	0,972	0,964	0,832	0,565	0,651	192.726	108,73	1,16

Note. Based on the covariances of the latent variables in the levels of access to credit by SMEs for the banking sector of El Oro. (Data analyzed with AMOS IBM SPSS, Byrne, 2021).

In relation to descriptive metrics involving model comparisons, they often indicate an optimal or suboptimal fit, and serve as a benchmark for comparison, both the IFC (Comparative Adjustment Index) and the TLI (Tucker-Lewis Index) or the NFI (Normalized Adjustment Index). The CFI (0.972) and TLI (0.964) values indicate optimal model fit (Gana and Broc, 2021).

However, the NFI (0.832) suggests unsatisfactory adjustment; this measure compares the goodness of fit of the proposed model with the goodness of fit of a null one, to determine how well the proposed model fits the data (Henseler *et al.*, 2021), cataloging it as suboptimal. However, three adjustments are shown with respect to the comparison model in terms of modification rates.

As long as the values of the parsimony adjustment measures PGFI (Parsimonious Goodness-of-Fit Index = 0.565) and PNFI (Parsimonious Normed Fit Index = 0.651) are closer to 1, they indicate a favorable balance between model complexity and fit to data (Hair *et al.*, 2021). On the other hand, the AIC criterion (Akaike Information Criterion = 192,726) indicates the quality of the fit that penalizes the complexity of the model, where lower values indicate a better fit (table 8).

Finally, x2 (Chi-Square – 108.73), which measures the difference between observed data and expected values, and x2/DF (Chi-Square divided by Degrees of Freedom = 1.16) which normalizes this value by dividing it by degrees of freedom, indicate that a value close to 1 of x2/DF is a good fit, although it can be affected by the sample size.

In general, the RMSEA, CFI and TLI measures suggest a good fit of model 4 to the data. However, the measures NFI, PGFI and PNFI indicate that this model is more complex or does not fit the data optimally.

The covariances of the latent variables and the errors of the default model were analyzed. In SEM

models, covariances represent the relationships between latent variables (F1, F2, F3) and their observed indicators (e12, e13, e14, e15, e16). The values of Estimate (estimation), S.E. (standard error), C.R. (contrast ratio) and P (p-value), allow to evaluate the significance of these relationships (table 9).

Table 9

Correlations and covariances between latent variables, El Oro banking sector

			Covariances: (Group number 1 - Default model)				Correlations: (Group number 1 - Default model)
			Estimate	S.E.	C.R.	p	Estimate
F1	<-->	F3	0,13	0,098	1,325	0,185	0,223
F2	<-->	F3	0,279	0,114	2,451	0,014	0,466
F2	<-->	F1	0,598	0,156	3,842	***	0,707
e14	<-->	e16	0,325	0,093	3,502	***	0,551
e13	<-->	e15	0,315	0,087	3,642	***	0,513
e16	<-->	e15	0,194	0,058	3,337	***	0,369
e12	<-->	e15	0,111	0,052	2,155	0,031	0,260

Note. Based on data analyzed with AMOS IBM SPSS (Byrne, 2021). (***) indicates values < 0.001

As a result:

- F1 <--> F3: the relationship is not significant, the p-value > 0.05. It is inferred that they do not have significant statistical covariation.
- F2 <--> F3: significant relationship (p < 0.05), evidencing dependence relationship.
- F2 <--> F1: p < 0.001; highly significant relationship.
- e14 <--> e16: P < 0.001; highly significant relationship.
- e13 <--> e15: P < 0.001; highly significant relationship.
- e16 <--> e15: P < 0.001; highly significant relationship.
- e12 <--> e15: p < 0.05; significant relationship.

As for the correlations between the different variables in the SEM model, unlike covariances, these are normalized and vary in the range from -1 to 1. It is noted that:

- F1 <--> F3: positive and moderate correlation (0.223).
- F2 <--> F3: positive correlation (0.466); its relation is stronger than between F1 and F3.

