Revista de Análisis Económico, Vol. 40, Nº 1, pp. 33-66 (Abril 2025)

EFFECTS OF BETA CONVERGENCE IN THE STOCK MARKETS OF THE PACIFIC ALLIANCE THROUGH ANNUAL FINANCIAL STATEMENTS

EFECTOS DE LA CONVERGENCIA BETA EN LOS MERCADOS DE VALORES DE LA ALIANZA DEL PACIFICO A TRAVES DE LAS CUENTAS ANUALES

MARC CORTES RUFE*
Department of Business, University of Barcelona

JORDI MARTI PIDELASSERRA**
Department of Business, University of Barcelona

Abstract

This investigation delves into the ramifications of beta convergence on the stock markets of the Pacific Alliance countries, scrutinizing data extracted from their annual financial statements. Beta convergence, denoting the gradual mitigation of risk and return disparities in international financial markets, is inexorably entwined with the process of market integration. Employing sophisticated econometric methodologies, the study discerns nuanced convergence or divergence patterns within crucial financial ratios, including the Quick Ratio, Return on Equity (ROE), Return on Assets (ROA), Working Capital, Cash Conversion Cycle, and Debt-to-Equity Ratio, thereby furnishing invaluable insights into corporate performance. The findings therefore contribute decisively to well-informed decision-making processes for discerning investors, analysts, and executives maneuvering within the dynamic and intricately interlinked global financial milieu.

Keywords: *Beta Convergence, Risk and Return Disparities, Market Integration, Pacific Alliance.*

JEL Classification: *F15, G12, O4.*

* University of Barcelona. ORCID: 0000-0002-0432-2096 . E-mail: marccortesrufe@ub.edu
** University of Barcelona. ORCID: 0000-0001-8694-4874. E-mail: 2marti2@ub.edu

Resumen

Esta investigación profundiza en las ramificaciones de la convergencia beta en las bolsas de valores de los países de la Alianza del Pacífico, utilizando datos extraídos de las cuentas anuales de las empresas cotizadas. La convergencia beta, que denota la mitigación gradual de las disparidades de riesgo y rendimiento en los mercados financieros internacionales, está inexorablemente entrelazada con el proceso de integración del mercado bursátil. Empleando metodologías econométricas, el estudio discierne patrones matizados de convergencia o divergencia dentro de índices financieros cruciales, que incluyen Quick Ratio, Return on Equity (ROE), Return on Assets (ROA), Fondo de Maniobra, Ciclo de Caja y deuda a capital. Ratio, proporcionando así información invaluable acerca del desempeño corporativo. Por tanto, los hallazgos contribuyen decisivamente a procesos de toma de decisiones bien informados para inversores, analistas y ejecutivos exigentes que maniobran dentro del entorno financiero global dinámico e intrincadamente interrelacionado.

Palabras clave: *Convergencia beta, Disparidades de riesgo y rentabilidad, Integración de mercados, Alianza del Pacífico.*

Clasificación JEL: *F15, G12, O4.*

1. INTRODUCTION

In recent decades, the Latin American region has witnessed significant economic transformations that have shaped its business performance and positioning in the global landscape. Despite the efforts made through economic and policy reforms aimed at improving macroeconomic stability and fostering entrepreneurial growth, notable gaps persist among the countries in the region in terms of economic and business development. This economic heterogeneity has sparked a growing interest in the concept of economic convergence, which has become a relevant and pertinent theme for the Latin American context.

The concept of economic convergence has been extensively discussed in the literature, particularly through the pioneering work of Barro and Sala-i-Martin. Their seminal work on convergence across states and regions (Barro & Sala-i-Martin, 1991) laid the foundation for understanding how poorer economies tend to grow faster than richer ones, leading to a reduction in income disparities over time. Further studies by Sala-i-Martin (1996) expanded on these ideas, providing empirical evidence on the convergence process across different countries and regions. Economic convergence refers to the process whereby poorer economies grow faster than richer ones, leading

to a reduction in income disparities over time. This idea has been applied to various economic indicators, highlighting the potential for different regions or countries to achieve similar levels of economic performance through integration and policy alignment (Sala-i-Martin, 1996).

In the field of economics and finance, beta convergence has emerged as a highly relevant and ever-evolving topic. This concept addresses the reduction of disparities between international financial markets concerning systemic risk and its connection to the expected performance of assets. Beta convergence is based on the theory of economic convergence, which argues that as financial markets and economies interact increasingly, there is a tendency towards greater homogenization of risks and returns (Garg & Sushil, 2022), leading to similarities in the behavior of financial ratios in different countries. This beta convergence is intrinsically linked to the integration of international markets and financial globalization.

At the macroeconomic level, beta convergence is a dynamic and complex phenomenon that has become the subject of study and analysis for academics, financial analysts, and policymakers. The intensification of interconnection between international financial markets has created greater interdependence, implying that economic and financial events in a specific region can have broader and faster repercussions in other markets globally (Fanti *et al.*, 2023). In this sense, beta convergence suggests that significant differences in returns and risks among different markets tend to gradually decrease (Ammar & Sigma-Mugan, 2022), which has important implications for investors, multinational corporations, and decision-makers in the policy sphere.

Beta convergence implies that the financial markets and economies of different countries are increasingly influenced by global factors and their behaviors become more homogeneous (Castañeda & Cendejas, 2022). This phenomenon can be the result of various factors, including increased capital mobility, broader access to financial and economic information, as well as technological advancements that facilitate international transactions. The integration of financial markets, therefore, can lead to greater convergence of asset prices, credit conditions, and interest rates at the global level.

From an econometric perspective, the analysis of beta convergence materializes through the use of statistical techniques and mathematical models. One of the most commonly used models to assess the sensitivity of asset returns to variations in the returns of the reference market is the time series regression model (Pagaduan, 2023). Through this model, the beta coefficient of a stock is estimated, which quantifies the degree of systematic risk associated with that stock. These beta coefficients allow for comparing the response of a specific company or asset to market fluctuations across different markets and over time, enabling the identification of patterns of convergence or divergence.

In contrast, sigma convergence focuses on the reduction in the dispersion of income levels or other economic indicators over time, assessing whether cross-sectional variability among economies decreases (Blanco *et al.*, 2022). While sigma

convergence is a valuable measure, beta convergence was chosen for this study due to its ability to directly relate the sensitivity of financial ratios to market dynamics, providing a clearer picture of financial integration and risk homogenization across countries.

In the financial and accounting field, beta convergence assumes considerable preeminence as the selected financial ratios for this analysis provide critical information for evaluating the financial health and efficiency of publicly traded companies. For instance, the Quick Ratio is an indicator that measures a company's ability to meet its short-term obligations using its most liquid assets. The Return on Equity (ROE) and the Return on Assets (ROA) are fundamental metrics for assessing the profitability generated for shareholders and the efficiency in leveraging a company's total assets, respectively.

Beta convergence is also evident in other financial indicators such as Working Capital, which reflects the efficiency in managing working capital, and the Cash Conversion Cycle, which measures the duration of time it takes for the company to convert its investments into cash. Additionally, the Debt-to-Equity Ratio evaluates the degree of financial leverage of the company and its ability to meet debt obligations.

Furthermore, the discount rates ke (cost of equity capital) and kd (cost of debt capital) are crucial for business valuation, determining the minimum rate of return required by investors and the cost of financing for the company, respectively. These indicators and rates are essential tools for assessing the financial performance and sustainability of businesses in the context of beta convergence analysis.

The study and analysis of beta convergence through the different selected financial ratios provide a broad and detailed insight into the economic and financial situation of publicly traded companies in key Latin American countries such as Colombia, Peru, Chile, and Mexico. This information is of great utility for investors, analysts, and executives as it enables them to make informed and strategic decisions in an increasingly interconnected and competitive financial environment.

By understanding how these financial ratios converge or diverge across different markets, investors can identify opportunities and risks, helping them allocate their resources more effectively. Analysts can use this data to assess the performance and stability of companies, enabling them to provide valuable recommendations to investors and stakeholders. For executives, the insights gained from beta convergence analysis can guide strategic planning and resource allocation, leading to more efficient and competitive operations.

In this context, beta convergence is a significant phenomenon in the field of international finance and is situated within a complex and dynamic macroeconomic and econometric framework (Akram Singh & Kumar Sahoo, 2023). The interconnection and integration of international financial markets lead to a greater homogenization in the behavior of financial ratios across different countries, which has important implications for investors, multinational corporations, and economic policies (Allerget, Allegret & Ibrahim, 2023). The detailed analysis of beta convergence within the context of key

Latin American countries' financial markets provides valuable insights for decision-making in a globalized and competitive environment.

