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## Return on equity determinants and Covid-19 pandemic impacts on Latin America companies: A panel data study

*Determinantes do retorno sobre o patrimônio líquido e os impactos da pandemia da Covid-19 em empresas da América Latina: Um estudo com dados em painel*

*Determinantes de la rentabilidad financiera y los impactos de la pandemia del Covid-19 en las empresas latinoamericanas: Un estudio con datos de panel*

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### ABSTRACT

This research investigates the determinants of ROE and the impact caused by the Covid-19 pandemic on public companies in Latin America. The fixed effects regression model with panel data is used to identify that factors related to sales policies and cost controls are the ones that contribute the most to ROE performance, regardless of the period. On the other hand, the level of indebtedness and macroeconomic indicators are not significant, strengthening the finding that the operational and internal decisions of the company contribute more strongly to maximizing shareholder returns. This verification helps financial managers in directing decisions and expands academic knowledge on this topic.

**Keywords:** ROE determinants; Covid-19; Latin America; panel data; fixed effects regression.

### RESUMO

Esta pesquisa investiga os determinantes do retorno sobre patrimônio líquido ou *return on equity* (ROE) e o impacto ocasionado pela pandemia da Covid-19 em empresas de capital aberto da América Latina. O modelo de regressão de efeitos fixos com dados em painel permite evidenciar que os fatores referentes às sales e controle de despesas são os que apresentam maior contribuição para o ROE, independentemente do período. Por outro lado, o nível de endividamento e os indicadores macroeconômicos se mostram não significativos, fortalecendo a constatação de que decisões operacionais e internas à empresa contribuem mais fortemente para a maximização do retorno ao acionista. Essa apuração auxilia os administradores financeiros no direcionamento de decisões e amplia o conhecimento acadêmico acerca desse tema.

**Palavras-chave:** determinantes de ROE; Covid-19; América Latina; dados em painel; modelo efeitos fixos.

### RESUMEN

Esta investigación busca los determinantes del ROE y el impacto causado por la pandemia de Covid-19 en las empresas que cotizan en bolsa en América Latina. El modelo de regresión de efectos fijos con datos de panel muestra que los factores relacionados con las ventas y el control de gastos son los que presentan mayor contribución al ROE, independientemente del período. Por otro lado, el nivel de endeudamiento y los indicadores macroeconómicos no son significativos, reforzando el hallazgo de que las decisiones operativas e internas de la empresa contribuyen con mayor fuerza a la maximización del retorno al accionista. Esta verificación ayuda a los administradores financieros en la toma de decisiones y amplía el conocimiento académico sobre este tema.

**Palabras clave:** determinantes del ROE; Covid-19; América Latina; datos en panel; modelo de efectos fijos.

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## 1 INTRODUCTION

The return on equity (ROE) is one of the main performance indicators used in companies, as it measures the efficiency of shareholders' use of capital to generate profitability (Higgins, 2014; Kijewska, 2016). The indicator is calculated by dividing net income by equity. According to Burja and Marginean (2014), ROE is analyzed both by shareholders, who seek to maximize the return on their investment, as well as by financial managers of companies, who use this metric as support in making their decisions. For both, it is an indication that demonstrates how to increase returns and, consequently, attract more investors to their businesses.

In this context, studies have been carried out to highlight the factors that most contribute to ROE performance, both from the internal and external perspectives of the company. In other words, the objective is to understand which elements arising from decisions inherent to the company taken by managers and macroeconomic indicators affect the company's profitability and impact on shareholder return (Ndlovu & Alagidede, 2015).

The search for elements that explain the behavior of ROE contributes to the expansion of knowledge on the subject, in addition to increasing the toolbox at the service of financial managers in conducting business.

Based on the DuPont method, factors such as profit margin, asset turnover and financial leverage are some of the research elements. Manjunatha and Gujjar (2018), Manjunatha et al. (2020) and Oriskooova and Paksiova (2018), for example, detect a strongly positive effect of profit margin on ROE. Concerning asset turnover, the results are also positive, but with different intensities impacting ROE (from strong to insignificant) (Bunea et al., 2019; Hsieh et al., 2020; Kijewska, 2016; Rogova, 2014; Tanasa et al., 2014; Weidman et al., 2019).

In addition, since 2019, companies have had to deal with the Covid-19 Pandemic (Corona Virus Disease 2019), which caused general and extensive impacts worldwide. From an economic perspective, both the demand side and the supply side are impacted due to the need for social distancing. As a result, many companies are unable to produce and/or market their products and services, resulting in an abrupt drop in their revenues and source of funds (Fahlenbrach et al., 2010; Liu et al., 2021).

As an unprecedented event, the consequences for business profitability (mainly in the medium and long term) are not yet fully known (Hassan et al., 2020). To this end, the analysis of economic-financial indicators is extremely relevant in understanding the effects of the pandemic on companies, since they identify and help financial managers in their decisions (Heyden & Heyden, 2021; Avelar et al., 2021).

