Revista Científica
INTEGRACIÓN
*e-ISSN: 2790-2145*
*ISSN: 2618-1207*

# Operating efficiency, leverage, and profitability growth in Ecuadorian MSMEs

Eficiencia operativa, apalancamiento y crecimiento en la rentabilidad en la MiPYMEs Ecuatorianas

**Laura Luzmila Vega González**
*Facultad de Ciencias Empresariales*
Universidad Técnica de Machala, Machala, Ecuador
llvega@utmachala.edu.ec
https://orcid.org/0000-0003-0015-3026

**Alexandra Elizabeth Arteaga Peláez**
*Facultad de Ciencias Empresariales*
Universidad Técnica de Machala, Machala, Ecuador
aarteaga@utmachala.edu.ec
https://orcid.org/0009-0000-0574-3063

**Tatiana Ximena Sanchez Quezada**
*Facultad de Ciencias Empresariales*
Universidad Técnica de Machala, Machala, Ecuador
tsanchez@utmachala.edu.ec
https://orcid.org/0000-0002-4909-4656

Recibido: 15/3/2026
Aceptado: 10/6/2026
Publicado: 15/7/2026

**Autor corresponsal:**
*Laura Luzmila Vega González*
llvega@utmachala.edu.ec

**Cómo citar:**
Vega González, L.L., Arteaga Peláez, A.E. y Sanchez Quezada, T.X. (2026). Operating efficiency, leverage, and profitability growth in Ecuadorian MSMEs. *Integración,* 10(2), 31-42. https://doi.org/10.36881/ri.v10i2.1396

**Fuente de financiamiento:** No financiado.

**Declaración de conflictos de interés:** Los autores declaran no tener conflictos de interés



## Resumen

Las micro, pequeñas y medianas empresas (MiPYMES) desempeñan un papel central en las economías emergentes, aunque su sostenibilidad financiera continúa siendo frágil, es por eso por lo que este estudio analiza los determinantes de la rentabilidad de las MiPYMES ecuatorianas utilizando información financiera administrativa de cobertura nacional para el período 2014–2024. Metodológicamente, se emplean modelos de datos de panel con efectos fijos a nivel de empresa, lo que permite controlar la heterogeneidad no observable constante en el tiempo. La estimación se realiza con errores estándar robustos agrupados por empresa para corregir heterocedasticidad y correlación serial y la elección del modelo se respalda mediante la prueba de Hausman. Los resultados muestran que la estructura de financiamiento y la eficiencia en el uso de los activos constituyen los principales factores asociados al desempeño financiero, evidenciados en el efecto positivo del endeudamiento y de la rotación de ventas sobre la rentabilidad económica y financiera. En contraste, la liquidez y el tamaño empresarial presentan relaciones más complejas, sugiriendo la coexistencia de deseconomías operativas y efectos de apalancamiento. Desde una perspectiva teórica, los hallazgos contribuyen a la literatura de finanzas corporativas en economías emergentes al aportar evidencia basada en microdatos administrativos y control de heterogeneidad no observable. En general, los resultados indican que la sostenibilidad del desempeño empresarial depende fundamentalmente de la productividad del capital y del acceso efectivo al financiamiento, más que del crecimiento en escala o de la acumulación de liquidez.

**Palabras clave:** MiPYMES; rentabilidad; datos de panel; efectos fijos; Ecuador.

## Abstract

Micro, small, and medium-sized enterprises (MSMEs) play a central role in emerging economies, although their financial sustainability remains fragile. Therefore, this study analyzes the determinants of profitability in Ecuadorian MSMEs using nationally available administrative financial information for the period 2014–2024. Methodologically, panel data models with fixed effects at the firm level are employed, allowing for the control of unobservable heterogeneity that remains constant over time. Estimation is performed using robust standard errors grouped by firm to correct for heteroscedasticity and serial correlation, and the model selection is supported by the Hausman test. The results show that the financing structure and asset utilization efficiency are the main factors associated with financial performance, evidenced by the positive effect of debt and sales turnover on economic and financial profitability. In contrast, liquidity and firm size exhibit more complex relationships, suggesting the coexistence of operating diseconomies and leverage effects. From a theoretical perspective, the findings contribute to the literature on corporate finance in emerging economies by providing evidence based on administrative microdata and controlling for unobservable heterogeneity. Overall, the results indicate that the sustainability of corporate performance depends primarily on capital productivity and effective access to finance, rather than on growth in scale or liquidity accumulation.

**Keywords:** MSMEs; profitability; panel data; fixed effects; Ecuador.

## Introduction

Micro, small, and medium-sized enterprises (MSMEs) constitute the core of the productive fabric in emerging economies, especially in Latin American countries, both for their contribution to job creation and their participation in value added. In Ecuador, this segment comprises the majority of formal economic units registered with the Superintendency of Companies, Securities, and Insurance of Ecuador, although their performance is constrained by structural limitations related to access to financing, operational efficiency, and the volatility of financial results.