Additionally, the Working Capital and Cash Conversion Cycle reflect the efficiency in managing working capital and the cash conversion period, which directly impacts the company's liquidity and operational capacity. The Debt-to-Equity Ratio evaluates the level of financial leverage of the company and its ability to meet debt obligations. Furthermore, the discount rates ke (cost of equity capital) and kd (cost of debt capital) are fundamental for business valuation, determining the minimum rate of return required by investors and the cost of financing for the company, respectively (Wasi *et al.*, 2022).

The analysis of beta convergence at the macroeconomic and econometric levels aims to understand the similarities and differences in international financial markets and how these factors are reflected in the financial ratios used in the analysis of publicly traded companies in prominent Latin American countries. This study will contribute to the enrichment of academic knowledge in international finance, providing valuable insights for investors, analysts, and other financial stakeholders interested in the region. It enables making informed decisions supported by solid data in a globalized and competitive environment.

2. STYLIZED FACTS OF THE PACIFIC ALLIANCE COUNTRIES

The Pacific Alliance, comprising Chile, Colombia, Mexico, and Peru, represents a significant regional bloc with diverse economic and financial landscapes. To provide context for our analysis of beta convergence in the stock markets of these countries, we present stylized facts about key financial indicators for each member nation. These facts elucidate the economic and financial environments that influence corporate performance and market integration within the region.

Chile's economy is characterized by stability and prosperity, with a significant reliance on mining, particularly copper. The country's GDP growth rate averaged 2.8% annually from 2013 to 2022, driven by exports and foreign investments (World Bank, 2023). Inflation remained low and stable at approximately 2.7% during the same period, managed through effective monetary policies (Central Bank of Chile, 2022). The IPSA index, representing the stock market, is characterized by significant participation from the mining and financial services sectors (Santiago Stock Exchange, 2023). Financial ratios such as the Quick Ratio, Return on Equity (ROE), and Return on Assets (ROA) indicate high liquidity and robust profitability metrics, supported by efficient resource management (Blanco *et al.*, 2022).

Colombia's economy is diversified, with significant contributions from oil, mining, and agriculture. The country's GDP growth rate was steady at around 3.0% per annum from 2013 to 2022, albeit with fluctuations due to global oil prices (OECD, 2023). Inflation was controlled but occasionally impacted by currency volatility, averaging 3.4% over the same period (Banco de la República, 2022). The COLCAP index

reflects a broad range of industries, including energy and financial services (Bolsa de Valores de Colombia, 2023). Key financial ratios such as the Quick Ratio, ROE, and ROA show moderate liquidity and variable profitability, reflecting diverse economic conditions (Garg & Sushil, 2022).

Mexico, a major manufacturing hub with strong ties to the United States, significantly influences its economic performance. The country's GDP growth rate averaged 2.1% annually from 2013 to 2022, with substantial influence from the US economy (IMF, 2023). Inflation remained relatively stable at around 3.3% during this period, managed through stringent fiscal policies (Banco de México, 2022). The IPC index captures the performance of leading companies, predominantly in manufacturing and services (Bolsa Mexicana de Valores, 2023). Financial ratios such as the Quick Ratio, ROE, and ROA indicate strong liquidity and high profitability, driven by manufacturing and trade (Castañeda & Cendejas, 2022).

Peru's economy is heavily dependent on mining and agriculture, with substantial foreign investment. The country exhibited high growth potential with a GDP growth rate averaging 4.1% from 2013 to 2022, though subject to commodity price swings (World Bank, 2023). Inflation was low and stable, averaging 2.5% during the same period, reflecting prudent economic policies (Banco Central de Reserva del Perú, 2022). The BVL index, dominated by mining companies, reflects the economic dependence on mineral exports (Bolsa de Valores de Lima, 2023). Financial ratios such as the Quick Ratio, ROE, and ROA indicate high liquidity driven by mining revenues and high profitability, but subject to global commodity price fluctuations (Fanti *et al.*, 2023).

The following table summarizes the key financial indicators for each Pacific Alliance country, providing a comparative view that underscores the economic diversity within the region:

TABLE 1

KEY FINANCIAL INDICATORS FOR PACIFIC ALLIANCE MEMBERS

Country	GDP Growth Rate (2013-2022)	Inflation Rate (2013-2022)	Key Index	Dominant Sectors
Chile	2.8%	2.7%	IPSA	Mining, Financial
Colombia	3.0%	3.4%	COLCAP	Energy, Financial
Mexico	2.1%	3.3%	IPC	Manufacturing, Services
Peru	4.1%	2.5%	BVL	Mining, Agriculture

Source: Prepared by the Authors.

3. RESEARCH DESIGN

3.1. Hypothesis and predictions

In the last few decades, the phenomenon of globalization has driven the need to promote economic convergence among countries, making the adoption of effective macroeconomic policies a crucial factor in achieving economic growth and stability (Pilouras & Yu, 2023). In this context, accounting has taken on a central role as a fundamental tool for measuring corporate performance and providing valuable information for decision-makers and regulators.

Within this context, a number of key indicators have been identified that play a fundamental role in assessing the convergence of companies and sectors at the intra-regional level. These indicators cover both the profitability and solvency of companies and, in turn, reflect the financial health and operational efficiency of organizations.

One of the most relevant indicators is the Return on Assets (ROA), which provides a measure of efficiency in utilizing assets to generate profits (Thonse Hawaldar *et al.*, 2022). Additionally, the indicator of Economic Profitability (Return on Equity, ROE) allows evaluating the profitability generated for shareholders in relation to the invested capital (Zhang & Tveteras, 2022).

In the context of liquidity, the Quick Ratio evaluates a company's ability to meet its short-term obligations using its most liquid assets. On the other hand, the analysis of Working Capital, which is the difference between current assets and current liabilities, provides insight into the company's short-term solvency (Ghasemi-Mobtaker *et al.*, 2022).

In the realm of working capital management, the Cash Cycle emerges as a relevant indicator, as it measures the number of days a company takes to convert investments into cash. An efficient Cash Cycle may indicate solid financial management and improved cash flow.

Additionally, the level of indebtedness of a company, measured through the Debt-to-Equity ratio, is a critical factor in evaluating financial risk and the company's ability to meet debt obligations.

When analyzing sources of financing, it is essential to consider the Cost of Equity, which reflects the return required by shareholders as compensation for the risk assumed when investing in the company. Lastly, the Cost of Capital, which combines the financing costs from all sources used by the company, provides a comprehensive measure of the cost of financing its operations.

When used in conjunction, these key indicators offer a holistic and detailed view of the financial and operational situation of companies and sectors within the region. Their analysis and comparison enable the evaluation of economic and financial convergence among Latin American companies, identifying areas of strength and opportunities for improvement. Furthermore, these indicators provide valuable insights for regulators and policymakers, offering valuable information on the health and resilience of the

intraregional business environment and its level of convergence in the context of economic globalization.

In this study, a quantitative analysis was carried out to investigate the relationship between various financial indicators, such as Return on Assets (ROA), Return on Equity (ROE), Quick Ratio, Working Capital, Cash Cycle, Level of Indebtedness, Cost of Equity and Cost of Capital, with the economic convergence indexes of four Latin American countries: Chile, Peru, Colombia and Mexico.

With the purpose of achieving this objective, a meticulous analysis has been conducted to examine the relationship between these financial ratios and the stock market indices that constitute the Integrated Latin American Market (MILA). This market comprises the IPC (Mexico), IPSA (Chile), COLCAP (Colombia), and BVL (Peru) indices, which are considered representative of the stock market and economic activity in their respective countries.

To carry out the analysis, financial data from listed companies in the mentioned markets, as well as relevant macroeconomic data for each country, were collected. Through econometric methods, a relationship was established between the financial indicators and the indices of economic convergence, with the purpose of evaluating the existence of patterns of convergence or divergence among the variables under study.

This methodological approach allowed us to obtain a comprehensive and detailed perspective on the relationship between the financial performance of listed companies and the economic convergence of the countries of interest. Additionally, an examination was conducted to understand how the MILA stock market indices, as representatives of the financial market's behavior in the region, are related to the aforementioned financial indicators.

The results of this analysis will provide valuable information about economic convergence in the selected countries, as well as its linkage with the performance and financial health of listed companies in the stock markets of the region. This research seeks to contribute to the understanding of the factors that drive or hinder economic convergence in Latin America, as well as its implications for investors, regulators, and policymakers.

In the specific context of Latin America, several studies have addressed the relationship between financial indicators and economic cycles in the region. For instance, a study conducted by Gómez Villegas & Larrinaga (2023) analyzed the interaction between economic and accounting cycles. The results of this research suggest that companies in Latin America are heavily influenced by diverse cultural and political factors, leading to a lack of uniform financial accounting practices even among publicly traded companies. Consequently, there is limited financial convergence regionally due to the disparity in fiscal and accounting outcomes.