The purpose of this study is therefore precisely to identify, in an exploratory manner, ROE determinants for non-financial and publicly traded companies located in Brazil, Chile, and Mexico. Likewise, the aim is to understand

the impact of the Covid-19 pandemic on these factors, based on the fact that the economic and financial performance of businesses is the basis for decision-making by investors, shareholders, creditors, and administrators. That is, research like this can lead to the maximization of its value (Devi et al., 2020). As other benefits, one can also highlight the importance of contributing to academic studies on the subject, especially in Latin American countries, as well as understanding the effect of the Covid-19 pandemic on the performance of companies in the region.

To this end, information from the financial statements of non-financial and publicly traded companies established in Brazil, Chile, and Mexico, from 2017 to 2021, is used. This data was collected on the S&P Capital IQ platform. The methodology used, in turn, is the regression of fixed effects for panel data - obtained using the STATA® software version 14.2.

The study is structured as explained below. Item 2 presents the theoretical framework, while topic 3 brings the methodology, econometric model, and survey of data adopted are described. In part 4, the results obtained and their analyzes are demonstrated and, finally, section 5 presents the conclusions and the indication of new studies.

## 2 THEORETICAL FRAMEWORK

### 2.1 Determinants of ROE

According to Assaf (2021), diagnosing the current position and producing results that serve as a basis for forecasting future trends is something done from the calculation of economic-financial indices extracted from the financial statements of companies. Allied with this, the author states that the temporal comparison of the indicators is indicative of the company's evolution and performance dynamically.

The most popular index among investors and managers is ROE (return on equity), as it portrays the efficiency with which the company employs shareholders' capital and what is its return. This measure is obtained by the ratio of net income to equity value (Higgins, 2014).

As for Catapan et al. (2011), ROE measures business profitability by analyzing the influence of profits on sales and efficiency in the use of assets. Kijewska (2016) states that this indicator measures the company's efficiency in generating returns from the resources invested by shareholders.

The DuPont method, developed by F. Donaldson Brown in the 1910s, decomposes ROE into three main elements: a) net margin, which is reflected in the company's commercial policies; b) asset turnover, which measures the degree of efficiency in the use of assets; c) financial leverage, which shows how much of the company's total assets are financed by third-party capital. Subsequently, two more items with a direct influence on ROE are incorporated into the model: financial cost and tax burden. This model is called the five-element DuPont model (Fernandes et al., 2014; Kijewska, 2016).

According to Bunea et al. (2019), the determinants of ROE are like levers available to financial managers to guide their decisions. This means that operational strategies and their economic performance - as well as financial performance - must serve as the basis for the actions of managers who aim to increase the return to the company's shareholders.

Additionally, to measure the impacts of elements external to the company on ROE, some studies include macroeconomic indicators in their models, (Anarfi et al., 2016; Ndlovu & Alegidede, 2015).

Table 1 shows the results of previous research on elements, internal and external, that impact ROE, such as profit margin, asset turnover, financial leverage, GDP, inflation, and basic interest rate.

**Table 1**  
Previous studies on ROE's determinants

Authors	Scope	Internal factors			External factors		
		Profit Margin	Asset turnover	Leverage	GDP	Inflation rate	Basic interest rate
Anarfi et al. (2016)	2005 to 2014 1,328 Czech firms	positive	positive	negative	negative	neutral	negative
Barbosa and Nogueira (2018)	2010 to 2016 3 Brazilian firms from the food sector	not applied	not applied	not applied	neutral	negative	neutral
Bunea et al. (2019)	2013 to 2017 1,253 Romanian energy firms	positive	positive	positive	not applied	not applied	not applied
Burja and Marginean (2014)	2000 to 2012 Romanian furniture firms	positive	positive	negative	not applied	not applied	not applied
Carvalho et al. (2017)	2007 to 2015 Brazilian trade companies	positive	positive	negative	not applied	not applied	not applied
Ghita-Mitrescu and Duhnea (2017)	2007 to 2016 Romanian financial firms	positive	neutral	positive	not applied	not applied	not applied
Hsieh et al. (2020)	1975 to 1996 39 American firms from chemical and pharmaceutical industries	positive	positive	positive	not applied	not applied	not applied
Kanwal and Nadeem (2013)	2001 to 2011 23 Pakistani financial companies	not applied	not applied	not applied	negative	negative	positive
Kijewska (2016)	2011 to 2013 Polish companies from the metallurgical sector	positive	positive	negative	not applied	not applied	not applied
Manjunatha and Gujjar (2020)	2011 to 2015 25 Indian technology companies	positive	positive	negative	not applied	not applied	not applied
Manjunatha et al. (2018)	2009 to 2018 25 infrastructure Indian companies	positive	positive	negative	not applied	not applied	not applied
Mucharreira and Antunes (2015)	2003 to 2013 4,428 Portuguese small and medium firms	not applied	not applied	not applied	neutral	positive	neutral
Ndlovu and Alagidede (2015)	2002 to 2012 73 South African companies	positive	positive	negative	positive	positive	negative
Oriskoova and Paksiova (2018)	2016 59 Slovak engineering companies	positive	positive	negative	not applied	not applied	not applied
Soares and Gaudi (2011)	1995 to 2008 Brazilian trade companies	positive	positive	positive	not applied	not applied	not applied
Weidman (2019)	2016 2,445 manufacturing companies from USA, German, and Japan	positive	positive	negative	not applied	not applied	not applied

Source: Developed by the authors.

