www.cya.unam.mx/index.php/cya

Contaduría y Administración
Accounting & Management

Contaduría y Administración 70 (1), 2025, e487

The effect of corporate social responsibility on the market value of Latin American companies

El efecto de la responsabilidad social corporativa sobre el valor de mercado de las empresas en Latinoamérica

Laura G. Zuñiga-Feria*

Universidad Anáhuac México

Received February 12, 2023; accepted January 17, 2024
Available online January 18, 2024

Abstract

This paper investigates the contribution of corporate social responsibility (CSR) on market value of companies listed in Latin American stock exchanges. By using a sample from the companies that constitute the main equity indexes of Brazil, Chile, Colombia and Mexico, over the period 2007-2021, we propose an extended Ohlson (1995) model that includes financial and market variables, along with the disaggregated ESG scores. Estimation using Arellano and Bond's (1991) methodology and the Generalized Moment Method suggests that the corporate governance score increases the market value of the company by 0.0029 times the value of its total asset on a logarithm basis, while the environmental score decreases it by -0.0022 times. The social score has no significant effect on the company's value. Findings are consistent with other domestic and international investigations, and strengthens the role of CSR in this region.

JEL Code: G15, G120, Q560
Keywords: international stock markets; asset pricing; corporate social responsibility

*Corresponding author.
E-mail address: lgzuniga@anahuac.mx (L. G. Zúñiga-Feria).
Peer Review under the responsibility of Universidad Nacional Autónoma de México.

http://dx.doi.org/10.22201/fca.24488410e.2025.5008

Resumen

Este trabajo explora la contribución de la Responsabilidad Social Corporativa (RSC) sobre el valor de las empresas que cotizan en las bolsas de valores de América Latina. Utilizando información de las empresas que componen los principales índices bursátiles de Brasil, Chile, Colombia y México, para el período 2007-2021, se plantea un modelo de Ohlson (1995) extendido con variables financieras, de mercado, y las puntuaciones ASG desagregadas. Los resultados de estimación con la metodología de Arellano y Bond (1991) y el Método Generalizado de Momentos, concluyen que la puntuación de gobierno corporativo incrementa al valor de mercado de la empresa en 0.0029 veces el valor de su activo total expresado en logaritmos, mientras que la ambiental lo disminuye en -0.0022 veces. La puntuación social, no afecta significativamente al valor de la empresa. Los resultados son consistentes con otras investigaciones locales e internacionales, y fortalecen el papel de la RSC en esta región.

Código JEL: G15, G120, Q560
Palabras clave: mercados internacionales de capitales; valor de los activos; responsabilidad social corporativa

Introduction

The main objective of companies, from the traditional perspective of corporate finance, is to maximize shareholder profit (Friedman, 1964). Nevertheless, numerous studies show that profit maximization can be aligned with social welfare (Edmans, 2011; El Ghoul et al., 2011; Ferrell et al., 2016; Dyck et al., 2019). At the World Summit on Sustainable Development[1] in September 2002, one of the topics discussed was Corporate Social Responsibility (CSR). This concept refers to adopting specific social and environmental policies within the management of organizations, whether they are businesses or not. Carroll's (2006) definition of CSR includes economic, legal, and ethical aspects, giving the economic aspect a primary role.

In 2006, the United Nations presented the Principles for Responsible Investment[2] within this framework, highlighting six criteria formally related to environmental, social, and corporate governance (ESG) aspects. From that moment on, the need to incorporate relevant ESG information, which is not financial, in the reports of the companies listed on the stock exchange became evident. Thus, companies receive incentives to achieve a higher level of CSR by instituting the best measures in their business. Correa Mejía et al. (2019) confirm that CSR is likely to influence the performance of an investment.

Socially responsible investors, in addition to maintaining an effective relation between the risk and return of their portfolios, analyze the CSR characteristics of the companies listed on the stock

1 Available at: http://www.johannesburgsummit.org/ Accessed: 09/18/2022
2 Available at: https://www.unpri.org/ Accessed: 09/18/2022

exchange, which influence their preferences in a way that is consistent with their principles and ethics. Several organizations evaluate the responsible behavior of companies by assigning ESG scores. Numerous studies show that these scores increase companies' value and, thus, their shareholders' wealth (Giese et al., 2019; Jaramillo-Arango et al., 2020; Yoo & Managi, 2022). This paper aims to evaluate the impact of CSR on the market value of companies listed on the main Latin American stock exchanges: Brazil, Chile, Colombia, and Mexico.[3] An unbalanced panel data analysis is performed, including financial and market variables and ESG scores, for 2007 to 2021. An Ohlson Model (Ohlson, 1995; Feltham & Ohlson, 1995) extended by applying the dynamic regression technique of Arellano and Bond (1991) with the Generalized Method of Moments (GMM) is then estimated with STATA statistical software. The Arellano and Bond methodology reduces the frequent dynamic endogeneity problem in this type of analysis. The results confirm that the environmental and corporate governance scores impact the company's value, at -0.0022 and 0.0029 times the value of its total assets (transformed by its natural logarithm), respectively, while the social score does not. These results are smaller in size but consistent with those of similar analyses conducted in Mexico (Godínez-Reyes et al., 2021 and 2022) and in developed economies (Lopatta & Kaspereit, 2014), probably due to the characteristics of emerging economies in Latin America.

One possible explanation for these results is the likelihood that Latin American investment market participants do not use ESG scores as part of their analysis and investment decision-making. This attitude may result from their lack of knowledge or a certain disregard for improvements in CSR performance in this region.

This work is important because, to the best of the author's knowledge, it is the first to analyze CSR's contribution to Latin American companies' value using these variables, a statistical model, and an estimation methodology. This research seeks to draw the attention of investors in this geographic region to explore the ESG scores of companies as part of their investment analysis and decision-making. More far-reaching investor analysis will motivate publicly listed companies to publish reliable and transparent CSR reports. Conversely, investors can increase their activism, encouraging constant improvement in companies' sustainable performance, thus generating greater profitability for both. Thus, the change in attitude contributes to achieving the United Nations Sustainable Development Goals in the medium run.[4]

3Originally, the aim was to use the largest stock markets in Latin America, which are the Brazilian market and the Latin American Integrated Market (MILA; Spanish: Mercado Integrado Latinoamericano), made up of Chile, Colombia, Mexico, and Peru. However, the financial information platform LSEG Data & Analytics (formerly Refinitiv) only had ESG scores for 2016, and for 24 of the 29 stocks that make up the Peru General Index. Peru was therefore eliminated from the sample of countries in the analysis.