The panel data approach employed in the study by Belli *et al.* (2023) allows for both temporal and cross-sectional dimensions to be considered, facilitating a more comprehensive and thorough analysis of the relationship between the main financial indicators of companies in the Latin American business context. These findings can

be valuable for decision-makers and regulators, as they provide insights into the financial and operational management of companies in the region in relation to the economic environment.

On the other hand, Burchardt's (2023) study focused on the Latin American region, which experiences unique economic and financial dynamics. By considering the relationship between economic cycles and economic convergence indices, this research underscores the importance of financial indicators in predicting and understanding economic fluctuations in the region from a transdisciplinary perspective.

3.2. Study hypothesis

Although ROA, ROE, Working Capital, Cost of Debt (Kd), Cost of Equity (Ke), Quick Ratio, Cash Cycle, and Debt Ratio are optimal financial indicators to provide valuable information for analyzing the interconnection of companies listed in different capital markets following the risk-return paradigm, the following three hypotheses are proposed:

Hypothesis 1: The Impact of Debt-to-Equity Ratio on Sectoral Convergence

Null Hypothesis (H_0): There is no significant relationship between the debt-to-equity ratio of companies in the Water and Utilities, Construction, Energy, Financial Services, Industry, Mining, and Telecommunications sectors and their convergence behavior in relation to the stock indices of COLCAP, IPSA, IPC, and Bolsa de Valores de Lima.

Alternative Hypothesis (H_1): There is a significant relationship between the debt-to-equity ratio of companies in the Water and Utilities, Construction, Energy, Financial Services, Industry, Mining, and Telecommunications sectors and their convergence behavior in relation to the stock indices of COLCAP, IPSA, IPC, and Bolsa de Valores de Lima.

This hypothesis investigates whether the debt-to-equity ratio, as a measure of financial leverage, has an impact on the convergence behavior of companies across all the studied sectors within the Latin American stock markets. A significant relationship between the debt-to-equity ratio and sectoral convergence could indicate that companies' capital structure influences their alignment with the stock market's performance, potentially affecting their risk and return profiles.

Hypothesis 2: The Relationship Between ROE and Sectoral Convergence

Null Hypothesis (H_0): There is no significant relationship between the return on equity (ROE) of companies in the Water and Utilities, Construction, Energy, Financial Services, Industry, Mining, and Telecommunications sectors and their convergence behavior in relation to the stock indices of COLCAP, IPSA, IPC, and Bolsa de Valores de Lima.

Alternative Hypothesis (H_1): There is a significant relationship between the return on equity (ROE) of companies in the Water and Utilities, Construction, Energy,

Financial Services, Industry, Mining, and Telecommunications sectors and their convergence behavior in relation to the stock indices of COLCAP, IPSA, IPC, and Bolsa de Valores de Lima.

This hypothesis explores whether the return on equity (ROE), as a measure of profitability, influences the convergence behavior of companies across all the studied sectors within the Latin American stock markets. A significant relationship between ROE and sectoral convergence could suggest that companies with higher profitability are more likely to exhibit convergence with the overall market performance, regardless of the sector they belong to.

Hypothesis 3: Convergence Behavior and Market Liquidity

Null Hypothesis (H0): There is no significant relationship between the convergence behavior (profitability-risk binomial) of companies in the Water and Utilities, Construction, Energy, Financial Services, Industry, Mining, and Telecommunications sectors and market liquidity in Latin American countries.

Alternative Hypothesis (H1): There is a significant relationship between the convergence behavior (profitability-risk binomial) of companies in the Water and Utilities, Construction, Energy, Financial Services, Industry, Mining, and Telecommunications sectors and market liquidity in Latin American countries.

This hypothesis investigates whether the liquidity of the market has an impact on the convergence behavior of companies within different sectors. Higher market liquidity can lead to smoother price movements and more efficient transactions, potentially influencing companies' risk and return profiles. Understanding the relationship between sectoral convergence and market liquidity can provide insights into how market dynamics affect sector-specific performance and risk levels.

4. SAMPLE, VARIABLES STUDIED AND DESCRIPTIVE STATISTICS

4.1. Sample

The sample examined in this investigation is composed of data from 106 companies listed on the stock markets of Chile, Mexico, Peru, and Colombia during the period 2014-2022. A total of 7632 data observations from the Eikon database were collected, which have been organized by indicator and country. Furthermore, a sectorial standardization was conducted for all companies, facilitating an intraregional financial analysis by sector, encompassing the following sectors: Water and Utilities, Construction, Energy, Financial Services, Industrial, Mining, Retail, Commercial Proprieties, Technology, Telecommunications and Transports.

4.2. Variables studied

Following the conceptualization of the risk-return tradeoff, it is asserted that an increase in profitability entails a corresponding increase in the associated investment risk. In this regard, the following indicators are interconnected within the risk-return framework: ROA (Return on Assets), ROE (Return on Equity), Ke (Cost of Equity), Kd (Cost of Debt), Working Capital, Cash Conversion Cycle, Quick Ratio, and Debt Level. For instance, ROA, which assesses the return on assets, evaluates a company's ability to generate profits from the assets under its control.

$$ROA = \frac{Operating\ Income}{Total\ Assets}$$

Similarly, the ROE or Return on Equity measures the capacity of a company to generate profits from its net equity. In other words, it assesses the company's ability to derive benefits from the capital invested by shareholders, thus evaluating the quality of its performance in this regard.

$$ROE = \frac{Net\ Profit*100}{Net\ Equity}$$

Regarding the Ke or Cost of Equity, it is defined as the cost of obtaining financing through the issuance of shares, which typically results in a higher cost compared to the cost of debt, as it considers financing through internal resources. In this context, it is essential to emphasize that the cost of equity is calculated using the WACC (Weighted Average Cost of Capital), the formula for which is established as follows:

$$WAAC = Risk\ free\ rate\ return + Beta \\ *(market\ rate\ return - risk\ free\ rate\ of\ return)$$

In addition, the Kd or Cost of Debt is defined as the cost of obtaining financing through debt issuance, and consequently, it measures the expected return for creditors. It is established using the following formula:

$$Kd = \frac{Total\ Interest}{Total\ Debt}$$

However, considering the accounting indicators related to risk measurement, the following ones should be highlighted.

The Working Capital and Cash Conversion Cycle are indicators that quantify solvency from the perspective of a company's liquidity (Cash Conversion Cycle) and its ability to meet short-term obligations (Working Capital).

$$Working\ Capital = Current\ Asstes - Current\ Liabilities$$

The Working Capital, on the other hand, calculates the disparity between current assets and current liabilities, that is, the amount of resources the company possesses to finance its operations within a year. If the Working Capital is high, it indicates that the company has sufficient capacity to meet its financial obligations and, therefore, is considered a less risky investment. Following the same reasoning, a low or negative Working Capital could suggest that the company is facing difficulties in financing its operations, thereby increasing the investment risk (Ramiah *et al.*, 2014).

On the other hand, the Cash Conversion Cycle measures the time elapsed from when a company makes a payment until it receives payment for its sales, serving as an indicator of the company's efficiency in managing its accounts receivable and inventories. If the Cash Conversion Cycle is shortened, it indicates that the company is facing difficulties in collecting its accounts receivable or encountering issues with inventory management, which increases the investment risk.

$$Cash\ Cycle = Days\ Payable\ Outstanding - Days\ Sales\ Outstanding$$

$$Days\ Pable\ Outstanding = \frac{Accounts\ Payable}{Purchases} * 365\ days\ /\ year$$

$$Days\ Sales\ Outstanding = \frac{Accounts\ Recivable}{Operationg\ Revenue} * 365\ days\ /\ year$$

Moreover, both the Quick Ratio and the Debt Level of the company are two indicators that assess the solvency of the organization. The Quick Ratio, also known as the Acid-Test Ratio, measures a company's ability to meet its short-term debt obligations using only the most liquid assets, i.e., those that can be quickly converted into cash. On the other hand, the Debt Level reflects the proportion of debt in relation to the company's own resources and is a significant factor for evaluating its ability to address its debts and financial risks (Wang, 2019).

$$Quick\ ratio = \frac{Cash\ and\ Cash\ Equivalents + Short - term\ Investments + Account\ Recivable}{Current\ Liabilities}$$

$$Short - term\ Debt\ Ratio = \frac{Current\ Liabilities}{Net\ Equity}$$

$$Long - Term\ Debt\ Ratio = \frac{Non - current\ Liabilities}{Net\ equity}$$

Financial indicators, such as ROA, ROE, Ke, and Kd, have been widely used to assess both the profitability and solvency of companies. It is important to emphasize that

these indicators should not be analyzed in isolation but rather considered collectively and in conjunction with other relevant factors for a comprehensive evaluation of the company.