It is observed that in all attributes analyzed, there are quite different results between the surveys. For example, financial leverage has a positive relationship with ROE in some studies (Bunea et al., 2019; Ghita-Mitrescu & Duhnea, 2017; Hsieh et al., 2020; Soares & Gaudi, 2011), while Anarfi et al. al. (2016), Burja and Marginean (2014), Carvalho et al. (2017), Kijewska (2016), Manjunatha and Gujjar (2020), Manjunatha et al. (2018), Ndlovu and Alagidede (2015), Oriskoova and Paksiova (2018) and Weidman (2019) find a negative sign between financial leverage and ROE.

Research such as Kijewska (2016) and Soares and Gaudi (2011) conclude, in turn, that operating factors such as net margin and asset turnover explain more the behavior

of ROE than the financial aspects themselves (financial leverage, for example ). Thus, actions taken by company managers that increase revenues and/or reduce costs and expenses tend to increase ROE. Added to this, it is observed that the company's form of financing, whether via equity or third-party capital, does not have a significant impact on ROE performance (Carvalho et al., 2017).

Liesz and Maranville (2008) state that, to increase ROE, the company must focus its actions on increasing operating profit, being more efficient in the use of its assets, optimizing the capital structure, reducing the cost of debt, and reducing the impact of the tax burden. Certainly, these decisions lead to different financial strategies.

## 2.2 Covid-19 pandemic and its impacts on business performance

Borrowed from the medical sciences, the term diagnosis means the study of changes in the expected behavior pattern in certain situations. In Administration, the analysis of performance indicators shows the effects of factors internal and external to the company on its economic and financial performance (Andekina & Rakhmetova, 2013).

The Covid-19 pandemic is an unprecedented event, exogenous to the company, but which affects its results. It impacts all economic agents, all businesses, and all countries; causes supply chain disruption, and represents a demand and supply shock (Salisu & Vo, 2020; Zheng, 2022).

As it is a recent event, all possible impacts on the financial performance of companies are not clear, especially those in the medium and long term. This requires financial managers and investors to make decisions in an unstable and unfamiliar environment, creating an even greater challenge. (Hassan et al., 2020; Salisu & Vo, 2020).

For Avelar et al. (2021), the impacts of the Covid-19 pandemic on the performance of companies should be measured not only by the price of their shares in the capital market but also by analyzing their financial statements. In addition to health actions, there is a need for measures to ensure the financial health of people, companies, and countries. The authors also emphasize the importance of understanding all the operational aspects of companies based on their economic and financial indicators. This provides support for managers' decisions related to resource allocation, maintenance of operations and competitiveness.

Fahlenbrach et al. (2021) conclude that the severe restriction on economic activities (due to social isolation) leads to reduced consumption, a drop in sales volume, and, consequently, a decrease in companies' profitability.

Shen et al. (2020) empirically show the negative and significant impact of the Covid-19 pandemic on the performance of publicly traded Chinese companies. According to the authors, restrictions on the movement of people and social isolation cause a drastic drop in demand, leading to a significant decrease in productivity, revenue, and, consequently, the ROE of companies.

The economic crisis reduces demand and, consequently, companies' sales. In the short term, cost containment does not follow the drop in revenues, negatively impacting business profitability. To measure the effectiveness of using assets to generate revenue, given these crisis scenarios, the inventory turnover, accounts receivable and accounts payable indicators are the most relevant, especially in the short term (Devi et al., 2020).

The research is justified by the importance that the ROE determinants maintain in this context since previous studies are inconclusive. In addition, it contributes with analyzes referring to Latin American countries and investigations of the impacts of Covid-19 on the results of companies.

The research hypotheses raised in this work are:

H1: The variables gross margin, sales growth, inventory turnover, average payment term, fixed asset turnover, and tax charges have a positive impact on companies' ROE.

H2: The variables selling and administrative expenses, average collection period, and debt ratio harm the ROE of companies.

H3: The Covid-19 pandemic negatively impacts the ROE of companies.

## 3 METHODOLOGY

### 3.1 Database and sample

The research is based on secondary data collected directly from S&P Capital IQ, a subscription-based platform that provides business data and news and economic, financial, and commercial conditions for public and private companies around the world. The information used in this work comprises the economic and financial variables of non-financial and publicly traded companies. The annual data comes from the Income Statement and Balance Sheet financial reports disclosed and available on Capital IQ's own database. Macroeconomic information is extracted from the World Bank and the International Monetary Fund for each of the analyzed countries.

The sample, collected on June 15, 2022, comprises the three Latin American countries with the highest number of companies listed on the capital market: Brazil, Chile, and Mexico. These three countries represent 73% of publicly traded companies listed on Latin American stock exchanges. Table 2 details the sample distribution after eliminating companies that represent negative equity.

Data is collected annually. The period before the Covid-19 pandemic from 2017 to 2019 represents 1,224 observations, while the post-pandemic period, from 2020 to 2021, has 816.

**Table 2**

Sample distribution

Country	No. of Companies	Total data
Brazil	195	975
Chile	123	615
Mexico	90	450
Total	408	2,040

Source: Developed by the authors.