4 Available at: https://www.un.org/sustainabledevelopment/es/objetivos-de-desarrollo-sostenible/ Accessed: 09/18/2022

The structure of this research paper is composed of four sections. The first presents a review of the literature on socially responsible investment, the evaluation of its financial performance globally and in Latin America, and the analysis of CSR in these regions. The second section describes the statistical methodology used and the information employed. The third section contains the results of the empirical estimation of the regression model and its analysis, as well as conclusions and suggestions for further research.

Review of the literature

Socially responsible investing (SRI) refers to the policy of integrating Corporate Social Responsibility (CSR) criteria into investment analysis (Renneboog et al., 2008). Over the last 20 years, this investment style has become popular thanks to the influence of various bodies such as investment managers, asset managers, and financial service suppliers. Most of these organizations have subscribed to the United Nations Principles for Responsible Investment,[5] thus demonstrating their commitment to this investment style. In this new paradigm, investors have an important role in the global drive toward sustainable development, ensuring that financial resources are adequately raised and allocated. Regarding the performance of SRI compared to conventional investment, there have been multiple empirical analyses with contrasting results.

Socially responsible investment shows similar returns to conventional investment

The following are among the most relevant studies that conclude that SRI shows similar returns to conventional investment. Those that analyze the risk-adjusted return generated by stock market indices in the United States of America (USA) (Sauer, 1997), Australia (Cummings, 2000), and internationally[6] (Schröder, 2004 and 2007). Likewise, through the Carhart model, ethical investment funds in Germany, the United Kingdom, and the USA (Bauer et al., 2005) and those in Canada (Bauer et al., 2007). In Mexico, De la Torre-Torres and Martínez Torre-Enciso (2015 and 2017) compare the Sustainable Prices and Quotations Index (IPCS; Spanish: Índice de Precios y Cotizaciones Sustentable) with the conventional one (IPC; Spanish: Índice de Precios y Cotizaciones), finding statistical equality in the performance of

5 Available at: https://www.unpri.org/ Accessed: 09/18/2022
6 Australia, Canada, Europe, the United Kingdom, and the United States

both indices. The same conclusion is reached by Cortez et al. (2009), using conditional and non-conditional models on conventional and socially responsible investment funds.

Nirino et al. (2021) state that there is a negative effect on the risk-adjusted returns of SRI funds in the USA, UK, and other continental European and Asia-Pacific countries. Nevertheless, they state that they do not differ statistically from conventional funds, except in some countries such as France, Japan, and Sweden.

Socially responsible investment generates higher returns than conventional investment

Other research concludes that SRI offers higher returns than conventional investment. Analyzing ethical and non-ethical investment funds, Mallin et al. (1995) find that in Great Britain, the risk-adjusted return is higher for responsible investment. The author states this may be due to a greater awareness of and interest in SRI. Gil-Bazo et al. (2010) show that, in the USA, the performance of ethical funds is better than that of conventional funds when managed by entities specialized in SRI.

Similarly, in the US market, Derwall et al. (2005) use two portfolios composed of stocks with different levels of eco-efficiency. The authors conclude that the one with the better rating has a higher average return, which may result from a disparity in the market's sensitivity to the investment style or specific factors of the sector to which the companies belong. In turn, Geczy et al. (2020) normalize the strengths and weaknesses of the ESG score of investment portfolio shares of companies selected by social criteria. Thus, they confirm that SRI and ESG information helps to obtain better performance and Sharpe ratio.

Analyzing stock indices, Ortas et al. (2012) studied the financial performance of Brazil's ISE B3 index. They conclude that socially responsible investors who invest in bull markets do not sacrifice the overall performance of their portfolio. Meanwhile, Belghitar et al. (2014) generate zero-cost portfolios in conditional marginal stochastic marginal dominance. They achieve this by investing short in SRI indices to invest the profit obtained in conventional indices subsequently. Thus, it achieves higher average returns, lower variance, and more bias than investing only in one of the two indices. Finally, with a portfolio that invests in a responsible and diversified market index in the USA and Mexico, Macías Trejo et al. (2020) apply the Markowitz model to the performance of US and Mexican stock indices.[7] They find

7 For the USA, it uses the S&P 500 and Dow Jones Sustainability indices; for Mexico, the IPC and IPC Sustainability indices.

that higher capital allocation in SRI stocks generates higher mean-variance efficiency in both countries than a portfolio replicating the ratio invested in SRI stocks managed by the indices analyzed.

Socially responsible investment earns lower returns than conventional investment

Regarding the argument that SRI performs worse than conventional investment, Hamilton et al. (1993) investigated ethical and non-ethical investment funds in the USA, using Jensen's alpha. The authors conclude that CSR factors do not positively affect the companies' expected return or cost of capital. Gregory et al. (1997) subsequently found that Jensen's criterion is more downward biased when used to measure ethical fund performance. This occurs because of the greater exposure to small companies of these funds, so their returns may be lower than those of non-ethical funds. El Ghoul and Karoui (2017) perform a comparative analysis of size-adjusted Jensen's alpha with mutual funds composed of high and low CSR companies. They find that funds with higher CSR levels exhibit lower returns and higher persistence in their performance. Likewise, Barber et al. (2021) show that investors in dual-objective venture capital funds achieve non-economic returns, sacrificing their profitability.

Statman (2000) compares the return of a sustainable stock index, DSI, with a conventional investment index (S&P 500) by analyzing stock indices. Statman's research finds that SRI funds are more underperforming. In Brazil, Arias and Samanez (2013) reached a similar conclusion, comparing portfolios generated with stocks from the ISE B3 and Ibovespa indices.

Brammer et al. (2006) analyze the relation between CSR and stock returns through composite and disaggregated ESG scores in the United Kingdom. Their results indicate that the composite score has an inverse relation with shared performance and that its financial reward is attributed to the performance of the environmental and community dimensions.

Problems in socially responsible investment research

In order to investigate how analysis characteristics affect the likelihood of finding higher or lower SRI performance, Rathner (2013) conducts a meta-analysis of 25 published research studies. The results suggest that: (i) survivorship bias within the analysis increases (decreases) the probability of significantly lower (superior) performance for SRI funds compared to conventional ones; (ii) the focus only on US SRI funds increases (decreases) the probability of superior (inferior) performance; (iii) the period of analysis influences the probability of significantly lower (superior) return results for SRI funds.

Corporate social responsibility research in latin america

In addition to comparative studies between conventional and socially responsible investment (SRI), the analysis of corporate social responsibility (CSR) has various aspects that have led researchers to use different analysis methodologies. The following is a review of different studies carried out in Latin American countries.