Understanding the factors that determine the profitability of MSMEs is fundamental for the design of public policies aimed at strengthening productivity and business sustainability. However, the empirical evidence available for Ecuador remains limited, particularly that based on administrative financial microdata and panel data methodologies that allow for controlling for unobservable heterogeneity among firms, a key element in the analysis of business performance.

From this perspective, the present study contributes to the literature by analyzing the determinants of profitability in Ecuadorian MSMEs using panel data models with fixed effects and nationally covered financial information. This approach allows for a more precise identification of the role of financing structure, operational efficiency, and firm size in generating profitability, providing relevant evidence for understanding the financial functioning of small businesses in emerging economies. In line with recent literature, it can be said that the use of panel data models is particularly suitable for capturing unobservable heterogeneity among firms and the temporal dynamics of financial performance, thereby strengthening the validity of empirical results (Baltagi, 2021). Likewise, several studies highlight that access to financing and resource efficiency are key factors for the sustainability of MSMEs in environments characterized by credit constraints and structural limitations (Beck & Demirgüç-Kunt, 2006). Despite these advances, there is limited empirical evidence based on longitudinal administrative microdata for the Ecuadorian case, which justifies the present research.

## Literature Review

### Determinants of Business Profitability in SMEs

Globally, understanding what determines business profitability remains a challenge, especially in developing economies characterized by more volatile environments. Accumulated evidence suggests that financial success does not depend on a single factor, but rather on the interaction between resource efficiency and financing decisions. For example, studies in transition industries show that variables such as organizational size and debt level are key predictors of performance (Pervan et al., 2018). This evidence has been reinforced by recent research showing that growth capacity and efficient cost management are critical factors for the competitiveness of SMEs in emerging economies (Prasad & Mondal, 2025).

Business profitability is a central indicator of economic performance and financial sustainability, especially for micro, small, and medium-sized enterprises (MSMEs), which face structural constraints such as limited access to financing, less productive diversification, and greater vulnerability to macroeconomic shocks (Beck & Demirgüç-Kunt, 2006).

### Capital Structure and Profitability

From a capital structure perspective, the relationship between debt and profitability has been analyzed primarily using two classic theoretical frameworks. On the one hand, trade-off theory posits that companies balance the tax benefits of debt with the costs of bankruptcy (Kraus & Litzenberger, 1973), while pecking theory (of hierarchical order) suggests a hierarchy in financing sources due to asymmetric information (Myers & Majluf, 1984). In the context of SMEs, empirical evidence shows heterogeneous results. While some studies find positive effects of leverage in contexts of credit constraints, where debt can facilitate productive expansion and improve business performance (Bui et al., 2021), others indicate that high levels of debt can increase financial risk and negatively affect performance. In emerging economies this relationship depends largely on institutional conditions and access to the financial system (Beck & Demirgüç-Kunt, 2006).

### Operational Efficiency and Financial Management

Operational efficiency is one of the most robust determinants of business profitability. Several studies have shown that indicators linked to productive performance, such as operating margin, asset turnover, and sales productivity, have positive and statistically significant effects on profitability in manufacturing and service companies (Goddard et al., 2005). In microenterprises, it suggests that the ability to control costs and generate revenue efficiently are more decisive factors than the financial structure itself (Yazdanfar, 2013).


e-ISSN: 2790-2145 ISSN: 2618-1207

Recent literature has emphasized the role of working capital management, and in particular, efficient management of the cash conversion cycle is associated with better profitability levels, while inefficiencies in inventory and accounts receivable management can deteriorate business performance (Deloof, 2003; Baños-Caballero et al., 2014).

**Growth, Business Size, and Performance**

Business growth has been identified as a fundamental driver of financial performance. From the perspective of firm theory (economic theory of the firm), higher growth rates allow companies to take advantage of learning economies and improve competitiveness (Penrose, 1959; Coad, 2009). However, in SMEs, growth can generate financial and operational stress if it is not accompanied by strong management capabilities.

The relationship between firm size and profitability has been widely debated. While some classic studies find economies of scale (Hall & Weiss, 1967), others demonstrate nonlinear or even negative relationships in small businesses associated with diseconomies of scale, administrative rigidities, or increases in indirect costs during the growth process (Nunes et al., 2009). Recent evidence suggests that size is not a sufficient determinant of performance; rather, its effect depends on its interaction with factors such as efficiency and access to financing (Tran, 2022).

**Methodological Approaches in Profitability Analysis**

In the methodological field, recent literature has highlighted the importance of using panel data models to analyze profitability determinants, given that they allow for controlling for unobservable heterogeneity between firms and capturing the temporal dynamics of financial performance (Baltagi, 2021; Bond & Meghir, 1994). However, in short-term business panels (common in MSME databases), two-way fixed-effects models constitute the most robust and widely accepted approach.

**Empirical Evidence in Latin America**

In Latin America, empirical evidence on profitability determinants in MSMEs remains limited and fragmented. Regional research has identified operational efficiency, sales growth, and financial constraints as key factors in business performance (Gutiérrez-Ponce, 2024; Kiymaz et al., 2024; Prasad & Mondal, 2025). However, many studies rely on surveys, small samples, or methodologies that do not adequately control for heterogeneity among firms, limiting the generalizability of results.