### 3.2 Variables definition

The ROE is analyzed as a dependent variable of the model to identify its determining factors.

The analysis variables of this study represent the explanatory components of return on equity (ROE). These variables represent indicators related to factors internal to the company, segregated into operational and financial, as well as external elements, which are represented by macroeconomic indices.

Among the indicators related to the operation, the following are used: gross margin, a ratio of administrative



and selling expenses to sales, inventory turnover, fixed asset turnover, tax charges, sales growth, average collection period, and average payment period.

Gross margin indicates how much of sales are available to pay fixed costs and expenses and increase profit. This allows for estimating the break-even point in sales (Higgins, 2014 p.42) and, similarly, shows that sales growth increases the company's profitability (Ullah et al., 2020) – both, therefore, positively impact the SWR.

The ratio of administrative and commercial expenses to sales, according to Caneghem et al. (2021), represents the ability to control expenses and efficiency in the use of resources by company managers. In other words, it is expected to harm ROE.

According to Berk and DeMarzo (2017 p. 79), the greater the inventory turnover, the fewer days of stopped goods, and the more efficient management of working capital, favoring ROE.

The average collection period informs how long sales are converted into cash, portraying the company's commercial policy. This means that the longer this period is, the lower the ROE. On the other hand, the average payment period expresses the moment when the company must have the resources to pay its suppliers. Thus, the longer this period is, the more breath the cash has - a positive effect on ROE (Berk & DeMarzo, 2017 p. 79; Higgins, 2014 p. 47).

The turnover of fixed assets represents the intensity of the use of capital or operational leverage in the company's activity. In other words, it signals the efficiency of using permanent assets to add value to the company (Higgins, 2014 p. 47).

Still, in the category of operational elements, Ullah et al. (2020) do not find a significant connection between tax

charges and profitability, contrasting the studies by Soares and Gaudi (2011), which point to a positive relationship.

The indicator of a financial nature studied is indebtedness, which corresponds to the proportion between third-party capital and equity. Despite having an inverse relationship with ROE, its maximization is not necessarily positive. Therefore, the challenge for financial managers is to find a balance between the costs vis-à-vis the benefits of the level of indebtedness practiced (Endri et al. 2021; Higgins, 2014 p. 47; Nguyen et al., 2021; Ullah et al., 2020).

For each of the countries studied, selected macroeconomic indices are collected from the World Bank and International Monetary Fund databases. The gross domestic product (GDP) represents the annual growth of the economy in percentage. The inflation rate depicts the annual consumer price index also in percentage. Finally, the basic interest rate reflects the interest rate defined by the country's monetary policy. For Mucharreira and Antunes (2015), the increase in GDP leads to the country's economic expansion, positively impacting the profitability of companies. The interest rate effect can be positive or negative, depending on the company's capital structure.

It is important to point out that, as already mentioned, studies on the impact of these macroeconomic indicators on ROE are inconclusive. This means that there is no congruence between their effect on the profitability of companies (Anarfi et al., 2016; Barbosa & Nogueira, 2018; Kanwal & Nadeem, 2013; Mucharreira & Antunes, 2015; Ndlovu & Alagidede, 2015).

Table 3 details the model's explanatory variables with their calculation formulas, as well as the expected sign on the impact on ROE.

**Table 3**

Independent variable

Type of indicator	Variable	Code	Calculation	Expected sign	Reference
Operational	Gross margin	GMG	Gross profit / net sales revenue	positive	Beck and DeMarzo (2017 p. 79) Higgins (2014 p. 41)
Operational	Sales growth	SAG	$(Sales_n - sales_{n-1}) / sales_n$	positive	Ullah et al. (2020)
Operational	Sales and administrative expenses	SAE	Sales and administrative expenses / net sales revenue	negative	Caneghem et al., (2021)
Operational	Inventory turn	INV	Cost of goods or services sold / inventory	positive	Beck and DeMarzo (2017 p. 79) Higgins (2014 p. 43)
Operational	Days sales outstanding	DSO	Accounts receivable/net sales revenue	negative	Beck and DeMarzo (2017 p. 79)
Operational	Days payable outstanding	DPO	Accounts payable / cost of goods or services sold	positive	Beck and DeMarzo (2017 p. 79) Higgins (2014 p. 45)
Operational	Fixed assets turnover	FAT	Net sales revenue / total fixed assets	positive	Beck and DeMarzo (2017 p. 79) Higgins (2014 p. 47)
Operational	Effective tax rate	ETR	Income taxes expenses/earnings before income taxes	positive/negative	Nguyen and Nguyen (2020) Ullah et al. (2020)
Financial	Debt ratio	DEB	$(Current\ liability + non-current\ liability) / Equity$	negative	Endri et al. (2021) Nguyen and Nguyen (2020)
Macroeconomic	Gross domestic product	GDP	Economic rate growth	positive/negative	Anarfi et al. (2016) Ndlovu and Alagidede (2015)
Macroeconomic	Consumer product inflation	CPI	Country Inflation rate	positive/negative	Barbosa and Nogueira (2018) Ndlovu and Alagidede (2015)
Macroeconomic	Basic interest rate	JUR	Country basic interest rate	positive/negative	Barbosa and Nogueira (2018) Mucharreira and Antunes (2015)

Source: Developed by the authors.