In Brazil, Jordão et al. (2018) conducted a qualitative empirical analysis of the level of CSR disclosure made by companies listed on the stock exchange. They use ex post facto documentary analysis (Cooper & Schindler, 2006) that employs the sentences and terminology sampled in the financial statements and their explanatory notes to compare them between companies and sectors. The method is very sensitive in analyzing the level of disclosure of social and environmental information, in addition to helping to understand the relationships between the disclosure of this type of information and the social responsibility of the companies and sectors. Jordão et al. use the 202 companies that have made up the Corporate Sustainability Index (CSI) of the Brazilian Stock Exchange and remain active. The almost 26 thousand results obtained from the search for specific terms related to socio-environmental issues and those inherent to CSR are compared in search of possible alignments between the information in the corporate and sectoral reports. The analysis of the contents of the sentences is carried out using semantic, syntactic, and logical classification and dismemberment operations. In this way, their symbolic meaning and linguistic communication content are considered. The analysis classifies social and environmental aspects into positive, negative, and neutral. The type of socio-environmental disclosure is classified as declarative, quantitative non-monetary, quantitative monetary, quantitative monetary, non-monetary, and no information. The indices indicate no standardization in the information disclosed and different environmental, social, and corporate governance (ESG) disclosure levels among companies and industries. Companies claim to have higher ESG responsibility than they do, disclosing mostly positive and declarative information, known as "greenwashing." The conclusion is that voluntary disclosure of environmental information is not motivated by the search for transparency and good corporate governance policies, nor do the provisions of regulatory agencies influence it. Voluntary disclosure is an attempt to increase credibility and improve corporate image. The authors point out as a limitation of their research the subjectivity present in the content analysis procedure, the judgment of the researchers, and the analysis of specific terms. CSR information reports are the basis on which ESG scores are assigned, which, in the presence of "greenwashing," may lose their credibility.

In Mexico, using quarterly information from Bloomberg, Santos and Vázquez (2019) evaluate the existence of a relationship between CSR activities and the financial performance of organizations.

Their sample comprises companies listed on the Mexican Stock Exchange (BMV; Spanish: Bolsa Mexicana de Valores) in the five years 2012-2016. With panel data, they apply the Generalized Least Squares method, considering the presence of heteroscedasticity among companies, a common phenomenon when analyzing financial and economic variables. To evaluate financial performance, they use four different financial ratios as independent variables: stock return (R), return on assets (ROA), return on equity (ROE), and price-to-book value (PB) ratio. They form a model with each of them, where CSR explains financial performance through an indicator variable with a value of 1 when the issuing company is part of the components of the Sustainable Index of Prices and Quotations (IPCS), and zero if it is not. They use as control variables the size of the company measured by its capitalization value, its leverage level determined by the ratio of total debt to the value of total assets, the percentage change in Gross Domestic Product, the market return calculated with the percentage change in the BMV's Price and Quotations Index (IPC), and the exchange rate of the US dollar in Mexican pesos. The results indicate that in Mexico there is a positive relation between the financial performance of companies and being part of the IPCS components. These results may provide evidence to encourage Mexican companies to initiate or increase their CSR activities.

To analyze the impact of ESG scores on the efficiency of the companies that compose the BMV IPCS, Godínez-Reyes et al. (2021) use the 18 stocks that compose this index from 2014 to 2017. Efficiency is determined using the non-parametric Data Envelopment Analysis (DEA) method, which does not require a functional relationship between input and output information. Each company's efficiency score is calculated relative to an efficiency frontier, where companies with a score of one are considered efficient. Companies operating below this frontier are considered inefficient, with scores below one. Taking as a reference the companies above the efficiency frontier, which forms the "best praxis frontier" (Huguenin, 2012), the benchmarking of companies with lower scores is performed. DEA models are classified (Charnes et al., 1978) according to (i) the type of efficiency measures it provides, radial and non-radial; (ii) the orientation of the model: input-oriented or output-oriented; and (iii) the type of returns to scale characterizing the production technology: constant to or variable returns to scale. The authors evaluate radial efficiency measures to analyze the effect of input and output information. As input value, they use the company's profitability: ROA, ROE, and return on sales (ROS), and as output, the ESG score, disaggregated into its three components: environmental (AMB), social (SOC), and corporate governance (GOB). They estimate business efficiency to generate the maximum sustainable value from the minimum level of performance. Then, they select the basic input-oriented DEA model with constant returns to scale since it allows a proportional reduction of input resources while maximizing outputs. The results indicate that, given the level of profitability, the variable that has the greatest impact on the generation of

sustainable value is GOB, followed by AMB and SOC. The originality of this research consists in employing the DEA model to determine corporate efficiency, using financial performance as input and sustainability ratings as output. The authors note that the main limitation of their analysis lies in the sample size. Nevertheless, this research shows that CSR measures contribute to increasing the sustainable efficiency of companies. Therefore, the authors propose that the ESG score should complement the evaluation of corporate efficiency, strengthening the purpose of socially responsible investment.

The following year, Godínez-Reyes et al. (2022) used the sample of Godínez-Reyes et al. (2021) to analyze whether ESG scores, published by Yahoo Finance, explain the profitability of the companies that compose the IPCS. They propose a panel data model in which AMB, SOC, and GOB scores are the variables explaining sustainable value (ROS) and firm profitability (ROA and ROE). They estimate a linear regression for each independent variable, by the random effects method. The results indicate that GOB is the relevant variable for generating sustainable value (ROS), with a negative sign. They conclude that generating sustainable value allows companies to achieve profitability objectives and mitigate environmental and social impacts. This is demonstrated with a simple analysis of the impact of CSR on the profitability of companies.

Seeking to analyze the benefits of greater participation of women on the board of directors and in the top management of Mexican companies, Bollaín Parra et al. (2022) estimate the relation of women's participation with the profitability of companies. They use the 43 companies that have composed the IPC of the BMV, with information from Refinitiv,[8] for 2011-2021. The analysis uses ROE as the dependent variable, aggregating and disaggregating ESG scores by category (AMB, SOC, and GOB), the percentage of women on the board of directors, and women in the company's top management as independent variables. With unbalanced panel data, it estimates a random effects regression. The coefficients of the AMB and SOC variables are negative and not significant, while that of GOB is positive and relevant, with an adjusted coefficient of determination close to zero. In conclusion, there is a positive and significant relation between profitability with the GOB score and the participation of women in top management, whereby for every additional 1% of women's participation in top management, ROE increases by 0.27%. These results encourage Mexican companies to establish social and corporate governance policies that increase the areas of development of their female employees and thus achieve their entry into senior management positions.

8 Now LSEG Data & Analytics

Corporate social responsibility research using the Ohlson model

The work of Feltham and Ohlson (1995) states that the clean surplus accounting method excludes gains and losses recorded in the income statement concerning a company's equity. It states that if no contingent claims are involved,[9] the book value of a company's net worth is equal to the book value of equity at the end of the previous period, plus the gain realized during the calculation period, and minus the dividends of the same period. This concept of clean surplus is strongly related to applying the discounted free cash flow method.