- F2 <--> F1: positive and high correlation (0.707). It indicates a strong and meaningful relationship.
- e14 <--> e16: indicates positive, significant and moderate relationship.
- e13 <--> e15: positive correlation.
- E16 <--> E15: weak positive correlation compared to previous ones.
- E12 <--> E15: positive and significant correlation, although it is the weakest observed (0.26).

These correlations indicate that there are associations between the corresponding variables of the SEM model. The strength and direction may vary and should be interpreted in the context of the underlying theory and research design.

The latent variables F1 and F3 were significant to explain F4 (table 10); p-value < 0.05 with significance level of 5 %, and confidence interval of 95 % ($F_4=0.53*F_1-0.20*F_2+0.63*F_3$).

Table 10

Regression model coefficients for the latent variable F4 (credit access requirements)

Regression Weights: (Group number 1 - Default model)							Standardized Regression Weights: (Group number 1 - Default model)		
			Estimate	H.E.	C.R.	P			Estimate
F4	<---	F1	0,53	0,193	2,744	0,006	F4	<---	F2	0,57
F4	<---	F2	-0,20	0,169	-1,17	0,242	F4	<---	F1	-0,21
F4	<---	F3	0,63	0,222	2,821	0,005	F4	<---	F3	0,46

Note. Based on data analyzed with AMOS IBM SPSS (Byrne, 2021).

Complex relationships are revealed between the latent variables in the El Oro banking sector, in terms of the requirements for accessing to credit (F4). Correlations show moderate association with financing conditions (F3) and strong relationship with organic codes (F1), while the relationship with the monetary regulatory framework (F2) is minimal. These findings highlight the significant influence of organic codes and financing conditions on access to credit requirements.

As for the regression coefficient model, the variable F3 has the greatest influence on F4, followed by the organic codes. On the other hand, the relationship between F2 and F4 is less influential and does not reach statistical significance. However, F1, F2 and F3 show positive association with F4.

These results underline the importance of financing conditions and organic codes in determining the requirements for accessing to credit in El Oro banking sector. In addition, they provide valuable information to understand how policies and regulations influence access to credit, as well as to identify areas for improvement in the local financial system.

The literature highlights that Ecuadorian small businesses face significant challenges in accessing external financing (Feijó *et al.*, 2023). This study identifies five trust profiles that influence financing decisions, highlighting the importance of addressing information asymmetry between lenders and borrowers. In addition, Espinoza (2020) highlights the limitations of bank credit to Ecuadorian SMEs, including the lack of guarantees and high financing costs. Acosta (2019) highlights the relevance of financial inclusion in the context of the Sustainable Development Goals, underscoring the

need to improve access to financial services for businesses and the general population.

In the regulatory field, Zhavoronok *et al.* (2022) and Páez *et al.* (2021) analyze the regulatory framework of the Ecuadorian banking sector and its effects on SME financing. They stress the importance of considering micro- and macro-economic aspects, as well as the need for alternative approaches to financial regulation. Integrating the findings of the study with the literature review provides a comprehensive understanding of the challenges and opportunities associated with access to credit in El Oro banking sector. These results can be used to design policies and strategies aimed at improving SMEs' access to finance and promoting sustainable economic development in the region.

Conclusiones

SME financing is essential for economic progress and stability in Latin America, as it is the backbone of many regional economies for generating employment, boosting innovation and fostering economic diversification. However, they face difficulties in accessing loans and the necessary capital due to their size and limited lending capacity, as is the case in Ecuador.

The analysis of variables such as: access to credit requirements, regulatory framework, organic codes and financing conditions, reveals a significant association between them, and highlights the importance of understanding these relationships to improve access to credit and promote sustainable economic growth. However, a lack of understanding of the banking legal framework may hinder this access. It is essential to work on the integra-

tion of the regulatory framework and improve administrative processes to promote economic development in El Oro region, Ecuador.

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