### 3.3 Econometric Model

To identify the behavior of key ROE factors - as well as the impact of the Covid-19 pandemic on the performance of Latin American companies - the data are examined with three-time frames. Following the example of studies such as Alsamhi (2022), Devid et al. (2020), and Krieger et al. (2021), three periods are considered: before the pandemic (from 2017 to 2019), after the pandemic (from 2020 to 2021) and the total period (from 2017 to 2021).

With the help of STATA® software version 14.2, statistical modeling is applied for the three periods separately. Subsequently, a comparative analysis is made between the results of these periods to highlight possible differences or similarities.

P Panel data, or stacked data, consider both the cross-section and the time series. This allows for analyzing the data considering both individual and time variations (Fávero, 2013). For Gujarati and Porter (2011) the estimation techniques that consider the heterogeneity of the data more efficiently measure the unobservable components. That is, they are more suitable for studying the dynamics of changes in cross-section.

Among the estimation techniques for panel data, the following stand out: a) the least squares model for stacked

data, Pooled Least Squares (POLS), which estimates the regression ignoring the cross-sectional nature and time series of the data; b) fixed effects model (FEM) that combines the observations, but the heterogeneity of each individual (cross-sectional unit) is captured in the constant and time-invariant part; c) random effects model (MEA), which assumes that the intercept values are assigned randomly (Gujarati & Porter, 2011).

The choice of the most adequate model to be applied is based on the Chow, Hausman, and Breusch-Pagan tests. According to Fávero (2013), the Chow test allows for identifying among the POLS (H0) and fixed effects (H1) models the one that is more adherent. The Hausman test compares random effects (H0) and fixed effects (H1) models. Finally, the Breusch-Pagan LM test indicates which one is the most suitable between the POLS (H0) and randomly selected (H1) models. For each test, if the p-value is less than 0.10, the null hypothesis (H0) is rejected and the alternative hypothesis (H1) is accepted.

After applying the statistical tests, as shown in Table 4, the appropriate model to be used in this study is the fixed effects regression with panel data:

**Table 4**

Econometric model definition tests

Tests	2017-2021		2017-2019		2020-2021	
	value	p-value	value	p-value	value	p-value
Chow	5.7	0.000	5.9	0.000	3.4	0.000
Hausman	98.4	0.000	44.1	0.000	47.7	0.000
Breusch-Pagan	497.9	0.000	322.4	0.000	40.4	0.000

Source: Developed by the authors.

Equation 1 demonstrates the econometric model and the variables used in this study:

$$ROE_{it} = \alpha + \beta_1 gmg_{it} + \beta_2 sae_{it} + \beta_3 sag_{it} + \beta_4 fat_t + \beta_5 inv_t + \beta_6 dso_t + \beta_7 dpo_t + \beta_8 etr_t + \beta_9 deb_t + \beta_{10} gdp_t + \beta_{11} cpi_t + \beta_{12} jur_t + \mu_{it} \quad (1)$$

where:

$\alpha$  = constant

$\beta$  = variable coefficients

$\mu$  = error term

gmg = gross margin

sae = ratio of selling and administrative expenses to sales

sag = sales growth

fat = fixed asset turnover

inv = inventory turnover

dso = days sales outstanding

dpo = days payable outstanding

etr = tax burden

deb = debt ratio

gdp = growth domestic rate

cpi = consumer price inflation

jur = basic interest rate of the country

It is noteworthy that, additionally, the Breusch-Pagan and White tests are applied to analyze the heteroscedasticity of the model. The endogeneity test is also used considering the macroeconomic variables with a time lag of one year for each sample observation.

## 4 ANALYSIS AND DISCUSSION OF RESULTS

### 4.1 Descriptive Statistics

Table 5 presents the descriptive statistics of the dependent (roe), independent (gmg, sae, sag, fat, inv, dso, dpo, etr and deb) and control (gdp, cpi, jur) variables for the periods before the pandemic from Covid-19 (2017 to 2019), post-pandemic (2020 and 2021) and the total period analyzed (from 2017 to 2021).

**Table 5**

Descriptive statistics

Variable	Mean			Standard deviation			Minimum			Maximum		
	2017-2021	2017-2019	2020-2021	2017-2021	2017-2019	2020-2021	2017-2021	2017-2019	2020-2021	2017-2021	2017-2019	2020-2021
roe	9.38	8.67	10.45	13.24	11.05	15.88	-28.58	-18.69	-28.58	55.92	32.82	55.92
gmg	34.57	34.33	34.94	18.98	19.12	18.78	7.07	7.53	7.07	80.26	80.26	79.23
sae	17.96	18.10	17.75	11.90	11.84	12.00	2.82	3.56	2.82	47.55	47.55	47.53
sag	11.18	8.24	15.59	21.37	16.07	26.90	-38.41	-25.30	-38.41	85.77	51.93	85.77
fat	7.76	7.88	7.57	13.65	13.78	13.46	0.10	0.10	0.20	59.29	59.29	55.22
inv	25.66	27.70	22.58	54.26	59.66	44.81	0.00	0.00	0.00	266.02	266.02	180.61
dso	64.00	64.09	63.86	37.17	36.87	37.64	10.26	10.26	11.71	163.79	163.79	160.77
dpo	63.61	62.24	65.67	41.73	41.06	42.66	8.00	8.00	10.91	180.17	170.28	180.17
etr	26.37	27.18	25.07	14.57	14.90	13.93	3.56	4.14	3.56	81.15	81.15	68.69
deb	83.81	80.22	89.15	75.91	75.02	76.94	0.00	0.00	2.38	330.77	330.77	312.17
gdp	1.23	1.61	0.66	4.29	0.99	6.64	-8.17	-0.19	-8.17	11.67	3.99	11.67
cpi	4.07	3.52	4.89	1.67	1.01	2.08	2.18	2.18	3.05	8.30	6.04	8.30
jur	0.05	0.05	0.04	0.03	0.02	0.03	0.01	0.02	0.01	0.09	0.08	0.09