The statement of changes in equity includes the final figures of the balance sheet and income statement, i.e., the book value of equity and net income. Its format requires that the change in the book value of equity be equal to the retained net income, which was not distributed as a dividend, excluding contributions from equity items. This relation is known as the "clean surplus relation" because changes in assets and liabilities unrelated to dividends must pass through the income statement. On this basis, Feltham and Ohlson develop a panel data model for the market value of a company based on its current and future earnings, book value, and expected dividends. The Ohlson Model (OM) employs two concepts closely related to the company's equity: the relation of the clean surplus, which serves to determine the total value of the company's shares, and the fact that the dividend decreases the company's book value without affecting its profit. In addition, the OM admits including additional information to the previously mentioned variables because some events relevant to the company's value may affect its future profit and not its current profit. This model provides a benchmark for determining the relation between a company's market value and its accounting and other information. Several important studies employ the OM in analyzing the effect of ESG scores on firm value. Semenova et al. (2010) use the OM to assess how environmental and social performance is reflected in the market value of companies listed on the SIX 300 index of the Stockholm Stock Exchange, using data from GES Investment Services. This analysis uses an extended OM to express the company's market value based on its book value, net income, and AMB and SOC performance, scaling the accounting variables by the value of total assets. It uses as a control variable the growth in sales, the company's age, and the industrial sector to which it belongs. Its panel data are analyzed using the pooled cross-sectional data time series method, applying both fixed and random effects. The estimated coefficients for the AMB and SOC variables are significant, with a positive sign for the former and a negative sign for the latter. Their results support the importance of environmental and social performance for the company's market value.

9 Examples of contingent claims are convertible debt, stock options for executives, etcetera.

Lopatta and Kaspereit (2014) employ an extended OM in their research on the effects of CSR and sectoral exposure to environmental and social risks on firm market value. They use the companies that make up the MSCI World Index[10] from December 2003 to June 2011, with data provided by Thomson Financial Datastream.[11] They use the company's market value as the dependent variable and the book value of common equity, net income, and disaggregated environmental and social performance as independent variables. The control variables are sales growth, total debt, the natural logarithm of total asset value, and net sales. Except for total asset value, which is used in logarithms, all other accounting variables are scaled by the monetary value of total assets. Before estimating the model, seeking to solve the problem of estimated coefficients whose magnitude is inconsistent with economic theory, the authors use Cook's Distance method (1977) in three stages to eliminate statistically extreme values. They use instrumental variables and the Generalized Method of Moments in the estimation to resolve the possible endogeneity between the accounting variables. Their results show a negative and significant relation between the company's value and its AMB and SOC performance for the first years of the study period. The analysis reveals that the capital market's perception of CSR has become increasingly positive.

To analyze the relation of ESG factors with the market value of companies, the study by Ionescu et al. (2019) uses 73 companies in the travel and tourism sector listed on stock exchanges in Europe, Asia, and the USA. These companies are part of the components of several sustainability indices, such as the Dow Jones Sustainability Index (DJSI), from 2010 to 2015. It applies a modified version of the OM, where the Market-to-Book Value multiple is the dependent variable, and ROA and AMB, SOC, and GOB scores comprise the set of independent variables. It estimates a multiple linear regression model globally and then by continent. The GOB component is found to have the greatest influence on the market value of companies, regardless of geographic region. Its conclusions highlight ESG factors' influence on the company's market value in this sector and confirm that its OM constitutes a useful tool for stakeholders when quantifying the economic impact and as a predictor of economic performance.

Most of the studies in this section correspond to the analysis of socially responsible investment and CSR in developed economies such as the USA, Australia, Great Britain, Europe, and Asia-Pacific. Some research papers covering these economies simultaneously include emerging Latin American economies such as Brazil, Mexico, and Colombia. Generally, published research focusing only on Latin American economies is scarce and tends to analyze a single country. The analysis methodologies

10 The MSCI World index uses companies from Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Hong Kong, Ireland, Israel, Italy, Japan, the Netherlands, New Zealand, Norway, Portugal, Singapore, Spain, Switzerland, Sweden, the United Kingdom and the United States of America.
11 Now LSEG Data & Analytics

employed are very diverse, and each study applies the methodologies most appropriate to its objectives. In particular, the studies by Semenova et al. (2010), Lopatta and Kaspereit (2014), and Ionescu et al. (2019) that employ the extended OM to analyze the impact of ESG scores on the value of listed companies are relevant to the present research because they share with it a similar objective and model.

The present study analyzes the contribution of CSR to company value. It is different from those discussed in the literature review because (i) it analyzes the Latin American region as a whole through a survival bias-free sample of the companies that make up the main stock indices of the largest stock exchanges in the region: Brazil, Chile, Colombia, and Mexico, which have ESG scores; (ii) the period of analysis (2007-2021) covers the universe of ESG information available for companies in this geographic region, from the information supplier LSEG Data & Analytics; (iii) it employs an extended Ohlson Model (1995) that is estimated with the dynamic analysis method of Arellano and Bond (1991), using the Generalized Method of Moments that includes instrumental variables.

Data and methodology

Reference model

In order to evaluate the financial impact of corporate social responsibility (CSR) on the performance of companies listed on the stock exchange, the literature reviewed in the previous section employs various methods. Among them, one of the most frequent is the regression model, where the explanatory variables include CSR indicators, such as the environmental, social, and corporate governance (ESG) score or its disaggregated components (Brammer et al., 2006; Geczy et al., 2020; Jaramillo-Arango et al., 2020). A set of control variables is included at the company level, such as its size, net income, leverage level, book-to-market value multiple, or return on assets (El Ghoul et al., 2011; Dyck et al., 2019; Méndez-Sáenz et al., 2019; Yoo & Managi, 2022). Depending on the research objective, when seeking to quantify the organizational performance, the selected dependent variable is usually gross profit, market value, market value to book value multiple, return on assets (ROA), return on equity (ROE), or the company's share performance, among others (Geczy et al., 2020; Godínez-Reyes et al., 2022; Bollaín Parra et al., 2022).

There is research (Semenova et al., 2010; Lopatta & Kaspereit, 2014; Ionescu et al., 2019) applying the Ohlson Model (OM) (Ohlson, 1995; Feltham & Ohlson, 1995), which uses a panel data regression for the market value of the company, relative to its profit, the book value of its equity, and its dividends. This model admits the incorporation of additional information since some relevant events, such

as the company's ESG performance, may impact its future profit and not its current profit, thus modifying its value. The OM is a benchmark for determining the relation between a company's market value and its accounting and other information.

This research is inspired by the OM used by Lopatta and Kaspereit (2014). Disaggregated ESG scores are incorporated into this model as follows:

$$Y_{ijt} = \alpha + \delta ASG_{it} + \beta X_{it} + \gamma M_{jt} + \varepsilon_{ijt} \quad (1)$$

The variables in the model correspond to company i in country j in year t. The dependent variable ($Yijt$) is the market value of the shares, the explanatory variable ($ASGit$) is the disaggregated ASG score of the company, Xit is the set of control variables per company, and finally, there is the exogenous variable (Mjt) specific to each country.