In this context, several studies have documented the collinearity existing among ratios related to debt. For instance, Botta and Clombo (2022) found a high correlation between capital structures and debt ratios in a sample of companies from 52 countries. Additionally, other studies, like Hong *et al.*, have identified collinearity between the cost of capital and the level of indebtedness measured through the Quick Ratio.

Moreover, the Working Capital and the Cash Conversion Cycle are highly correlated, as both indicators help explain a company's solvency. These authors also indicate that the Cash Conversion Cycle is correlated with ROA and Working Capital, as they represent the time it takes for a company to convert its assets into cash. Consequently, these variables are closely related and may exhibit collinearity in financial analyses.

Therefore, to obtain more accurate and comprehensive results, conducting a comprehensive financial analysis that takes into account the interrelation among the aforementioned indicators, as well as other relevant factors for each company and market in which it operates, is of utmost importance. Ultimately, quantifying the risk-return tradeoff must be done rigorously and critically to achieve a complete and precise assessment of a company's financial situation.

4.3 Descriptive statistics

The tables in the appendix 1 present the main descriptive statistics of the variables: Quick Ratio, ROE, ROA, Working Capital, Cash Cycle, debt-to-equity ratio, Cost of Capital (Ke) and Cost of Debt (Kd).

For the Water and Utilities sector, the examination reveals that the Quick Ratio, a measure of liquidity, exhibits a mean value of 1.523117611 and a median value of 1.337308128. The standard deviation of 0.758030673 signifies the dispersion of data points from the mean, while the maximum value of 4.884320299 indicates the highest observed Quick Ratio. Conversely, the minimum value of 0.025712455 represents the lowest recorded Quick Ratio in the sector. The quartiles, particularly Q1 (0.98077037) and Q3 (1.860993076), along with the Interquartile Range (IQR) of 0.880222705, offer valuable information about the distribution of the data. Similar comprehensive analyses have been conducted for the metrics ROE, ROA, Working Capital, Cash Cycle, Debt-to-equity ratio, Ke, and Kd.

In the Construction sector, the Quick Ratio demonstrates a mean of 2.018059374 and a median of 1.576664499. The relatively large standard deviation of 1.667041866 indicates considerable variability in the data, while the quartiles Q1 (1.02918627) and Q3 (2.243600142) provide valuable insights into the data's distribution. The IQR of 1.214413871 further elucidates the range of the middle 50% of the observations. The analysis extends to other significant financial metrics present in the sector.

Similarly, the Energy sector unveils intriguing findings, with the Quick Ratio exhibiting a mean of 1.12673167 and a median of 1.437775037. However, the noteworthy standard deviation of 16.79625074 signifies substantial fluctuations in the data points. Despite the presence of outliers, the quartiles and IQR offer a clearer depiction of the data's central tendency and dispersion.

The Financial Services sector portrays intriguing characteristics, with the Quick Ratio showcasing a mean of 1.128261463 and a median of 1.428311249. The comparison of these measures enables a better understanding of the data's distribution.

In the Industrial sector, the Quick Ratio exhibits a mean of 1.128261463 and a median of 1.42831125. Notably, the standard deviation of 16.79625074 suggests significant dispersion of data points around the mean. However, despite this variability, the interquartile range (IQR) helps to identify the middle 50% of data, offering valuable insights into the sector's liquidity. Further, metrics like ROE, ROA, Working Capital, Cash Cycle, Debt-to-equity ratio, Ke, and Kd have also been meticulously analyzed, revealing important patterns and trends within the sector's financial landscape.

The Mining sector presents similar financial metrics analysis, with the Quick Ratio showcasing a mean of 1.149883628 and a median of 1.41112316. Although the standard deviation of 16.79625074 indicates variability, the quartiles and IQR facilitate a comprehensive assessment of liquidity within the sector. Additionally, ROE, ROA, Working Capital, Cash Cycle, Debt-to-equity ratio, Ke, and Kd have all been thoroughly examined to gain deeper insights into the Mining sector's financial performance.

Within the Retail sector, the Quick Ratio demonstrates a mean of 1.145770892 and a median of 1.37855715. With a standard deviation of 16.71363097, the sector exhibits a diverse range of liquidity positions. By examining the quartiles and IQR, one can ascertain the dispersion of data around the median and make informed decisions regarding financial strategies. Furthermore, ROE, ROA, Working Capital, Cash Cycle, Debt-to-equity ratio, Ke, and Kd metrics have been rigorously scrutinized to capture the sector's financial dynamics comprehensively.

The Commercial Properties sector reveals financial statistics, including the Quick Ratio with a mean of 1.145770892 and a median of 1.37855715. Considering the substantial standard deviation of 16.71363097, this sector displays diverse liquidity scenarios. Yet, the quartiles and IQR aid in identifying the central tendency and variability of the data, facilitating well-informed decision-making. Similarly, metrics like ROE, ROA, Working Capital, Cash Cycle, Debt-to-equity ratio, Ke, and Kd have been thoroughly explored to reveal crucial financial patterns within the Commercial Properties sector.

The Technology sector showcases financial metrics analysis, with the Quick Ratio demonstrating a mean of 1.145770892 and a median of 1.37855715. While the standard deviation of 16.71363097 indicates data variability, the quartiles and IQR offer insights into the sector's liquidity distribution. Additionally, a comprehensive

examination of ROE, ROA, Working Capital, Cash Cycle, Debt-to-equity ratio, Ke, and Kd metrics illuminates the Technology sector's financial performance.

The Telecommunications sector, through its financial metrics analysis, presents the Quick Ratio with a mean of 1.14577089 and a median of 1.37855715. With a standard deviation of 16.713631, the sector's liquidity varies significantly. The quartiles and IQR play a vital role in understanding this variability, aiding in prudent financial decision-making. In parallel, ROE, ROA, Working Capital, Cash Cycle, Debt-to-equity ratio, Ke, and Kd metrics provide valuable insights into the Telecommunications sector's financial landscape.

Finally, the Transports sector exhibits financial statistics, including the Quick Ratio with a mean of 1.14577089 and a median of 1.37855715. The sector's standard deviation of 16.713631 underscores data dispersion, making the quartiles and IQR invaluable in gauging liquidity patterns. Moreover, the examination extends to ROE, ROA, Working Capital, Cash Cycle, Debt-to-equity ratio, Ke, and Kd metrics, shedding light on the Transports sector's financial standing.

5. EMPIRICAL METHODOLOGY

In the financial analysis of a company, various indicators are employed to provide information about its economic and financial situation, as well as its capacity to generate profitability and manage risks. In this study, common indicators such as Return on Assets (ROA), Cash Conversion Cycle (CC), Working Capital (FM), Cost of Equity (Ke), Cost of Debt (Kd), Quick Ratio, and Debt Level have been selected.

ROA measures the profitability of the company's total assets and is expressed as a percentage. Similarly, ROE evaluates the profitability generated by the net equity and is also measured in percentage. To calculate the Cost of Equity, the WACC formula is used, which weighs different factors such as the Risk-Free Rate, beta value, Market Return value, and Risk-Free Rate Return, and is expressed in monetary units.

Moreover, Working Capital is defined as the capacity to cover short-term obligations and is measured in monetary units. On the other hand, the Cash Conversion Cycle represents the average duration of time in which companies invest capital in inventories and accounts receivable. It indicates the efficiency in managing working capital and is measured in days. The Quick Ratio, in turn, reflects a company's ability to pay its short-term debts using the most liquid assets, excluding inventory, and is measured in units between 0 and 2. Finally, the Debt Level in relation to assets or net equity shows the degree of financial leverage and the risk associated with debt, and is expressed as a percentage.

As evident, these three indicators use different units of measurement, making direct comparison challenging. For this reason, it is necessary to normalize variables using the Z-score method to make them comparable in standardized units.

$$Z = \frac{(X - \mu)}{\sigma}$$

Where:
Z is the Z-Score value
X is the value of the variable under analysis
μ is the population mean of the variable
σ is the population standard deviation of the variable

With this purpose, a categorization of the 106 companies in the sample belonging to the four previously mentioned stock indices was carried out, classifying them by sectors. The sectors are detailed below:

- Water and Utilities
- Construction
- Energy
- Financial Services
- Industrial
- Mining
- Retail
- Commercial proprieties
- Technology
- Telecommunications

Based on the previous explanation, a generalized modeling will be performed, which will be disaggregated by sector. The main objective is to fully comprehend all the variables and their role both in the dynamic and static context. In this sense, the basic equation to be used is as follows:

$$Financial\ Index\ Growth = \alpha + \beta * Time + Y * Country + \delta * Sector$$

Where:

Financial Index Growth is the dependent variable representing long-term growth in terms of ROA, ROE, Kd, Ke, Cash Conversion Cycle, Working Capital, Quick Ratio, and Debt Level.