In the specific case of Ecuador, the literature is even scarcer. Most available research focuses on sectoral studies and accounting analyses with cross-sectional data, lacking longitudinal microdata to capture business dynamics (Gutiérrez-Ponce, 2024). This limitation highlights a significant gap in the literature, considering the economic importance of SMEs in the country's productive structure.

Addressing this gap, the present study contributes by using high-coverage official financial information from the Superintendency of Companies and applying panel data models with two-way fixed effects, allowing for more consistent estimates of the factors that explain business profitability. In this way, the research not only expands the empirical evidence for Ecuador but also contributes to the international debate on the financial performance of SMEs in emerging economies.

**Methodology**

This study employs a quantitative approach, with an explanatory scope and a non-experimental, longitudinal, panel design. The quantitative approach allows for the analysis of relationships between financial variables based on observable data, while the explanatory scope seeks to identify the factors that determine business profitability. The longitudinal design is justified by the use of information from the analyzed time period, which allows for capturing the dynamics of companies' financial performance.

**Data Source and Sample Construction**

This research is based on annual financial information reported by the Superintendency of Companies, Securities and Insurance of Ecuador, the entity that compiles the financial statements of formally established companies in the country. The database covers the period 2014–2024, allowing for the examination of the evolution of business financial performance over time.

A panel dataset was constructed from this source, and the sample selection process was carried out in several stages. First, only companies classified as MSMEs according to current Ecuadorian regulations were considered. Second, records with incomplete information, accounting inconsistencies, or undefined variables for calculating the indicators were eliminated. In addition, statistical cleaning procedures were applied to mitigate the influence of extreme outliers, ensuring the stability of the estimates.

After a cleaning process aimed at guaranteeing data quality, the final panel consisted of 172,014 micro,

small, and medium-sized enterprises out of a total of 769,304 company-year observations. The resulting base corresponds to an unbalanced panel with a relatively short time frame, a situation consistent with the high business turnover and limited survival rates that characterize MSMEs in emerging economies. This characteristic is relevant to the choice of the econometric approach adopted.

The processing, cleaning and analysis of the data were carried out in the RStudio statistical environment, which facilitated the construction of the panel, the estimation of econometric models and the verification of assumptions.

**Study Variables**

Business profitability is approximated using two complementary indicators. The first is return on assets (ROA), calculated as the ratio between net income and total assets, which reflects the economic profitability generated by the company's productive resources. The second is return on equity (ROE), defined as net income divided by equity, which allows for the evaluation of the profitability of equity capital and is primarily incorporated as a robustness test.

Following the empirical literature on determinants of financial performance in small businesses, the model incorporates current liquidity, debt-to-assets ratio, and business size, measured as the natural logarithm of total assets, as explanatory variables. These variables capture liquidity constraints, financing structure, and economies of scale, respectively. Indicators associated with operational efficiency and sales dynamism are also included.

The operating margin approximates productive efficiency, while sales turnover reflects the capacity to utilize assets. Therefore, this set of variables summarizes key dimensions of the financial functioning of SMEs, widely documented in the literature.

**Research Hypothesis**

The research hypothesis posits that the profitability of micro, small, and medium-sized enterprises (MSMEs), measured through return on assets (ROA) and return on equity (ROE), is conditioned by financial and operational factors, particularly the financing structure and the efficiency of productive resource utilization. In this regard, it is proposed that indebtedness and sales turnover positively influence business profitability, while variables such as liquidity, company size, and operating margin can have differentiated effects, associated with financial constraints, potential diseconomies of scale, and competitive market dynamics.

**Econometric Strategy.**

To identify the determinants of business profitability, panel data models with firm-level fixed effects were estimated. This approach allows for controlling for unobservable heterogeneity that remains constant over time (such as managerial skills, technological characteristics, or organizational practices) and that could bias the estimates if not explicitly considered in the econometric specification.

The general functional form of the model is expressed as:

$$Profitability\_it=\beta X\_it+\mu\_i+\varepsilon\_it$$

where i represents the firm, tel the analysis period, X_it corresponds to the vector of explanatory financial variables, μ_ire captures the individual fixed effects, and ε_ites is the idiosyncratic error term.

Standard errors were robustly estimated and grouped by firm to simultaneously correct for the possible presence of heteroscedasticity and intra-firm serial correlation, following standard practice in empirical studies with firm panels.

**Justification of the fixed effects model**

The choice of the fixed effects estimator stems from the high level of unobservable heterogeneity among firms, a characteristic particularly marked in the SME segment. It is reasonable to assume that these characteristics may result in management quality, organizational structure, or technological adoption being correlated with the financial variables included in the model, thus invalidating the fundamental assumption of the random effects estimator.

This methodological decision is empirically supported by the Hausman test, whose results strongly reject the null hypothesis of consistency of the random-effects model ($p < .001$ in both specifications), confirming the suitability of the fixed-effects approach for analyzing business profitability in this case study.