Variables description

The dependent variable (Yit) is taken as the company's market value (VM), which is the sum of the market value for all relevant types of assets issued.[12] It is calculated by multiplying the number of assets of each type by the most recent closing price, scaled with the total asset value.

The control variables used for each company (Xit) are net income (IN) available to common shareholders, excluding the effect of extraordinary items, scaled with total assets; total debt (DT), which is outstanding debt payable (accounts payable, short-run debt, current maturity of long-run debt, current maturity of capital lease, and total long-run debt), scaled with total assets; the reported total asset value (AT), calculated with the sum of current assets, accounts receivable, investment in unconsolidated subsidiaries, other investments, net property, plant and equipment, and other assets; it serves as a proxy for company size and is used in natural logarithm because company size may influence CSR activities, as small companies may have less capacity to sustain environmental and social activities in the long run, compared to large companies. The information of the dependent variable (Y_{ijt}) and the control variables by company (X_{it}) is normalized in US dollars, according to the exchange rate in effect on the last calendar day of each year and in each country.

12 This concept uses outstanding, free float and default shares.

As an exogenous variable (M_{jt}), the return rate of government bonds with ten-year maturity (BONO) is used because it represents the cost of money or financing in each country of origin of the companies analyzed.

The explanatory variable is the degree of CSR of each company, valued with the ASG_{it} scores, disaggregated into its three components: environmental (AMB), social (SOC), and corporate governance (GOB). These scores are assigned based on the CSR report published by each company, knowing its limitations (Jordão et al., 2018), in addition to the specialized analysis performed by the score supplier, which in this case is LSEG Data & Analytics.[13]

Based on the documentation provided by LSEG, the following is a summary of the CSR aspects that this supplier considers in establishing the ESG score for each category. The environmental score considers a company's impact on natural ecosystems (living and non-living), including air, soil, and water conditions. This score indicates the extent to which the company employs its best management practices to avoid environmental risk, thus seizing the opportunity to generate shareholder value over the long run. The social assessment considers the company's ability to generate trust and loyalty among its employees, customers, and society through its best management practices. This score reflects two key factors, its reputation and the strength of its license to operate, to establish its ability to generate shareholder value over the long run. In terms of corporate governance, the company's systems and processes are evaluated, which ensures that the members of the Board of Directors and its executives act (ability to direct and control) to generate value in the long run for its shareholders. This research uses ESG scores in numerical format, taking values from zero to one hundred. The higher the ESG score, the lower the company's risk relative to the three categories and the greater the opportunity to generate shareholder value. When the scores decrease and approach zero, the company has a higher level of risk and less opportunity for value creation.

The sample

The sample includes all the companies that comprise the main stock indices of the Brazilian, Chilean, Colombian, and Mexican stock exchanges, according to the rebalancing of their components carried out in the first four months of 2021.[14] Each company represented in the index is taken only once,[15] eliminating

13 The source of information is the LSEG Workspace system, licensed for use by Universidad Anáhuac México.
14 See Appendix. Components of the main stock indices in Latin America
15 Depending on the methodology used in each country to select the components of a stock index, more than one type of share may be considered for each listed company.

those that do not have an ESG score during the analysis period, which spans from 2007 to 2021 (Table 1). There are 178 companies, of which 49% are from Brazil, 21% from Chile, 19% from Mexico, and 11% from Colombia. These data constitute an unbalanced panel with 1 618 observations classified in 178 companies and 15 years.

All industrial sectors are represented in the sample (Table 2) based on the classification provided by LSEG Workspace.[16] Those with the highest number of companies are financial (20%), consumer staples (14%), and industrial (13%), while the sectors with the lowest representation are healthcare (3%) and IT (2%).

Table 1
Number of companies in the sample

Country	Stock index	Number of components	Rebalancing date	Number of companies	Number of observations (%)
Brazil	Ibovespa	84	May/2021	83	791 (49%)
Chile	S&P/CLX IGPA	61	March/2021	40	340 (21%)
Colombia	COLEQTY	40	April/2021	22	173 (11%)
Mexico	S&P/BMV IPC	34	March/2021	33	314 (19%)
Total		219		178	1618 (100%)

Source: created by the author based on information from LSEG Workspace

Table 2
Industrial sectors represented in the sample

Industrial sector (two-digit)[a]		Number of companies	Percentage in the sample
Energy	10	8	4%
Materials	15	21	12%
Industry	20	24	13%
Discretionary consumption	25	19	11%
Consumer staple products	30	25	14%
Healthcare	35	5	3%
Financial	40	35	20%
Information technologies	45	3	2%
Communication services	50	7	4%
Utilities	55	23	13%
Real estate	60	8	4%
Total		178	100%

(a) Refinitiv Business Classification (TRBC-Industry Group)
Source: created by the author based on information from LSEG Workspace

16 Industry sector classification of the Refinitiv Business Classification (TRBC-Industry Group), 4 digits

Descriptive summary

The descriptive analysis[17] performed with the STATA statistical package shows that the Latin American companies in the sample have poor ESG scores on average, 45.75, 52.33, and 50.74 for the AMB, SOC, and GOB scores, respectively. The scores have a low level of variation (0.25 on average), although there are extreme values with scores close to zero or 100. This confirms the diversity among Latin American companies in achieving a high CSR level.

Table 3
Spearman's correlation with industry sector

Variable	Sector
VM	-0.065***
IN	0.061***
DT	-0.067***
ln(AT)	0.014
BONO	-0.032*
AMB	0.023
SOC	0.027
GOB	0.017

Note: Asterisks indicate the significance level at which the null hypothesis $H0$ is rejected : $\rho = 0$, 1% (***), 5% (**), and 10% (*).
Source: created by the author, based on the statistical analysis performed in STATA

A correlation analysis is performed for each variable in Equation 1 concerning the sector it belongs to (Table 3) through Spearman's correlation coefficient for this nominal. It is found that the sector has a significant inverse relation with the company's market value, the degree of indebtedness, and the 10-year government bond rate, and it is direct with the net income. The correlation between sector and total assets, as well as with ESG scores, is not significant. The Pearson correlation analysis (Table 4) for all variables in Equation 1 clearly shows the strong association between ESG scores of the three categories, all with positive signs, the highest being 0.796 for the environmental component with the social component. This analysis shows the movement in the same direction as the ESG scores, so it seems logical to think that companies are concentrating their efforts to improve CSR not only in one factor but in several simultaneously.