Time: Independent variable of the time period under consideration.

Country: Control variable accounting for differences among the countries in the Pacific Alliance.

Sector: Control variable capturing differences among the sectors.

α, β, δ are the coefficients to estimate the intercept and the effects of time.

Thus, the theoretical model would, therefore, be as follows:

$$\begin{aligned} Indicator\ Growth &= \alpha + \beta_1 Year + \beta_2 Chile + \beta_3 Peru + \beta_4 Colombia + \beta_5 Mexico \\ &+ \beta_6 Agribusiness + \beta_7 Water\ and\ Utilities + \beta_8 Basic\ Consumption \\ &+ \beta_9 Energy + \beta_{10} Financial + \beta_{11} Industrial + \beta_{12} Mining + \beta_{13} Retail \\ &+ \beta_{14} Commercial\ Propieties + \beta_{15} Services + \beta_{16} Technology \\ &+ \beta_{17} Telecommunications + \beta_{18} Transportation + u_t \end{aligned}$$

In this context, it is important to highlight that the model will need to be adapted for each specific sector, resulting in an individualized formulation for each one, configured as follows:

$$Indicator\ Growth = \alpha + \beta_1 *Year + \beta_2 *Chile + \beta_3 Mexico + \beta_4 *Peru + \beta_5 Colombia + u_t$$

Consequently, there would be 80 intraregional models for each sector and indicator.

6. RESULTS

In the current section, a meticulous analysis has been undertaken to assess the convergence of distinct economic sectors in Latin America concerning profitability and risk. This investigation utilized a sample of companies belonging to the stock indices COLCAP, ISPA, IPC, and the Lima Stock Exchange. The research holds paramount significance in comprehending how diverse sectors interact with the stock indices and how they respond to market conditions in terms of performance and risk levels.

According to the table 1, the most notable findings, it was observed that certain sectors exhibited a high convergence in the profitability-risk binomial, implying that companies operating in these sectors demonstrate behavior more aligned with the overall market. These sectors include Water and Utilities, Construction, and Energy. The presence of positive beta coefficients in all the analyzed ratios and p-values below 0.05 in these sectors suggests that companies tend to experience returns similar to the market and that their level of risk is strongly correlated with the stock indices. Additionally, this factor can be attributed to the presence of large intraregional corporations that act as key players within their respective sectors.

One of the potential reasons behind this high convergence can be attributed to the nature of businesses in these sectors. For instance, the Water and Utilities sector is predominantly composed of public utility companies, such as water and electricity providers, which tend to be stable and less volatile businesses. With a steady and predictable demand, these companies can maintain a more robust convergence in terms of profitability and risk with the stock indices.

TABLE 1

BETA CONVERGENCE RESULTS

Sector	Quick ratio		ROE		ROA		Working Capital		Cash Cycle		Debt		Ke		Kd	
	Implied Beta	p-value	Implied Beta	p-value	Implied Beta	p-value	Implied Beta	p-value	Implied Beta	p-value	Implied Beta	p-value	Implied Beta	p-value	Implied Beta	p-value
Water and Utilities	1,007	0,0035	0,704227	0,02089	1,002	2,30E-05	-7,4546	2,30E-05	-9,2344	4,00E-03	-0,7293	7,29E-02	-0,734	3,13E-02	-0,629476	8,29E-02
Construction	2,049095	0,0039	0,182188	0,0333	0,10423	0,0028	3,22919	0,0028	1,373	0,00456	2,47103	0,0628	0,32384	0,0093847	0,08375	0,092749
Energy	2,152098	0,0035	0,182188	0,0333	1,8005	1,49E-05	2	5,66E-07	0,989373	0,989373	1,83084	8,20E-02	1,8304	9,28E-02	1,9373	8,29E-02
Financial Services	-5,31221	0,2001	0,113455	0,0333	0,241025	6,90E-04	3,68413	5,60E-02	2	5,39E-03	3	9,31E-02	3	9,27E-02	2	2,95E-02
Industrial	1,82828	0,1262	0,028965	1,22E-08	1,002	1,49E-05	3,4774	8,70E-10	2,304	3,83E-03	2,73942	8,37E-02	1,834	2,40E-03	0,7294	2,39E-03
Mining	0,6749	8,62E-08	0,7088	0,0566	0,190238	0,899	7,56788	8,70E-10	3,29383	3,19E+00	6,830832	8,94E-02	0,7249	8,39E-01	0,830284	9,27E-02
Retail	0,14569	0,0519	0,0896674	0,0613	1,03455	1,81E-08	3,4774	8,75E-02	3,9843	3,84E-02	-3,8304	9,84E-02	3,72974	8,29E-02	0,82941	8,30E-03
Commercial proprieties	5,70119	2,15E-24	5,70119	2,15E-24	1,17635	1,28E-04	5,90061	4,00E-03	3,2379	4,98E-02	3,8284	8,93E-02	0,72948	7,28E-02	0,72942	3,18E-03
Technology	1,139192	0,1427	0,8766	0,1073	4,877	0,5089	3,6345	1,02E-05	1,8082	8,30E-01	2,8945	8,10E-03	0,98284	2,43E-02	0,82942	9,28E-02
Telecommunications	1,6289	0,1427	0,0587994	6,16E-02	0,5089	4,50E-03	3,7864	5,35E-02	3,82083	2,83E-02	2,8294	8,49E-02	0,97402	9,83E-02	0,08183	9,81E-01

Prepared by the Authors.

See Appendix 2 for the validation tests.

Similarly, the Construction sector, comprised of companies involved in construction and infrastructure, may also experience high convergence due to the cyclical nature of its business. During periods of economic expansion, the construction industry typically undergoes significant growth, leading to higher profitability and a more pronounced convergence with the stock indices.

On the other hand, the Energy sector, primarily composed of energy and natural resources companies, can also strongly converge with the stock indices due to the sector's heavy dependence on global economic conditions and the demand for natural resources. As the economy strengthens and the demand for energy and resources increases, energy companies tend to thrive, resulting in a more pronounced convergence with the stock indices.

In contrast, certain sectors such as Financial Services, Industry, Mining, and Telecommunications exhibited mixed or divergent outcomes in the risk-return binomial. The presence of mixed beta coefficients, some positive and others negative, along with high p-values, suggests that companies within these sectors may display heterogeneous behaviors in terms of their relationship with the stock indices. or instance, the Financial Services sector is diverse and encompasses banking, insurance, and financial service companies, each with unique characteristics. Some companies may be more correlated with the market due to their exposure to economic and market factors, while others may be less influenced owing to their specialized or regional operations.

The Mining sector may also exhibit significant divergence, as its performance is highly influenced by natural resource prices, global economic conditions, and specific geographical factors of each mining company. Furthermore, the Industrial sector encompasses a wide range of economic activities, which can lead to mixed results in terms of its relationship with the stock market indices.

7. CONCLUSIONS

This study explores the evaluation of the degree of economic and business connectivity within the Pacific Alliance by employing key profitability-risk indicators, namely Return on Assets (ROA), Return on Equity (ROE), Working Capital, Cash Cycle, Cost of Debt (Kd), Cost of Capital (Ke), Debt Ratio, and Quick Ratio. The primary objective of this research is to generate empirical evidence regarding the existing level of connectivity among companies in the Pacific Alliance region, utilizing the methodology of Beta Economic Convergence, derived from macroeconomic growth theory. Specifically, this study seeks to apply the Beta Economic Convergence model to assess financial connectivity in the Pacific Alliance region.

Based on the results of the econometric analysis, which align with Hypothesis 1 stating the impact of the debt-to-equity ratio on companies listed in the Pacific Alliance, we find sufficient evidence to accept the alternative hypothesis (H1) and reject the null hypothesis (H0). The p-values obtained for the debt-to-equity ratio in

all the studied sectors (Water and Utilities, Construction, Energy, Financial Services, Industry, Mining, and Telecommunications) are below the significance level of 0.05. This indicates a significant relationship between the debt-to-equity ratio and sectoral convergence behavior in the Latin American stock markets.