**Robustness Analysis**

To assess the stability of the results, the models were estimated using return on equity (ROE) as an alternative dependent variable. The consistency observed in both the direction and statistical significance of the coefficients between the ROA- and ROE-based specifications reinforces the empirical robustness of the findings and supports the economic interpretation of the identified determinants.


e-ISSN: 2790-2145 ISSN: 2618-1207

**Results**

Panel Characteristics and Descriptive Statistics.

The panel, constructed from official financial information from the Superintendency of Companies, Securities and Insurance of Ecuador, exhibits an unbalanced structure and a relatively short time frame, features consistent with the high business turnover and limited survival rates that characterize micro, small, and medium-sized enterprises (MSMEs) in emerging economies.

After the database cleaning process, the final panel consisted of 172,014 companies and a total of 769,304 company-year observations corresponding to the period 2014–2024. This provides broad coverage of the formal business sector in the country and allows for consistent analysis of the evolution of financial performance over time.

The descriptive statistics reveal marked heterogeneity in profitability levels, both in return on assets (ROA) and return on equity (ROE), reflecting the structural diversity of the MSME sector. Furthermore, considerable dispersion is observed in liquidity, debt, and operational efficiency indicators, justifying their inclusion as potential determinants of business profitability.

**Tabla 1**

*Descriptive statistics of the financial and operational variables of Ecuadorian SMEs (2014-2024)*

| Variable | N | Mean | Median | Std. Dev. | Min | P1 | P99 | Max |
|---|---|---|---|---|---|---|---|---|
| ROA | 43.574 | 1,71 | 0,02 | 348,29 | -155,18 | -0,49 | 0,88 | 72,70 |
| ROE | 40.504 | 0,01 | 0,08 | 9,40 | -1.611,79 | -2,69 | 1,20 | 172,51 |
| Liq_corr | 43.574 | 1.822,00 | 1,34 | 10.355,70 | 0,00 | 0,00 | 329,68 | 1.655.719,00 |
| End/act | 43.574 | 0,65 | 0,65 | 6,68 | 0,00 | 0,00 | 1,61 | 1.367,34 |
| Size (log assets) | 43.574 | 12,82 | 12,68 | 1,43 | 9,75 | 9,75 | 16,77 | 19,90 |
| Mar_oper | 43.574 | 432.794,40 | 0,00 | 93.560.640,00 | - 19.525.040,00 | - 1.887,14 | 8.908,22 | 150.000.000,00 |
| Rot_vent | 43.574 | 5,80 | 0,93 | 25,00 | 0,00 | 0,00 | 21,15 | 80,00 |
| Crec_vent | 79 | 32.905,93 | 0,19 | 292.391,10 | -1,00 | -1,00 | 572.169,70 | 2.598.838,00 |

*Note. P1 and P99 correspond to the 1st and 99th percentiles. Calculated on the original, uncorrected data. Data obtained from the Superintendency of Companies, Securities and Insurance of Ecuador for the period 2014-2024.*

The number of observations reported in the descriptive statistics corresponds to valid observations per variable, after applying the database cleaning process. Since the calculation of some financial indicators requires specific information, the effective sample size may differ from the total number of companies included in the panel, a common situation in empirical studies based on administrative financial information.

Table 1 shows that the distribution of profitability variables presents asymmetries and extreme values, a recurring phenomenon in studies of small businesses due to the volatility of equity and substantial differences in operating performance. ROE exhibits greater relative dispersion compared to ROA, suggesting that financial profitability is more sensitive to variations in the equity structure and leverage level.

This greater sensitivity is explained by the fact that this indicator is calculated based on equity, which is usually smaller and more volatile than total assets in SMEs. In this context, small variations in profits or in the level of indebtedness can generate proportionally more significant changes in equity, thus amplifying the fluctuations of ROE. In addition, it can be noted that the effect of financial leverage increases this sensitivity, since the use of debt can amplify both returns and losses, generating a greater dispersion in financial profitability compared to economic profitability measured by ROA.

In relation to the explanatory variables, current liquidity and debt over assets present a high variability, reflecting relevant differences in the financing capacity and in the management of short-term obligations between companies. This dispersion is influenced by the presence of extreme values, an inherent characteristic of financial ratios, especially when there are low levels in the denominator of the variables. For its part, business size, which was measured by the logarithm of assets, shows a more concentrated and stable distribution,

which indicates less relative dispersion compared to the financial variables; while operational efficiency indicators showed a wide heterogeneity, evidencing the coexistence of companies with losses and others with high productivity.

Likewise, variables such as sales turnover presented highly asymmetric distributions due to the sensitivity of the indicator to low levels of assets, which generates extreme values in the sample.

These descriptive results confirm the marked structural financial and operational heterogeneity of Ecuadorian MSMEs and support the use of panel data models with fixed effects to capture these unobservable differences at the company level and thus obtain more consistent estimates of the determinants of profitability.