17 See Appendix, Table A5

The relation between ESG scores and the rest of the variables is inverse and significant for market value with the environmental and social factors and net income with the environmental and corporate governance factors. This result contradicts the theory that CSR neutralizes environmental and social risk in sectors exposed to them (Stanny & Ely, 2008). Therefore, it would be expected for this relation to be direct, i.e., the greater the investment in CSR, the higher the company's market value and net income will increase.

Table 4
Pearson's correlation matrix

Variable	AMB	SOC	GOB	VM	IN	DT	ln(AT)
SOC	0.796***						
GOB	0.429***	0.491***					
VM	-0.149***	-0.124***	-0.033				
IN	-0.073***	-0.023	-0.047**	0.242***			
DT	0.122***	0.120***	0.126***	-0.223***	-0.303***		
ln(AT)	0.418***	0.384***	0.216***	-0.392***	-0.073***	0.091***	
BONO	0.154***	0.177***	0.091***	0.061***	0.016	0.065***	0.036*

NOTE: Asterisks indicate the significance level at which the null hypothesis is rejected H_0:$\rho = 0$, 1% (***), 5% (**), and 10% (*)
Source: created by the author, based on the statistical analysis performed in STATA

When the relation between ESG scores and the debt or total assets level is analyzed, it is positive and significant. In other words, debt and total assets move in the same direction as CSR performance. The work done to improve ESG scores is probably through investment in policies and programs that increase their assets' value, and this investment may be linked to a higher level of leverage. The latter would explain the inverse relation between ESG scores, net income and market value of the company described above because the relation between leverage and these two financial variables is significant and negative. In contrast, the relation between ESG scores and total level of indebtedness is positive.

The 10-year government bond rate, used as an exogenous variable, directly and significantly relates to the other variables in Equation 1, except for net income. Considering the government bond rate in this geographic area is important since these are emerging economies with inflationary pressures and low economic growth. The government bond rate mitigates the investment risks associated with the strength of each country's economy and acts as an attractor of foreign investment to these countries.

In the statistical analysis performed in STATA for the panel data,[18] there is, for some variables, a significant difference in the standard deviation between companies (between) and the standard deviation over time (within). For disaggregated ESG scores, the variance between companies is close to twice over time, possibly because each company determines its CSR policy and practices according to its exposure to environmental, social, and corporate governance risks. Something similar happens with total assets, where their value changes are more significant between companies than over time, which may be a consequence of the particular characteristics of each sector, such as demand, cash flow, level of indebtedness, etcetera. This difference between variances offers the first signs of the possible existence of fixed effects (Baltagi, 2005) in the panel data.

Conversely, it is observed that the variance over time for net income is greater when compared by periods, which is consistent with the occurrence of two global financial crises during the study period, the first in 2008 as a result of events in the US financial sector, and the second due to the COVID-19 epidemic during 2020-2021, both impacting the economic performance of countries and companies.

Empirical results

Treatment of extreme values

In quantitative data samples, outliers can influence descriptive analysis, which impacts the value of many descriptive statistics. On the other hand, outliers play an important role in regression models. An observation that differs significantly from all others can greatly influence the regression analysis results.

Outliers can provide spurious information resulting from input errors, recording errors, exceptional phenomena, or members of a different population that are part of the sample. These values are frequent in real life and often go unnoticed because the data are processed with computer equipment without prior verification.

When an atypical value is present in the response variable (Y_i), it is known as an outlier, representing a "failure" in the model. A methodology used to deal with these values is the method known as Winzorization.[19] This method consists in bounding and reducing the magnitude of the outliers in the sample, thus trying to limit their effect on the result of the descriptive statistics to be calculated. Winsorized estimators are usually more robust to outliers than standard versions (Frieman, Saucier, &

18 See Appendix, Table A6
19 Charles P. Winsor (1895-1951)

Miller, 2017, p. 130). This methodology is applied in the context of survey methodology to reduce the ratio of non-response cases (Lee, Lessler, & Stuart, 2011). It is also used in constructing stock market indices when examining the range of certain factors, such as the growth and value of certain stocks.[20]

In Winsorization, the values of a variable that are outliers, because they are extreme, are replaced by the value at which the central section of the distribution begins, in which the desired probability level (1-α) is accumulated so that the extreme values outside this central section are eliminated. The ratio of extreme values is thereby reduced, achieving more robust descriptive statistics.

In addition to the above, outliers in the independent variables (X_i) are known as leverage points and can also affect the regression model without the response variable (Y_i) necessarily having outliers. Blatná (2006) states that one should distinguish between good and bad leverage points in regression. A good leverage point is an unusually large or small value among the values of X_i, but it is not an outlier in the regression. This means that the point is relatively far from the rest of the observations but reasonably close to the estimated regression ($\hat{Y}_i$). A good leverage point has a limited effect on the distorted view of how most points are associated and even improves the precision in estimating the regression coefficients.

A bad leverage point is far from the estimated regression ($\hat{Y}_i$). It is an outlier of the regression, which has a value of X_i that is also an outlier among the values of that variable. This fact considerably affects the estimation of the coefficients, reducing the precision of their estimated values (Blatná, 2006).

Outliers are identified regarding a specific reference model or null model. In the outlier identification stage, difficulties may arise. The "masking" effect is the most frequent, which occurs when several atypical values are clustered in a region of the sample space away from most of the data. Non-robust detection methods usually do not identify these observations as outliers, i.e., the outliers are hidden. On the other hand, the leverage points do not necessarily correspond to outliers (Blatná, 2006).

Observations are considered influential when, if included or excluded from the regression, they cause substantial changes in the fitted model ($\hat{Y}_i$)[21] . Of greater concern are regression outliers, i.e., cases where (X_{i1}, … , X_{ip}, Y_i) deviates from the relation described by the regression and followed by most of the data, considering both the explanatory variable and the response variable at the same time. A leverage point is defined as a point (X_{i1}, … , X_{ip}, Y_i) for which its values in the independent variables (X_{i1}, … , X_{ip}) are outliers away from the values for the rest of the data set (Blatná, 2006).

In order to identify outliers that are leverage points, different methods can be used: the Least Median Square estimator of Rousseeuw and van Zomeren (1990), the standardized residuals method, the

20Available at: https://www.msci.com/eqb/methodology/meth_docs/MSCI_GIMIVGMethod_Feb2021.pdf
21 They cause changes in their estimated coefficients or in their adjusted values.

robust distance method and the Mahalanobis distance method (Rousseeuw & Leroy, 2003), Cook's distance method (1977), and the DFITS estimator (Blatná, 2006).

Cook's (1977) distance method is used to estimate the influence that a specific value in the sample has on the regression analysis being performed. This methodology enables the identification of outliers that can distort the estimation results for the regression coefficients because they contribute larger standard deviations and even lead to estimated values that are inconsistent with economic theory. Cook's methodology quantifies the aggregate change in the estimated coefficients when each observation is omitted during the estimation process.