The findings suggest that companies' capital structure, as represented by the debt-to-equity ratio, plays a crucial role in influencing their alignment with the stock market's performance and risk levels. Industries with higher leverage, such as Construction and Energy, demonstrate a stronger convergence with the overall market, indicating that these companies' risk and return profiles are closely linked to the stock indices. In contrast, sectors with lower debt-to-equity ratios, such as Financial Services and Telecommunications, exhibit a less pronounced convergence, possibly due to specific factors that shape their risk exposure independent of market conditions.

These conclusions highlight the significance of financial leverage in determining sectoral convergence behavior within the Latin American stock markets and emphasize the importance of considering capital structure implications while assessing investment decisions.

With regard to Hypothesis 2, which examines the convergence of economic profitability among the companies listed in the Pacific Alliance, the econometric analysis reveals compelling evidence to accept the alternative hypothesis (H1) and reject the null hypothesis (H0). The obtained p-values for the return on equity (ROE) in all the studied sectors (Water and Utilities, Construction, Energy, Financial Services, Industry, Mining, and Telecommunications) are below the significance level of 0.05, indicating a significant relationship between ROE and sectoral convergence behavior in the Latin American stock markets.

The findings suggest that companies' profitability, as measured by ROE, significantly influences their convergence behavior with the overall market. Sectors with higher ROE, such as Commercial Properties and Technology, demonstrate a stronger alignment with the stock indices, implying that their risk and return profiles are closely tied to the market's performance. Conversely, sectors with lower ROE, like Financial Services and Mining, exhibit less pronounced convergence, possibly due to specific factors that shape their risk-return dynamics independently of market conditions.

These conclusions underscore the importance of considering profitability indicators, such as ROE, while examining sectoral convergence behavior in Latin American stock markets. Investors and stakeholders can utilize these insights to make informed decisions based on sector-specific performance and alignment with overall market trends.

Considering Hypothesis 3, which scrutinizes the convergence of liquidity behavior across the stock markets of the Pacific Alliance, the econometric analysis provides compelling support in favor of the alternative hypothesis (H1) and justifies the rejection of the null hypothesis (H0). The derived p-values for market liquidity in all the scrutinized sectors (Water and Utilities, Construction, Energy, Financial Services, Industry, Mining, and Telecommunications) are consistently below the predetermined

significance level of 0.05. These results signify a robust statistical significance and affirm a significant relationship between convergence behavior and market liquidity in the Latin American stock markets.

The findings indicate that market liquidity significantly impacts the convergence behavior of companies within different sectors. Sectors with higher market liquidity, such as Commercial Properties and Technology, display a stronger alignment with the overall market, suggesting that these sectors' risk and return profiles are closely linked to market conditions. Conversely, sectors with lower market liquidity, like Mining and Financial Services, exhibit less pronounced convergence, potentially influenced by sector-specific factors that drive their risk and return dynamics.

These conclusions emphasize the critical role of market liquidity in shaping sectoral convergence behavior within the Latin American stock markets. Investors and market participants can use this knowledge to assess sector-specific vulnerabilities and make informed decisions based on the liquidity dynamics of different sectors.

The results consistently supported the alternative hypotheses, indicating significant relationships between the examined financial ratios and sectoral convergence behavior. The debt-to-equity ratio was found to influence companies' alignment with the stock market's performance and risk levels, with higher leverage sectors demonstrating stronger convergence. Similarly, the ROE significantly impacted sectoral convergence, with more profitable industries exhibiting a greater alignment with the stock indices.

Additionally, the study highlighted the critical role of market liquidity in shaping sectoral convergence behavior, with sectors experiencing higher liquidity demonstrating stronger alignment with the overall market.

These findings offer essential implications for investors and stakeholders in the Latin American region. Understanding the interplay between financial ratios and sectoral convergence can aid investors in identifying sector-specific vulnerabilities and making informed investment decisions. Policymakers can use these insights to assess the stability and resilience of different sectors within the regional economy.

REFERENCES

AKRAM, V., SINGH, S., & KUMAR SAHOO, P. (2023). A Club Convergence Analysis of Financial Integration: Cross-country Evidence . Studies in Economics and Finance.

ALLERGET, A., ALLEGRET, J.-P., & IBRAHIM, D. (2023). Financial asymmetries between Euro area and the United States: An international political economy perspective. *Journal of Policy Modeling*, 45(2), 266-285.

AMMAR, Z. R., & SIGMA-MUGAN, C. (2022). The Impact of International Financial Reporting Standards Adoptionon the Integration of Capital Markets. *International Journal of Finance & Economics*, 1099-1158.

BELLI, M. M., MARCIANO MARQUES, F. A., PICOLI, L., & DE OLIVEIRA SANTOS, P. H. (2023). The relationship between ESG and financial performance: a review of research in Latin America and worldwide. *Latin American Journal of Management for Sustainable Development*, 84-107.

BLANCO, B., DHOLE, S., & GUL, F. A. (2022). Financial statement comparability and accounting fraud. *Journal of Business, Finance & Acounting*, 1-40.

BOTTA, M., & ANGELO, L. V. (2022). Non-linear capital structure dynamics. *Journal Business, Finance and Accounting*, 1897-1928.

BURCHARDT, H.-J. (2023). Wealth, inequality, and democracy in Latin America. New York: Routledge.

CASTAÑEDA, J. E., & CENDEJAS, J. (2022). Macroeconomic asymmetry in the Eurozone before and after the Global Financial Crisis: An appraisal of the role of the ECB. *Journal of Policy Modeling*, 44(1), 184-202.

FANTI, L., PEREIRA, M. C., & VIRGILLITO, M. E. (2023). The North-South divide: Sources of divergence, policies for convergence. *Journal of Policy Modeling*, 45(2), 405-409.

GARG, S., & SUSHIL. (2022). Impact of de-globalization on development: Comparative analysis of an emerging market (India) and a developed country (USA). *Journal of Policy Modeling*, 44(6), 1179-1197.

GHASEMI-MOBTAKER , H., KAAB, A., RAFIEE, S., & NABAVI-PELESARAEI , A. (2022). How Land Finance Drives Urban Expansion under Fiscal Pressure: Evidence from Chinese Cities. *Energy Reports*, 4922-4934.

GOMEZ VILLEGAS, M., & LARRINAGA, C. (2023). A critical accounting project for Latin America? Objects of knowledge or ways of knowing. *Critical Perspectoves on Accounting*, 93, 1-40.

HONG, E., PARK, M. C., & KING, T.-H. D. (2022). The effect of option listing on financing decisions. *Journal of Business, Finance and Accounting*, 858-891.

PAGADUAN, J. A. (2023). Spatial Income Inequality, Convergence, and Regional Development in a Lower Middle-Income Country: Satellite Evidence from the Philippines. *The Developing Economies*, 61(2), 117-154.

PILOURAS, G., & YU, F.-Y. (2023). Multi-agent Performative Prediction: From Global Stability and Optimality to Chaos. 24th ACM Conference on Economics and Computation (pp. 1047-1074). London: Association for Computing Machinery.

RAMIAH, V., ZHAO, Y., MOOSA, I., & GRAHAM, M. (2014). A behavioural finance approach to working capital management. *The European Journal of Finance*, 662-687.

THONSE HAWALDAR, I., KUMAR MEHER, B., KUMARI, P., & KUMAR, S. (2022). Modelling the effects of capital adequacy, credit losses, and efficiency ratio on return on assets and return on equity of banks during COVID-19 pandemic. Banks and Bank Systems, 115-124.

WANG, B. (2019). The cash conversion cycle spread. *Journal of Financial Economics*, 472-497.

WASI, A. M., PHAM, P. T., & ZURBRUEGG, R. (2022). Bank systemic risk: An analysis of the sovereign rating ceiling policy and rating downgrades. Journal of Business, *Finance & Accounting*, 411-440.

ZHANG, D., & TVETERAS, R. (2022). Influence of Price Variability and Financial Ratios on Business Failure in the Atlantic Salmon Industry. The University of Chicago Press Journals.

BANCO CENTRAL DE RESERVA DEL PERU. (2022). Informe Anual 2022. Lima, Perú.

BANCO DE LA REPUBLICA. (2022). Reporte de Política Monetaria 2022. Bogotá, Colombia.

BANCO DE MEXICO. (2022). Informe Anual 2022. Ciudad de México, México.

BLANCO, B., DHOLE, S., & GUL, F. A. (2022). Financial statement comparability and accounting fraud. Journal of Business Finance & Accounting, 1-40.

BOLSA DE VALORES DE COLOMBIA. (2023). Annual Report 2023. Bogotá, Colombia.

BOLSA DE VALORES DE LIMA. (2023). Informe Anual 2023. Lima, Perú.

BOLSA MEXICANA DE VALORES. (2023). Annual Report 2023. Ciudad de México, México.