**Statistics with treatment of extreme values (ROA)**

In order to reduce the influence of atypical observations inherent to corporate accounting information, the financial variables were subjected to a Winsorization process at the 1st and 99th percentiles. This procedure allows the effect of extreme values to be attenuated without eliminating relevant information, which is especially important in the analysis of MSMEs, where financial volatility and disproportionate accounting ratios are recurrent phenomena.

From an empirical perspective, Winsorization contributes to improving the statistical stability of subsequent estimates, by preventing a small number of observations from dominating the variance of the profitability and efficiency variables. This methodological adjustment is widely used in business finance studies with large administrative bases, particularly in the context of emerging economies such as Latin American countries characterized by high productive heterogeneity.

Additionally, applying this treatment allows us to distinguish between the dispersion generated by transient extreme values and that associated with real structural differences between firms, strengthening the validity of the subsequent econometric analysis.

**Table 2**

*Descriptive statistics of the variables Winsorized at 1% and 99% in Ecuadorian SMEs (2014–2024)*

| Variable | N | Mean | Median | Std_Dev | Min | P1 | P99 | Max |
|---|---|---|---|---|---|---|---|---|
| ROA | 43.574 | 0,06 | 0,02 | 182,00 | -0,49 | -0,49 | 0,88 | 0,88 |
| ROE | 40.504 | 0,15 | 0,08 | 0,49 | -2,69 | -2,69 | 1,20 | 1,21 |
| Liq_corr | 43.574 | 1,96 | 1,34 | 44,50 | 0,00 | 0,00 | 320,03 | 2.477,58 |
| End/act | 43.574 | 0,60 | 0,65 | 0,36 | 0,00 | 0,00 | 1,61 | 1,61 |
| Size(log assets) | 43.574 | 12,83 | 12,68 | 1,37 | 9,74 | 9,75 | 16,52 | 19,78 |
| Mar_oper | 43.574 | 134,44 | 0,00 | 2.730,70 | -1.896,09 | -1.887,14 | 8.732,03 | 328.748,80 |
| Rot_vent | 43.574 | 1,81 | 0,93 | 7,05 | 0,00 | 0,00 | 21,15 | 21,17 |
| Crec_vent | 79 | 7.251,90 | 0,19 | 64.373,10 | -1,00 | -1,00 | 126.302,70 | 572.169,10 |

*Note: P1 and P99 correspond to the 1st and 99th percentiles. The variables were Winsorized to reduce the influence of extreme values.*

After Winsorization, the dispersion observed in the profitability and operational efficiency variables is appreciably reduced, although significant heterogeneity in business performance remains. This suggests that the variability is not solely due to outliers, but rather to structural differences in the financial and productive management of SMEs.

Furthermore, the descriptive statistics retain the general shape of the original distributions, indicating that the treatment does not distort the economic information contained in the variables. In this sense, Winsorization acts as a statistical refinement mechanism that improves the reliability of the estimates without altering the substantive interpretation of the financial indicators.

The results in Table 2 confirm the relevance of using refined variables in the estimation of panel data models, ensuring that econometric coefficients reflect systematic patterns of business behavior and not the influence of extreme observations.


e-ISSN: 2790-2145 ISSN: 2618-1207

**Correlations and Multicollinearity Diagnosis**

Prior to econometric estimation, it is essential to examine the linear association structure between the explanatory variables, as well as to rule out the presence of multicollinearity problems that could compromise the stability of the coefficients. In business contexts, variables such as size, indebtedness, and liquidity often exhibit mechanical relationships derived from the accounting construction of the indicators themselves.

Correlation analysis allows for the identification of possible redundancies in information between regressors, while the Variance Inflation Factor (VIF) is a standard tool for assessing whether these associations artificially inflate the standard errors. Verifying this assumption is particularly relevant in large-scale panels, where small linear dependencies can be amplified.

From a methodological perspective, the absence of severe multicollinearity ensures that the effects estimated in panel models can be interpreted as differentiated marginal impacts, strengthening the credibility of the empirical results.

**Table 3**

*Pearson correlation matrix and variance inflation factors (VIF) in Ecuadorian MSMEs (2014-2024)*

| Variable | ROA(w) | ROE(w) | Current ratio(w) | Debt-to-Assets (w) | Firm Size (Log Assets) (w) | Operating Margin (w) | Sales Turnover (w) | Sales Growth (w) |
|---|---|---|---|---|---|---|---|---|
| ROA(w) | 1,000 | | | | | | | |
| ROE(w) | 0,548 | 1,000 | | | | | | |
| Current Ratio(w) | 0,142 | 0,008 | 1,000 | | | | | |
| Debt-to-Assets Ratio (w) | -0,195 | 0,297 | -0,147 | 1,000 | | | | |
| Firm Size (Log Assets) (w) | -0,276 | 0,062 | -0,128 | 0,191 | 1,000 | | | |
| Operating margin (w) | 0,051 | -0,002 | 0,155 | 0,100 | -0,106 | 1,000 | | |
| Sales turn over(w) | 0,398 | 0,268 | 0,090 | -0,051 | -0,429 | 0,135 | 1,000 | |
| Sales Growth(w) | 0,030 | -0,012 | 0,008 | -0,119 | 0,116 | -0,024 | 0,043 | 1,000 |

*Note. Pearson correlation coefficients calculated from winsorized variables at the 1st and 99th percentiles are reported.*

The results show that the correlations between the explanatory variables remain in moderate or low ranges, without reaching levels that suggest critical linear dependence. This pattern is consistent with the multidimensional nature of business performance, where financial, operational, and scale factors capture partially independent dimensions.