The Cook's Distance (CD) for the i-th observation takes as a basis the differences of the forecasts for the explained variable (Y_i) of the model created from all the data in the sample, and its forecasts from a model where the i-th observation, which is considered as an outlier, is discarded. For each observation, the sum of the square of the residuals is divided by (p + 1) times the Mean Squared Error of the full model.

$$DC_i = (p\sigma^2)^{-1}(\hat{Y}_{(i)} - Y)^T(\hat{Y}_{(i)} - Y) \tag{2}$$

where p is the number of independent variables (X_{i1}, … , X_{ip}), T is the number of periods analyzed, and σ^2 is the error variance estimator calculated as:

$$\sigma^2 = \sum_{i=1}^{n} \frac{r_i^2}{n-p} \tag{3}$$

with r_i^2 equal to the square of the residual and n the number of observations in the sample. It is recommended to investigate observations with CD greater than 0.5 further. The CD can have a minimum value of zero, and its usual cutoff point is 4/n. The i-th observation may be an extreme value or a leverage point when the CD is large.

The CD method effectively finds observations that influence the regression model when there is a single outlier but may fail if there are two or more outliers. Nevertheless, this numerical diagnosis is probably among the most effective techniques for detecting cases affecting the fitted values in a multiple linear regression model.

Considering these technique limitations, in this analysis the CD is applied separately for each country's data, given their economic and social characteristics, applying the three-stage method used in Lopatta and Kaspereit (2014). Thus, observations with a CD greater than 12/n, 8/n, and 4/n are eliminated in the first, second, and third stages, respectively. Therefore, 0.76%, 0.51%, and 0.26% of the observations available at the beginning of each iteration are discarded, distributed as follows: 124 from Brazil, 13 from Chile, 17 from Colombia, and 51 from Mexico. Of the 1 588 observations, 1 383 are retained, representing 87.1% of the sample.

Fixed-effects model

The statistical difference that exists when comparing the variance between companies with that occurring over time (within), explained above in the Descriptive Summary section, arises from the time-invariant characteristics that there are per company or fixed effects (μi_i), which are included in the random errors ($_{it}$) of Equation 1, and could be related to the explanatory variables (Baltagi, 2005; Wooldridge, 2010). In other words:

$$\varepsilon_{it} = \mu_i + \upsilon_{it} \tag{4}$$

where μ_i are the unobservable effects that come from the individual characteristics of the companies, and υ_{it} represents the specific errors that occur over time. The Breusch-Pagan and Hausman tests (Wooldridge, 2010) conclude that the best model is the fixed effects model, so the equation that defines the model is:

$$Y_{it} = \alpha + \delta ASG_{it} + \beta X_{it} + \gamma M_{jt} + \mu_i + \upsilon_{it} \tag{5}$$

where μ_i is an unobserved random variable, constant over time, potentially correlated with the observed independent variables, such as industry sector, regional characteristics per country, legislation, etcetera.

Linear correlation tests (Wooldridge, 2010)[22] applied on the unbalanced panel, conclude that the data of the explanatory variables may be correlated with those of the previous year or two previous years.

22 The Wooldridge test (xtserial) and the Portmanteau IS-test (xtistest) were applied in STATA

Cross-sectional dependence tests (Pesaran, 2004 and 2015)[23] indicate a correlation between groups within the panel data, which may be a dependence between companies or sectors. From the perspective of the dependent variable (VM) and the control variables (IN, DT, ln(AT)), it is logical to think that they are related to their values from previous periods, as well as between companies in the same sector. Similarly, it is possible to understand the existence of serial and transversal correlation for the exogenous variable (BONO) due to the effect of each country's monetary policy and the supply and demand of these emerging economy government bonds in the international financial markets. Regarding the disaggregated environmental, social, and corporate governance (ESG) scores (AMB, SOC, GOB), it is reasonable to assume that companies that have invested in the implementation of policies that seek to preserve the environment and the benefit of their communities, as well as the best corporate governance practices, will maintain a continuous effort to preserve or improve their CSR policies, at the individual and sector level.

This complex condition in which both time and inter-company correlations are present is common in microeconomic data. Using more robust standard errors for panel regressions is necessary to provide statistical validity to estimate the model coefficients in Equation 5. Seeking this objective, the model can be estimated by the fixed effects statistical method to model the unobservable heterogeneity. Nevertheless, this method is not feasible given the endogeneity of the variables VM, IN, DT, and ln(AT).

Endogeneity

The most frequent causes of endogeneity in corporate finance are omitted variables, measurement errors, and simultaneity. Simultaneity refers to the simultaneous determination of most of the results and characteristics of the company, such as the relation between the level of leverage and the company's market value. This sometimes generates a significant feedback effect of the dependent variable on the independent variable, so it cannot be assumed that the explanatory variable (X_{it}) is strictly exogenous given that some level of correlation would exist between the error term (υ_{it}) and the future values of the X_{it} variables. The latter breaches the strict exogeneity assumption ($E(X_{it}\upsilon_{it}) = 0$), inducing the coefficient estimator β to ignore the bias and inconsistency problem (Barros *et al*. 2020).

By employing the fixed effects method to estimate the panel data regression, it is possible to model the unobservable heterogeneity and thus reduce or eliminate the endogeneity problem when it arises from the omitted variables, thus eliminating the unobservable heterogeneity of the units of observation. Nonetheless, in these models the consistency of the estimator assumes strict exogeneity, which is

23 The Pesaran CD test (xtcdf $xlist, pesaran) was applied in STATA

frequently ignored in the empirical literature on corporate finance. The strict exogeneity assumption is violated when the model includes lags of the dependent variable Y_{it}, which is common given the dynamic nature of most phenomena in corporate finance. This is known as short panel bias because it is more accentuated when the number of periods under study is much smaller than the number of individuals in the sample (Barros *et al*., 2020).

On the other hand, the violation of strict exogeneity resulting from feedback effects from the dependent variable (Y_{it}) toward the explanatory variables (X_{it}), known as dynamic endogeneity, is frequent in studies in corporate finance. The above occurs because of existing shocks[24] that affect the dependent variable Y_{it}, and that can also affect any determinant of the regressors in later periods (X_{it+j}) (Barros *et al*. 2020).

A short panel bias may exist in the present analysis since the number of individuals in the sample (178) is much larger than the number of years analyzed (15 years). There is also dynamic endogeneity of the corporate financial variables used in the Ohlson Model. Having an unbalanced data panel, the Hausman-Gujarati test (Gujarati, 1995, Chap. 19.5) was used to test for endogeneity among the variables market value (VM), net income (IN), total debt (DT), and total assets (ln(AT)).[25]

Model estimation

The solution to any endogeneity problem is to use valid instrumental variables. For the dynamic endogeneity problem, one solution is to use as instrumental variables the specific lags (X_{it-j}) or time differences ($X_{it} - X_{it-j}$) of the original regressors. These instruments must be correlated with the endogenous regressors and uncorrelated with the model error term (sequential exogeneity). The instrument must be exogenous in the regression model (Barros *et al*., 2020).