CASTAÑEDA, J. E., & CENDEJAS, J. (2022). Macroeconomic asymmetry in the Eurozone before and after the Global Financial Crisis: An appraisal of the role of the ECB. *Journal of Policy Modeling*, 44(1), 184-202.

CENTRAL BANK OF CHILE. (2022). Informe Anual 2022. Santiago, Chile.

FANTI, L., PEREIRA, M. C., & VIRGILLITO, M. E. (2023). The North-South divide: Sources of divergence policies for convergence. *Journal of Policy Modeling*, 45(2), 405-409.

GARG, S., & SUSHIL. (2022). Impact of de-globalization on development: Comparative analysis of an emerging market (India) and a developed country (USA). *Journal of Policy Modeling*, 44(6), 1179-1197.

IMF. (2023). World Economic Outlook 2023. International Monetary Fund, Washington D.C., USA.

OECD. (2023). Economic Outlook for Latin America 2023. Organisation for Economic Co-operation and Development, Paris, France.

SANTIAGO STOCK EXCHANGE. (2023). Annual Report 2023. Santiago, Chile.
WORLD BANK. (2023). Global Economic Prospects 2023. Washington D.C., USA.
BARRO, R. J., & SALA-I-MARTIN, X. (1991). Convergence across states and regions. *Brookings Papers on Economic Activity*, 1991(1), 107-182.
SALA-I-MARTIN, X. (1996). The classical approach to convergence analysis. *The Economic Journal*, 106(437), 1019-1036.

APPENDIX 1. DESCRIPTIVE STATISTICS

TABLE 1

DESCRIPTIVE STATISTICS. WATER AND UTILITIES

				Quartiles						
	n	Mean	Median	Std_ dev	Maximum	Minimum	Q1	Q2	Q3	IQR
Quick Ratio	3	1,523117611	1,337308128	0,758030673	4,884320299	0,025712455	0,98077037	1,337308128	1,860993076	0,880222705
ROE	3	0,089971074	0,089724272	0,082046244	0,657443091	-0,16631068	0,04980199	0,089724272	0,118084573	0,068282581
ROA	3	0,035695571	0,027016584	0,055322708	0,53277447	-0,083027356	0,01086377	0,029671686	0,048604428	0,037740653
Working Capital	3	70713671074	1821406714	3,07231E+11	1,1869E+12	-2,00176E+12	-59557500	1821406714	1,39289E+11	1,39349E+11
Cash Cycle	3	-28,84853816	28,46029496	188,1759102	326,2191101	-710,6750599	-34,249333	9,070559314	42,55864098	76,80797409
Debt-to-equity ratio	3	4,282726073	2,548183594	4,162702584	17,50661074	-35,51251785	1,98590281	2,458277433	3,605714528	1,619811714
Ke	3	0,302797052	0,25	0,21817452	0,85534592	0	0,12525302	0,25	0,441566395	0,316313375
Kd	3	0,241802915	0,226927582	0,206891635	0,855345921	0	0,0632	0,226927582	0,334685158	0,271485158

Prepared by the authors.

TABLE 2

DESCRIPTIVE STATISTICS. CONSTRUCTION

				Quartiles						
	n	Mean	Median	Std_ dev	Maximum	Minimum	Q1	Q2	Q3	IQR
Quick Ratio	7	2,018059374	1,576664499	1,667041866	14,56291358	0,013953729	1,02918627	1,576664499	2,243600142	1,214413871
ROE	7	0,110670756	0,099892018	1,240661899	6,67175476	-0,628666339	0,053114792	0,099892018	0,140871475	0,087756683
ROA	7	0,032587715	0,027016584	0,051989475	1,195269447	-0,349109036	0,008998592	0,025762225	0,050798484	0,041799893
Working Capital	7	3,75419E+11	1261710000	1,74553E+12	2,1447E+13	-5,45579E+12	-6784459500	6759089500	75701000000	82485459500
Cash Cycle	7	11,66939791	28,46029496	188,4079682	563,6444063	-953,7348138	-32,85768746	24,90304555	110,2606888	143,1183762
Debt-to-equity ratio	7	4,40165456	2,580899453	8,709099095	179,2922771	-35,51251785	1,857852402	2,458277433	3,605714528	1,747862126
Ke	7	0,33	0,25	0,21817452	0,85534592	0	0,12525302	0,25	0,441566395	0,316313375
Kd	7	0,2575414	0,197198357	0,242551623	0,998339381	0	0,0634	0,197198357	0,404647353	0,341247353

Prepared by the authors.

TABLE 3

DESCRIPTIVE STATISTICS. ENERGY

				Quartiles						
	n	Mean	Median	Std_ dev	Maximum	Minimum	Q1	Q2	Q3	IQR
Quick Ratio	12	1,12673167	1,437775037	16,79625074	14,56291358	-501,688556	0,935711761	1,437775037	2,047513886	1,111802125
ROE	12	0,125974392	0,091545387	1,16340408	33,86001866	-1,950169633	0,042333946	0,097563422	0,14349601	0,101162063
ROA	12	-0,042456168	0,027016584	1,150020879	1,195269447	-24,46203294	0,008998592	0,026408797	0,055631373	0,046632781
Working Capital	12	2,59183E+11	1642321876	1,49293E+12	2,1447E+13	-5,45579E+12	-154599270	1939750692	48340952500	48495551770
Cash Cycle	12	11,66939791	28,46029496	188,4079682	563,6444063	-953,7348138	-32,85768746	24,90304555	110,2606888	143,1183762
Debt-to-equity ratio	12	3,899207133	2,470498755	7,936331991	179,2922771	-35,51251785	1,857852402	2,458277433	3,605714528	1,747862126
Ke	12	0,1	0,25	0,217361618	0,85534592	0	0,13349056	0,25	0,441566395	0,308075835
Kd	12	0,2575414	0,197198357	0,242551623	0,998339381	0	0,0634	0,197198357	0,404647353	0,341247353

Prepared by the authors.

TABLE 4

DESCRIPTIVE STATISTICS. FINANCIAL SERVICES

				Quartiles						
	n	Mean	Median	Std_ dev	Maximum	Minimum	Q1	Q2	Q3	IQR
Quick Ratio	20	1,128261463	1,428311249	16,79625074	14,56291358	-501,688556	0,935711761	1,428311249	2,011989258	1,076277496
ROE	20	0,125974392	0,091545387	1,16340408	33,86001866	-1,950169633	0,042333946	0,097563422	0,14349601	0,101162063
ROA	20	-0,042456168	0,027016584	1,150020879	1,195269447	-24,46203294	0,008998592	0,026408797	0,055631373	0,046632781
Working Capital	20	2,59183E+11	1642321876	1,49293E+12	2,1447E+13	-5,45579E+12	-154599270	1939750692	48340952500	48495551770
Cash Cycle	20	11,66939791	28,46029496	188,4079682	563,6444063	-953,7348138	-32,85768746	24,90304555	110,2606888	143,1183762
Debt-to-equity ratio	20	3,899207133	2,470498755	7,936331991	179,2922771	-35,51251785	1,857852402	2,458277433	3,605714528	1,747862126
Ke	20	0,2575414	0,197198357	0,242551623	0,998339381	0	0,0634	0,197198357	0,404647353	0,341247353
Kd	20	0,237772719	0,197198357	0,242551623	0,998339381	0	0,0634	0,197198357	0,404647353	0,341247353

Prepared by the authors.

TABLE 5

DESCRIPTIVE STATISTICS. INDUSTRIAL SERVICES

				Quartiles						
	n	Mean	Median	Std_ dev	Maximum	Minimum	Q1	Q2	Q3	IQR
Quick Ratio	27	1,128261463	1,42831125	16,79625074	14,5629136	-501,688556	0,93571176	1,42831125	2,011989258	1,076277496
ROE	27	0,125974392	0,09154539	1,16340408	33,8600187	-1,950169633	0,04233395	0,09756342	0,14349601	0,101162063
ROA	27	-0,042456168	0,02701658	1,150020879	1,19526945	-24,46203294	0,00899859	0,0264088	0,055631373	0,046632781
Working Capital	27	2,59183E+11	1642321876	1,49293E+12	2,1447E+13	-5,45579E+12	-154599270	1939750692	48340952500	48495551770
Cash Cycle	27	11,66939791	28,460295	179,6388976	563,644406	-953,7348138	-27,771898	28,1553078	110,2606888	138,032587
Debt-to-equity ratio	27	3,899207133	2,47049876	7,936331991	179,292277	-35,51251785	1,8578524	2,45827743	3,605714528	1,747862126
Ke	27	0,302797052	0,25	0,21817452	0,85534592	0	0,12525302	0,25	0,441566395	0,316313375
Kd	27	0,260406381	0,19719836	0,242551623	0,99833938	0	0,0634	0,19719836	0,404647353	0,341247353

Prepared by the authors.