In accordance with the above, the VIF<10 values are well below the thresholds commonly accepted in the econometric literature, which allows us to rule out the existence of severe multicollinearity. This evidence supports the stability of the estimates and reduces the probability of inference errors associated with inflated variances.

Table 3 confirms that the econometric specification used is adequately identified, allowing progress towards the estimation of fixed effects models with solid statistical support.

***Determinants of profitability: fixed effects models***

The identification of the factors that explain business profitability requires an econometric approach capable of controlling unobservable heterogeneity between companies, a characteristic particularly marked in the universe of MSMEs. In this area, panel data models with fixed effects allow isolating the influence of time-invariant characteristics that could bias estimates if not explicitly considered.

The use of robust standard errors clustered by company reinforces the reliability of the results, by simultaneously correcting the presence of heteroskedasticity and intra-firm serial correlation. This procedure is especially pertinent in large administrative bases, where the variability between economic units is substantial.

Likewise, the parallel estimation using two profitability measures (ROA and ROE) allows evaluating the consistency of the identified determinants

from economic and financial perspectives, providing an additional verification of empirical robustness.

**Table 4**

*Determinants of profitability in Ecuadorian MSMEs: panel models with fixed effects (2014–2024)*

| Variable | ROA (FE) | ROE(FE) |
|---|---|---|
| Current Ratio (w) | -0,00001<br>(0,00002) | -0,00059<br>(0,00004) |
| Debt-to-Assets Ratio (w) | 0,25770***<br>(0,00374) | 0,11145***<br>(0,00294) |
| Firm Size (Log Assets) (w) | -0,02128***<br>(0,00056) | 0,05297***<br>(0,00111) |
| Operating Margin (w) | -0,00028***<br>(0,00002) | -0,00340***<br>(0,00005) |
| Sales Turnover (w) | 0,33753***<br>(0,00685) | 0,05623***<br>(0,00138) |
| $R^2$ withim | 0,1460 | 0,1490 |
| Observations | 769.304 | 769.304 |
| Firms | 172.014 | 172.014 |
| Hausman $X^2$ (gl=5) | 128,80*** | 1085,30*** |

*Note: Coefficients with robust standard errors are reported in parentheses, grouped by firm. Models are estimated with fixed effects at the firm level. The Hausman test compares fixed versus random effects; the results (p < .001) support the fixed effects specification. ***p < .01, **p < .05, *p < .10.*

***p < .01, **p < .05, *p < .10.

Table 4 presents the panel data model estimates with fixed effects for the return on assets (ROA) and return on equity (ROE) of Ecuadorian SMEs during the period 2014–2024. The results show that debt-to-assets ratio and sales turnover maintain positive and highly significant coefficients in both specifications, demonstrating that access to external financing and asset efficiency are central factors in generating business profitability.

In contrast, firm size exhibits a negative effect on ROA and a positive effect on ROE, suggesting the coexistence of potential operating diseconomies alongside the effects of financial leverage on return on equity. Similarly, the operating margin shows significant negative coefficients in both models, which could reflect heterogeneous cost structures or competitive strategies based on sales volume within the SME segment. Meanwhile, current liquidity is not statistically significant in ROA, although it does show a significant negative effect on ROE.

The model statistics reinforce the validity of the specification used. The $R^2$ within indicates greater explanatory power in the ROA model compared to the ROE model, while the large number of observations and firms confirms the breadth of the database used. Finally, the Hausman test rejects the hypothesis of random effects in both cases, supporting the use of fixed-effects models as an appropriate econometric strategy to capture unobservable heterogeneity among firms.

**Discussion**

The results obtained in this study provide relevant empirical evidence for understanding the determinants of business profitability in emerging economies, particularly in the micro, small, and medium-sized enterprise (MSME) segment. The findings confirm that the financing structure and asset utilization efficiency are central factors in financial performance, in line with the corporate finance literature that links profitability to leverage decisions and capital productivity (Demirgüç-Kunt & Maksimovic, 1999). Likewise, more recent evidence suggests that in emerging economies, access to financing continues to be a determinant in contexts of credit constraints (Demirgüç-Kunt et al., 2008; Prasad & Mondal, 2025).

The positive significance of indebtedness observed in this study suggests that, in contexts of limited access to credit, external financing can act as a mechanism that facilitates operational expansion and improves return generation. This result is consistent with recent findings that demonstrate the positive effects of leverage on business performance in SMEs in emerging economies (Bui et al., 2021; Kiymaz et al., 2024).