Source: Developed by the authors.

The average ROE in the post-pandemic period compared to before the pandemic shows an increase of 1.8 p.p. (from 8.67% to 10.45%). For the total period, it appears that the ROE has an average of 9.38%, with a standard deviation of 13.24. The minimum value found is -28.58% and the maximum is 55.92%. This means that there is high dispersion and the data is heterogeneous.

Of the independent variables, it is observed that indebtedness, sales growth and average collection period are the ones that grew the most with 8.9 p.p. (from 80.2% to 89.1%), 3 p.p. (from 8.2% to 15.5%) and 3.4 p.p. (from 62.2% to 65.6%) of increase, respectively. On the other hand, the variables inventory turnover and tax charges suffer the biggest drops between the two periods, that is, they fall 5.1 p.p. (from 27.7% to 22.6%) and 2.1 p.p. (from 27.2% to 25.1%), in that order.

As for the macroeconomic indicators of the three Latin American countries analyzed (Brazil, Chile and Mexico), a decrease of 0.9 p.p. on average GDP. The average inflation rate shows an increase of 1.4 p.p. between the two periods. The base interest rate, however, does not oscillate. It is important to note that these variations are consistent with the impact of the Covid-19 pandemic on the countries' economies.

The correlation matrix between the variables expresses the behavior of the dependent variable concerning the independent and control variables. Tables 6, 7 and 8 demonstrate the correlation between the factors analyzed for the segregated periods: before the pandemic, from 2017 to 2019; after the pandemic, from 2020 to 2021; and the entire period studied, 2017 to 2021, respectively.

It appears that the gross margin, fixed assets turnover, inventory turnover, and debt ratio components have a weak or medium positive correlation with ROE and remain unchanged over the years. The indicators of administrative and commercial expenses on sales, average collection period, average payment period, and tax charges show a low and negative correlation with ROE. The highlight is the sales growth factor, which shows an increase in correlation with ROE from 0.15 to 0.40 between the moments before and after the Covid-19 pandemic.

It is worth noting that the three macroeconomic indices included in this study, GDP, inflation, and the basic interest rate, do not show a correlation with the ROE in the period before the pandemic, but they do show a positive, relevant correlation in the post-pandemic years.

**Table 6**

Correlation matrix – 2017 to 2021

2017-2021	roe	gmg	sae	sag	fat	inv	dso	dpo	etr	dpo	gdp	cpi	jur
roe	1.0000												
gmg	0.1145	1.0000											
sae	-0.1835	0.4096	1.0000										
sag	0.3362	-0.0188	-0.1217	1.0000									
fat	0.1651	-0.0646	-0.1224	0.0412	1.0000								
inv	0.0971	-0.1291	-0.2177	-0.0081	0.1967	1.0000							
dso	-0.1124	0.0876	0.1214	-0.1507	0.1849	-0.0164	1.0000						
dpo	-0.1082	0.3573	0.1917	-0.1129	-0.1791	-0.1115	0.0957	1.0000					
etr	-0.2435	-0.0678	-0.0198	-0.1085	-0.0537	0.0279	-0.1179	0.0802	1.0000				
deb	0.1811	-0.0979	-0.2060	0.0474	0.1134	0.0443	-0.0774	0.0326	0.1524	1.0000			
gdp	0.1505	-0.0004	-0.0415	0.3831	-0.0139	-0.0160	-0.0398	-0.0337	-0.1315	-0.0284	1.0000		
cpi	0.2993	0.0589	-0.0168	0.4556	0.0996	-0.0185	-0.0689	-0.0476	-0.0573	0.0918	0.3944	1.0000	
jur	0.2118	0.0631	0.0349	0.3316	0.1203	0.0422	-0.0827	-0.0654	0.0178	0.0749	0.3642	0.7454	1.0000

Source: Developed by the authors.