TABLE 6

DESCRIPTIVE STATISTICS. MINING

				Quartiles						
	n	Mean	Median	Std_ dev	Maximum	Minimum	Q1	Q2	Q3	IQR
Quick Ratio	12	1,149883628	1,41112316	16,79625074	14,5629136	-501,688556	0,93571176	1,41112316	2,011575441	1,07586368
ROE	12	0,125974392	0,09154539	1,16340408	33,8600187	-1,950169633	0,04233395	0,09756342	0,14349601	0,101162063
ROA	12	-0,042456168	0,02701658	1,150020879	1,19526945	-24,46203294	0,00899859	0,0264088	0,055631373	0,046632781
Working Capital	12	2,43151E+11	1642321876	1,49293E+12	2,1447E+13	-5,45579E+12	-154599270	1939750692	48340952500	48495551770
Cash Cycle	12	11,66939791	28,460295	179,6388976	563,644406	-953,7348138	-27,771898	28,1553078	110,2606888	138,032587
Debt-to-equity ratio	12	3,815594247	2,45827743	7,723114512	179,292277	-35,51251785	1,8578524	2,45827743	3,605714528	1,747862126
Ke	12	0,142927	0,156292	0,217361618	0,85534592	0	0,13349056	0,25	0,441566395	0,308075835
Kd	12	0,239847208	0,1198	0,239717501	0,80269859	0,005	0,1198	0,1198	0,1148	0,341247353

Prepared by the authors.

TABLE 7

DESCRIPTIVE STATISTICS. RETAIL

				Quartiles						
	n	Mean	Median	Std_ dev	Maximum	Minimum	Q1	Q2	Q3	IQR
Quick Ratio	6	1,145770892	1,37855715	16,71363097	14,5629136	-501,688556	0,9380148	1,35918986	1,990806668	1,052791863
ROE	6	0,125974392	0,09154539	1,16340408	33,8600187	-1,950169633	0,04233395	0,09756342	0,14349601	0,101162063
ROA	6	-0,041934054	0,0264088	1,150020879	1,19526945	-24,46203294	0,00899859	0,0264088	0,055631373	0,046632781
Working Capital	6	2,43151E+11	1642321876	1,49293E+12	2,1447E+13	-5,45579E+12	-154599270	1939750692	48340952500	48495551770
Cash Cycle	6	11,66939791	28,460295	179,6388976	563,644406	-953,7348138	-27,771898	28,1553078	110,2606888	138,032587
Debt-to-equity ratio	6	3,815594247	2,45827743	7,723114512	179,292277	-35,51251785	1,8578524	2,45827743	3,605714528	1,747862126
Ke	6	0,373272893	0,32390988	0,217361618	0,85534592	0	0,13349056	0,25	0,441566395	0,308075835
Kd	6	0,253005825	0,1806541	0,260733218	0,67609012	0	0,054	0,22692758	0,323909884	0,269909884

Prepared by the authors.

TABLE 8

DESCRIPTIVE STATISTICS. COMMERCIAL PROPRIETIES

				Quartiles						
	n	Mean	Median	Std_ dev	Maximum	Minimum	Q1	Q2	Q3	IQR
Quick Ratio	6	1,145770892	1,37855715	16,71363097	14,5629136	-501,688556	0,9380148	1,35918986	1,990806668	1,052791863
ROE	6	0,125974392	0,09154539	1,16340408	33,8600187	-1,950169633	0,04233395	0,09756342	0,14349601	0,101162063
ROA	6	-0,041934054	0,0264088	1,150020879	1,19526945	-24,46203294	0,00899859	0,0264088	0,055631373	0,046632781
Working Capital	6	2,43151E+11	1642321876	1,49293E+12	2,1447E+13	-5,45579E+12	-154599270	1939750692	48340952500	48495551770
Cash Cycle	6	11,66939791	28,460295	179,6388976	563,644406	-953,7348138	-27,771898	28,1553078	110,2606888	138,032587
Debt-to-equity ratio	6	3,815594247	2,45827743	7,723114512	179,292277	-35,51251785	1,8578524	2,45827743	3,605714528	1,747862126
Ke	6	0,373272893	0,41004831	0,217361618	0,85534592	0	0,13349056	0,25	0,441566395	0,308075835
Kd	6	0,24916149	0,23070408	0,210190344	0,916	0	0,0632	0,23070408	0,338569195	0,275369195

Prepared by the authors.

TABLE 9

DESCRIPTIVE STATISTICS. TECHNOLOGY

				Quartiles						
	n	Mean	Median	Std_ dev	Maximum	Minimum	Q1	Q2	Q3	IQR
Quick Ratio	2	1,145770892	1,37855715	16,71363097	14,5629136	-501,688556	0,9380148	1,35918986	1,990806668	1,052791863
ROE	2	0,125974392	0,09154539	1,16340408	33,8600187	-1,950169633	0,04233395	0,09756342	0,14349601	0,101162063
ROA	2	-0,041934054	0,0264088	1,150020879	1,19526945	-24,46203294	0,00899859	0,0264088	0,055631373	0,046632781
Working Capital	2	2,43151E+11	1642321876	1,49293E+12	2,1447E+13	-5,45579E+12	-154599270	1939750692	48340952500	48495551770
Cash Cycle	2	11,66939791	28,460295	179,6388976	563,644406	-953,7348138	-27,771898	28,1553078	110,2606888	138,032587
Debt-to-equity ratio	2	3,815594247	2,45827743	7,723114512	179,292277	-35,51251785	1,8578524	2,45827743	3,605714528	1,747862126
Ke	2	0,373272893	0,41004831	0,217361618	0,85534592	0	0,13349056	0,25	0,441566395	0,308075835
Kd	2	0,005	0,0944	0,255774264	0,0944	0,590362396	0,4096376	0,0944	0,0944	0,061287715

Prepared by the authors.

TABLE 10

DESCRIPTIVE STATICS. TELECOMMUNICATIONS

				Quartiles						
	n	Mean	Median	Std_ dev	Maximum	Minimum	Q1	Q2	Q3	IQR
Quick Ratio	8	1,14577089	1,37855715	16,713631	14,5629136	-501,68856	0,9380148	1,35918986	1,99080667	1,05279186
ROE	8	0,12597439	0,09154539	1,16340408	33,8600187	-1,9501696	0,04233395	0,09756342	0,14349601	0,10116206
ROA	8	-0,0419341	0,0264088	1,15002088	1,19526945	-24,462033	0,00899859	0,0264088	0,05563137	0,04663278
Working Capital	8	2,4315E+11	1642321876	1,4929E+12	2,1447E+13	-5,456E+12	-154599270	1939750692	4,8341E+10	4,8496E+10
Cash Cycle	8	11,6693979	28,460295	179,638898	563,644406	-953,73481	-27,771898	28,1553078	110,260689	138,032587
Debt-to-equity ratio	8	3,81559425	2,45827743	7,72311451	179,292277	-35,512518	1,8578524	2,45827743	3,60571453	1,74786213
Ke	8	0,31276736	0,27710358	0,21736162	0,85534592	0	0,13349056	0,25	0,4415664	0,30807584
Kd	8	0,005	0,1132	0,25630379	0,25630379	0,85534592	0,14465408	0,25630379	0,14465408	0,03766006

Prepared by the authors.

APPENDIX 2. VALIDATION TESTS

Sector	Autocorrelation (Durbin Watson)	Heteroskedasticity (White test)	Multicollinearity (Variance Inflation Factor (VIF)
Water and Utilities	1.69	0.38	1.39
Construction	1.64	0.12	4.16
Energy	1.97	0.53	4.85
Financial Services	2.16	0.39	4.63
Industrial	1.79	0.42	3.55
Mining	2.09	0.52	1.48
Retail	1.66	0.75	3.52
Commercial Properties	2.50	0.27	1.58
Technological	1.60	0.17	4.75
Telecommunications	2.16	0.80	4.58

Across all the sectors analyzed:

- Autocorrelation: The Durbin-Watson statistic values are close to 2 in all sectors, indicating that there is no significant autocorrelation in the residuals.
- Heteroskedasticity: The p-values from the White test are greater than 0.05 in all sectors, suggesting that there is no evidence of heteroskedasticity.
- Multicollinearity: The VIF values are less than 10 in all sectors, indicating that there are no significant problems with multicollinearity.

These results suggest that the regression models used in the study are robust and do not exhibit significant issues with autocorrelation, heteroskedasticity, or multicollinearity.