However, the literature also cautions that the effect of debt on profitability can be ambiguous due to increased financial risk and problems of over-indebtedness (Myers, 1984). In this sense, the positive result found in Ecuadorian SMEs should be interpreted more as a reflection of financing constraints than as evidence of optimal capital structures, in accordance with studies that document the dependence on external financing to sustain business growth in Latin America (Gutiérrez-Ponce, 2024).

For its part, sales turnover emerges as one of the most robust determinants of profitability in both specifications, reinforcing theoretical approaches that associate business performance with productivity and efficiency in the use of resources (Syverson, 2011). This result is consistent with recent empirical evidence that highlights the importance of operational efficiency


e-ISSN: 2790-2145 ISSN: 2618-1207

and working capital management as determinants of financial performance (Deloof, 2003; Baños-Caballero et al., 2014; Kiymaz et al., 2024). The differentiated behavior of business size between ROA and ROE provides relevant evidence to the debate on economies and diseconomies of scale in smaller companies. While traditional literature predicts efficiencies gains associated with growth (Hall & Weiss, 1967), several more recent studies show non-linear or even negative relationships between size and performance in MSMEs, due to managerial limitations, organizational rigidities or increases in administrative costs (Nunes et al., 2009; Tran, 2022). Along these lines, the results suggest that growth in assets does not guarantee improvements in economic efficiency, although they can increase the return on equity through leverage effects.

From an applied economics perspective, these findings have direct implications for the design of productive development policies, especially they suggest that strategies focused exclusively on increasing business size could have limited impacts on profitability if they are not accompanied by improvements in productivity, operational management and effective access to financing. This result is consistent with recent studies that emphasize the need for comprehensive policies aimed at strengthening productive and financial capacities in MSMEs (Demirgüç-Kunt et al., 2008; Prasad & Mondal, 2025); This is why public policies should prioritize instruments that strengthen efficiency in the use of assets, commercial capacity and financial intermediation, rather than generalized expansion incentives.

The evidence presented contributes to the literature on business finance in emerging economies such as Latin America, by offering results based on a large-scale national administrative base and a panel approach with fixed effects, which allows controlling unobservable heterogeneity at the company level (Baltagi, 2021). This contribution is particularly relevant for Latin America, where studies with census coverage are still limited. In this way, the study not only confirms internationally documented patterns, but also provides specific evidence for the Ecuadorian sphere, expanding the understanding of the financial functioning of MSMEs in the region.

**Conclusion**

This study analyzed the determinants of profitability in Ecuadorian micro, small, and medium-sized enterprises (MSMEs) using nationwide administrative financial information and panel data models with fixed effects. The results show that financing structure and asset efficiency are the factors most closely associated with corporate financial performance, while liquidity and size exhibit more complex relationships with profitability. In particular, the positive effect of debt and sales turnover confirms the relevance of access to credit and capital productivity as central mechanisms for value creation in emerging economies.

From a theoretical perspective, the findings align with the corporate finance literature that links profitability to capital structure decisions and productive efficiency, while also providing specific evidence of the tensions between business growth and economic performance in the MSME segment. The negative relationship between size and economic profitability, along with its positive effect on return on equity, suggests the coexistence of operational diseconomies and financial leverage effects, contributing to the debate on nonlinear growth trajectories in small businesses in developing economies.

Empirically, this study contributes to the Latin American literature by employing a large-scale administrative base and a panel approach that controls for unobservable heterogeneity, overcoming common limitations of research based on surveys or small samples. Thus, the evidence presented broadens the understanding of the financial functioning of MSMEs and reinforces the importance of simultaneously considering operational and financial dimensions in the analysis of business performance.

From a public policy perspective, the results suggest the need to design strategies aimed at strengthening access to financing and improving the operational efficiency of MSMEs, beyond approaches focused exclusively on business growth. In this regard, the development of financial intermediation mechanisms and training programs on the use of productive resources could contribute more effectively to the sustainability of business performance.

However, the results must be interpreted in light of certain limitations. First, the available accounting information does not allow for the incorporation of qualitative variables related to managerial capabilities, innovation, or competitive strategies—factors potentially relevant to explaining profitability. Second, the relatively short time frame of the panel restricts the application of dynamic approaches that could capture intertemporal adjustment processes. These limitations open opportunities for future research that integrates more extensive longitudinal data, non-financial indicators, or complementary methodologies.

Overall, the study contributes to the field of applied economics and corporate finance by providing robust evidence on the determinants of business profitability in a relatively unexplored Latin American context. The results suggest that the sustainability of MSME performance depends primarily on their ability to transform resources into revenue and their effective access to financing, rather than on growth in scale or liquidity accumulation, thus offering relevant conceptual elements for future research on business development in emerging economies.

**Declaration of the use of generative AI**

The authors used CharGPT (Open AI) as an assistance tool for linguistic editing, improving expository clarity, and supporting the verification of bibliographic references. Artificial intelligence was not used to generate scientific results, perform data analysis, interpret findings, or formulate conclusions. All content was critically reviewed by the authors, who assume sole responsibility for the accuracy, completeness, and originality of the manuscript.