**Table 7**

Correlation matrix – 2017 to 2019

2017-2019	roe	gmg	sae	sag	fat	inv	dso	dpo	etr	dpo	gdp	cpi	jur
roe	1.0000												
gmg	0.1544	1.0000											
sae	-0.1537	0.3894	1.0000										
sag	0.1547	-0.0281	-0.1233	1.0000									
fat	0.1369	-0.0333	-0.0827	0.0649	1.0000								
inv	0.1037	-0.1463	-0.2151	0.0517	0.1822	1.0000							
dso	-0.0854	0.0687	0.1208	-0.1124	0.1586	-0.0257	1.0000						
dpo	-0.0859	0.3696	0.1843	-0.0876	-0.1892	-0.1215	0.0855	1.0000					
etr	-0.2800	-0.0932	-0.0258	-0.0830	-0.0256	0.0217	-0.1023	0.0927	1.0000				
deb	0.1408	-0.0695	-0.1869	0.0917	0.0545	0.0445	-0.0497	0.0248	0.1799	1.0000			
gdp	0.0049	-0.0083	-0.0389	0.0741	-0.0324	-0.0126	0.0283	0.0197	-0.0692	-0.0940	1.0000		
cpi	0.0487	0.0691	0.0461	0.1848	0.0472	-0.0135	-0.1383	0.0188	0.1279	0.0909	-0.0148	1.0000	
jur	0.0838	0.0668	0.0689	0.1939	0.1189	0.0545	-0.1078	-0.0226	0.1161	0.1135	-0.1433	0.7746	1.0000

Source: Developed by the authors.

**Table 8**

Correlation matrix - 2020 and 2021

2020-2021	roe	gmg	sae	sag	fat	inv	dso	dpo	etr	dpo	gdp	cpi	jur
roe	1.0000												
gmg	0.0794	1.0000											
sae	-0.2157	0.4456	1.0000										
sag	0.4046	-0.0154	-0.1155	1.0000									
fat	0.1916	-0.1134	-0.1812	0.0093	1.0000								
inv	0.1280	-0.0944	-0.2369	-0.0557	0.2401	1.0000							
dso	-0.1445	0.1185	0.1212	-0.1995	0.2257	0.0007	1.0000						
dpo	-0.1397	0.3374	0.2046	-0.1507	-0.1646	-0.0939	0.1117	1.0000					
etr	-0.2039	-0.0228	-0.0171	-0.1193	-0.0938	0.0325	-0.1473	0.0597	1.0000				
deb	0.2051	-0.1423	-0.2295	-0.0193	0.1891	0.0577	-0.1159	0.0441	0.1247	1.0000			
gdp	0.2144	0.0020	-0.0644	0.5066	-0.0116	-0.0338	-0.0733	-0.0599	-0.2142	-0.0167	1.0000		
cpi	0.3681	0.0631	-0.0349	0.5116	0.1382	0.0202	-0.0221	-0.1162	-0.1802	0.0536	0.5622	1.0000	
jur	0.3536	0.0635	-0.0160	0.4964	0.1346	0.0132	-0.0607	-0.1170	-0.1196	0.0557	0.5223	0.9665	1.0000

Source: Developed by the authors.

## 4.2 Results of the Econometric Model

The data obtained by the fixed effects regression model with panel data are presented in Table 9. With the analysis of the results in any period of time, it is verified that the factors, gross margin, sales growth and average term of payments present significance and positive effect on the ROE, corroborating the studies by Anarfi et al. (2016), Brunea et al. (2019), Hsieh et al. (2020) Of these, sales growth is the one with the highest positive correlation with ROE, especially in the post-Covid-19 pandemic period.

The tax burden indicator is also significant, but with a negative impact on ROE. These results are in line with the literature and previous studies (Beck & DeMarzo, 2017 p. 79; Nguyen et al., 2021; Ullah et al., 2020), suggesting that factors related to the sales operation have a fundamental impact on behavior of ROE, regardless of elements external to the company.

The factor selling and administrative expenses on sales, despite having a significance of 1% in the consolidated and pre-pandemic periods, becomes insignificant considering the period after the pandemic. On the other hand, the fixed asset turnover index indicates significance in the total and post-pandemic period, but it is not significant from 2017 to 2019. This result is in contrast to previous studies (Beck & DeMarzo, 2017 p. 79;

Caneghem et al., 2021) since they present different conclusions, depending on the moment analyzed. This implies that expense control is less relevant in times of crisis, such as the Covid-19 pandemic, than at other times. In contrast to the impact of the company's fixed structure, represented by the fixed asset turnover ratio, with greater weight in the company's profitability in periods of crisis.

The inventory turnover and average collection period indicators, on the other hand, show contradictory results when comparing the periods before and after the Covid-19 pandemic segregated with the total period (from 2017 to 2021). The inventory turnover ratio only expresses significance when looking at separate periods. On the other hand, the average term of receipts expresses significance only in the full period. These indicators are related to working capital management and from these results it can be inferred that inventory management is more relevant in the short or very short term, while the impact presented by the average collection period is more significant in the medium and long term deadlines.

The debt ratio, which represents the component of the financial decisions of the company, shows insignificance in any moment of time. Endri et al. (2021) and Nguyen et al. (2021) found a negative impact on ROE. It is worth noting that debt has a low correlation with ROE. This result



suggests that decisions on how the company finances itself have no relevant impact on shareholder return, as long as debt interest does not cause perverse effects on the company's profitability.