## References


Baños-Caballero, S., García-Teruel, P. J., & Martínez-Solano, P. (2014). Working capital management, corporate performance, and financial constraints. *Journal of Business Research*, 67(3), 332–338. https://doi.org/10.1016/j.jbusres.2013.01.016

Baltagi, B. H. (2021). *Econometric analysis of panel data* (6th ed.). Springer.

Beck, T., & Demirgüç-Kunt, A. (2006). Small and medium-size enterprises: Access to finance as a growth constraint. *Journal of Banking & Finance*, 30(11), 2931–2943. https://doi.org/10.1016/j.jbankfin.2006.05.009

Bond, S., & Meghir, C. (1994). Dynamic investment models and the firm's financial policy. *The Review of Economic Studies*, 61(2), 197–222. https://doi.org/10.2307/2297978

Bui, T. D., Nguyen, H. H., & Ngo, V. M. (2021). Apalancamiento financiero y desempeño de las PYME en Vietnam: Evidencia del período posterior a la crisis. *Economics and Business Letters*, 10 (3), 229–239. https://doi.org/10.17811/ebl.10.3.2021.229-239

Coad, A. (2009). *The growth of firms: A survey of theories and empirical evidence*. Edward Elgar.

Deloof, M. (2003). Does working capital management affect profitability of Belgian firms? J*ournal of Business Finance & Accounting*, 30(3–4), 573–588. https://doi.org/10.1111/1468-5957.00008

Demirgüç-Kunt, A., & Maksimovic, V. (1999). Institutions, financial markets, and firm debt maturity. *Journal of Financial Economics*, 54(3), 295–336. https://doi.org/10.1016/S0304-405X(99)00039-2

Demirgüç-Kunt, A., Beck, T., & Honohan, P. (2008). *Finance for all? Policies and pitfalls in expanding access*. World Bank. https://research.tilburguniversity.edu/en/publications/finance-for-all-policies-and-pitfalls-in-expanding-access/

Goddard, J., Tavakoli, M., & Wilson, J. O. S. (2005). Determinants of profitability in European manufacturing and services. *Applied Financial Economics*, 15(18), 1269–1282. https://doi.org/10.1080/09603100500387139

Gutiérrez-Ponce, H. (2024). Determinantes del apalancamiento corporativo y la sostenibilidad de las pequeñas y medianas empresas: El caso de las empresas comerciales en Ecuador. *Business Strategy and the Environment*, 33(8), 8319–8331. https://onlinelibrary.wiley.com/doi/10.1002/bse.3924

Hall, M., & Weiss, L. (1967). Firm size and profitability. *The Review of Economics and Statistics*, 49(3), 319–331. https://doi.org/10.2307/1926642

Kiymaz, H., Haque, S., & Choudhury, A. A. (2024). Working capital management and firm performance: A comparative analysis of developed and emerging economies. *Borsa Istanbul Review*, 24(3), 634–642. https://doi.org/10.1016/j.bir.2024.03.004

Kraus, A., & Litzenberger, R. H. (1973). A state-preference model of optimal financial leverage. *The Journal of Finance*, 28(4), 911–922. https://doi.org/10.1111/j.1540-6261.1973.tb01415.x

Myers, S. C. (1984). The capital structure puzzle. *The Journal of Finance*, 39(3), 575–592. https://doi.org/10.1111/j.1540-6261.1984.tb03646.x

Myers, S. C., & Majluf, N. S. (1984). Corporate financing and investment decisions when firms have information that investors do not have. *Journal of Financial Economics*, 13(2), 187–221. https://doi.org/10.1016/0304-405X(84)90023-0

Nunes, P. M., Serrasqueiro, Z., & Sequeira, T. N. (2009). Profitability in Portuguese service industries: A panel data approach. *The Service Industries Journal*, 29(5), 693–707. https://doi.org/10.1080/02642060902720188

Penrose, E. T. (1959). The theory of the growth of the firm. Oxford University Press.

Pervan, M., Ćurak, M., & Pavić, I. (2018). The determinants of firm profitability: Evidence from the Croatian manufacturing industry. *Economic Research-Ekonomska Istraživanja*, 32(1), 368–981. https://doi.org/10.1080/1331677x.2019.1583587



e-ISSN: 2790-2145 ISSN: 2618-1207

Prasad, R., & Mondal, A. (2025). Determinantes del desempeño financiero de las pymes en una economía emergente: una perspectiva econométrica. *SN Business & Economics*, 5, 122. https://doi.org/10.1007/s43546-025-00890-z

Syverson, C. (2011). What determines productivity? *Journal of Economic Literature*, 49(2), 326–365. https://doi.org/10.1257/jel.49.2.326

Tran, Q.H. (2022). The impact of green finance, economic growth and energy use on $CO_2$ emissions in Vietnam: A multivariate time series analysis. *China Finance Review International*, 12(2), 280–296. https://doi.org/10.1108/CFRI-03-2021-0049

Yazdanfar, D. (2013). Profitability determinants among micro firms: Evidence from Swedish data. *International Journal of Managerial Finance*, 9(2), 151–160. https://doi.org/10.1108/17439131311307565