Concerning macroeconomic factors, it should be noted that GDP and the basic interest rate are insignificant in any analyzed period, while inflation is highly significant when the entire period is considered. It is important to

mention that macroeconomic indicators have a median correlation with ROE. This result is in line with previous studies (Anarfi et al., 2016; Barbosa & Nogueira, 2018; Mucharreira & Antunes, 2015), which found similar results. It can be deduced that effects external to the company are not relevant for the return to shareholders, mainly in the short term.

**Table 9**

Fixed effects regression model results

	2017 to 2021			2017 to 2019			2020 to 2021		
	coefficient	p-value		coefficient	p-value		coefficient	p-value	
gmg	0.5207 (0.0401)	0.0000	***	0.3292 (0.0558)	0.0000	***	0.6389 (0.1092)	0.0000	***
sae	-0.4709 (0.0649)	0.0000	***	-0.3515 (0.0749)	0.0000	***	-0.2146 (0.3348)	0.5220	
sag	0.0629 (0.0119)	0.0000	***	0.0362 (0.0158)	0.0230	**	0.0745 (0.0292)	0.0110	**
fat	0.1154 (0.0297)	0.0000	***	0.0195 (0.0608)	0.7480		-0.3071 (0.1774)	0.0850	*
inv	0.0080 (0.0078)	0.3100		-0.0188 (0.0088)	0.0340	**	0.0801 (0.0479)	0.0960	*
dso	-0.0496 (0.0133)	0.0000	***	-0.0162 (0.0171)	0.3430		-0.0798 (0.0522)	0.1280	
dpo	-0.0221 (0.0106)	0.0370	**	-0.0211 (0.0120)	0.0790	*	-0.0755 (0.0363)	0.0390	**
etr	-0.1583 (0.0170)	0.0000	***	-0.1730 (0.0171)	0.0000	***	-0.1482 (0.0536)	0.0060	***
deb	0.0001 (0.0070)	0.9880		-0.0011 (0.0094)	0.9110		-0.0185 (0.0188)	0.3280	
gdp	0.0378 (0.0592)	0.5230		0.1727 (0.2064)	0.4030		0.1033 (0.0805)	0.2000	
cpi	0.8659 (0.1660)	0.0000	***	0.2615 (0.3878)	0.5000		0.2593 (0.7537)	0.7310	
jur	-12.4078 (13.9693)	0.3750		-1.1246 (25.5996)	0.9650		16.6026 (53.7729)	0.7580	
_cons	6.1245 (1.9149)	0.0010	***	12.0199 (3.0510)	0.0000	***	8.2369 (7.5064)	0.2740	

Source: Developed by the authors.

Note: \*, \*\*, \*\*\* correspond to significance level of 10%, 5% and 1%, respectively, standard error in brackets, cons. represents alfa intercept of model regression line.

It is noteworthy that the results after applying White's robust correction do not change the observed results and conclusions. In other words, the macroeconomic variables remain non-significant and the other independent variables integrate the explanation of the ROE behavior. Furthermore, when adopting the time lag of the variables inflation, GDP and interest rate in one year, it is detected that they present a higher level of significance with the behavior of the ROE. This makes sense as these factors reflect consequences on the results of companies over an extended period.

## 5 CONCLUSIONS

The purpose of the study is to identify the determining factors of ROE in the period from 2017 to 2021, making a comparison between the periods before (2017 to 2019) and after (2020 to 2021) the Covid-19 pandemic (2017 to 2019) with data of publicly traded companies in Latin American countries: Brazil, Chile and Mexico. The 2,040 data are obtained from the database provided by S&P Capital IQ and the STATA® software version 14.2 is used to obtain the

descriptive statistics, correlation matrix and econometric model of regression of fixed effects with panel data for the proposed analysis.

The correlation matrix identifies that none of the factors raised have a very strong correlation with ROE. Of the elements analyzed, sales growth is what stands out, with 0.40 in the period after the Covid-19 pandemic.

Based on the results of the fixed effects regression model, it is observed that the variables gross margin, tax charges and sales growth are the ones with the greatest significance with ROE, regardless of the period analyzed. This shows that the managers' decisions that increase revenue and reduce costs and expenses contribute more substantially to raising the company's shareholder return. Consequently, the importance of commercial policies in determining the company's profitability is perceived. On the other hand, the level of indebtedness and macroeconomic factors do not have a relevant impact on ROE.

It can therefore be concluded that expanding sales revenue and controlling expenses are the main focus of attention for managers, regardless of external factors (such

as the Covid-19 pandemic). In other words, operational factors outweigh financial and macroeconomic variables concerning shareholder returns on their investments. Thus, administrators must focus their actions on the company's operational activities, maximizing the efficient use of its resources.

This study contributes to financial managers by identifying the relevant components and directing their decision-making to increase the company's profitability and competitiveness, in addition to maximizing the return to its shareholders. For the academy, this research is relevant because, in addition to expanding knowledge about the determining factors of ROE -especially in Latin America -, it offers elements for a better understanding of the impact of the Covid-19 pandemic on the performance of companies and return to earnings. shareholders.

As a recommendation for future work, it is recommended to use dummy variables to control the period before and after the pandemic, incorporating longer periods, mainly after Covid-19. In addition, investigate ROE determinants by industrial segments, to enrich studies on the subject.

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