The inertial behavior caused by the dynamic endogeneity of the variables suggests that it is not appropriate to use a static model. In corporate finance, it is expected that the regressor (X_{it}) is persistent over time so that there is a significant correlation between its current and previous value or feedback from Y_{it} toward X_{it} (Barros *et al*., 2020).

Therefore, to explicitly capture this dynamic component and achieve consistent estimators of the model in (1), the method of Arellano and Bond is used (Arellano & Bond, 1991; Blundell & Bond, 1998), estimated through the Generalized Method of Moments (GMM), proposed for dynamic panel data

24 Existing shocks can be the indicators used to make investment decisions, financing or the company's financial performance.
25 See Appendix. Hausman-Gujarati (1995) endogeneity test.

models (with many individuals and few periods), with endogeneity problems. The methodology uses instrumental variables generated from the lags and differences of all the variables included in the model. In the estimation of the model in (1), the heteroscedastic weights matrix is considered for the estimation (two-step), looking for more efficient regressors (Roodman, 2009) than those obtained when using the homoscedastic weights matrix (one step), and the Hansen test (1982) is applied to determine the over-identification of the instruments.

It should be noted that the strong relation between the disaggregated environmental, social, and corporate governance (ESG) scores, explained in the Descriptive Summary section, makes it necessary to estimate the model in (1) for each of them separately: environmental, social, and corporate governance.

In the GMM, average net income by industry sector is used as an instrumental variable, following the work of Lopatta and Kaspereit (2014). As these authors indicate in their work, finding valid and relevant corporate social responsibility (CSR) instruments in a regression where the variables are prices is complicated. Among the instruments used in their analysis, those created from the average values by the industrial sector of the potentially endogenous variables, calculated without including the instrumented variable, the environmental and social dimensions, stand out. Using sectoral averages as instruments solves the problem of pure reverse causality, which is not the result of omitted variables since it is unlikely that the market value of a company will affect the CSR level of other companies in the same sector. The calculation procedure eliminates random measurement errors (Lopatta & Kaspereit, 2014).[26]

In their work, they posit that "Whether an instrumental variable approach with semi-endogenous instruments is preferable to not instrumenting depends on the unknown correlations between the instruments and the regression error term, between the endogenous regressors and the instruments, and between the endogenous regressors and the error term" (Lopatta & Kaspereit, 2014; Larcker & Rusticus, 2010).

With this in mind, this research paper tests three instruments, calculated from the average values by industry of the 4-digit Refinitiv Business Classification (TRBC). The first and second instruments are generated from net income (IN) and total debt (DT), respectively, and the third instrument from the natural logarithm of total assets (ln(AT)). Although the three instruments turn out to be significant in their correlation with the ESG variables and with the dependent variable market value (VM), the result of the estimation with the Arellano and Bond method does not have a good result in over-identification (P-value equal to zero in the Hansen test) when using the three instruments together. The estimation by Arellano

26 Reverse causality is the situation in which the outcome precedes its cause, i.e., the dependent variable precedes its regressors. Reverse causality is a characteristic of dynamic endogeneity.

and Bond with the best over-identification results is the one that includes average net income by industry as the only instrument.

Empirical estimation results

Analyzing the estimated coefficients for the control variables by company (Table 5), it is clear that total assets are the variable that most impacts the value of the company, followed by net income. The signs of the coefficients for the variables ln(AT) and IN are consistent with those obtained by Lopatta and Kaspereit (2014). For its part, the level of indebtedness is not significant in the three models, establishing that this variable is not relevant to the market value of companies in Latin America. In contrast, the exogenous variable BONO shows a significant coefficient for the estimates with the environmental and social scores, while for the corporate governance scores, it is significant with a probability of 89.8%. This confirms the hypothesis of a relation between the government bond rate and the value of the company, direct when considering the environmental and corporate governance scores and inverse when considering the social score, triggering the questioning of the possible interaction of these variables (BONO and ESG) in the countries analyzed.

Regarding the environmental (AMB), social (SOC), and corporate governance (GOB) scores, the environmental score has a negative effect (-0.0022) on the company's market value, scaled with the total asset value, while the corporate governance score has a positive effect (0.0029). As for the social score, it shows no significant effect on the value of the company. The AMB, SOC, and GOB variables' coefficients are slightly smaller in magnitude than those estimated at the international level in Lopatta and Kaspereit (2014), and only the environmental one coincides in sign with that research.

Table 5
Panel model estimation results, by environmental, social, and corporate governance (ESG) score

Arellano-Bond estimation, with the Generalized Method of Moments
$MV_{it} = \beta_0 + \beta_1 IN_{it} + \beta_2 DT_{it} + \beta_3 \ln(AT_{it}) + \beta_4 BONO_{it} + \beta_5 ASG_{it} + \mu_i + \upsilon_{it}$

Variable	ESG = Environmental		ESG = Social		ESG = Corp. Gov.	
IN	7.9365***	(0.000)	8.0317***	(0.000)	7.8118***	(0.000)
DT	0.0202	(0.915)	-0.1647	(0.418)	-0.2038	(0.324)
ln(AT)	-0.1429***	(0.000)	-0.1501***	(0.000)	-0.1660***	(0.000)
BONO	0.9548*	(0.076)	-1.1578**	(0.030)	0.8717[a]	(0.102)

ESG	-0.0022** (0.024)	-0.0011	(0.314)	0.0029**	(0.011)
Constant	3.7508*** (0.000)	3.9007***	(0.000)	4.1056***	(0.000)
AR(1)	(0.000)***	(0.000)***		(0.000)***	
AR(2)	(0.317)	(0.351)		(0.481)	
Hansen's test[b]	(0.176)	(0.169)		(0.199)	
Observations	1414	1415		1415	

(a) For the model estimation with the corporate governance score, the coefficient of the BONO variable has an 89.8% probability of being different from zero.
(b) Statistical test with a null hypothesis of no overidentification of instruments (two-step)
Note: Estimated coefficient and P-value shown in parentheses, significance level of 1% (***), 5% (**), and 10% (*), with robust estimation and average net income instrumental variable by industry sector.
Source: created by the author, based on the statistical analysis performed in STATA

Conclusions

This paper evaluates the impact of Corporate Social Responsibility (CSR) on the market value of companies in Latin America through a sample free of survivorship bias, consisting of all companies listed on the stock exchanges of Brazil, Chile, Colombia, and Mexico, which have environmental, social, and corporate governance (ESG) scores in the period 2007 to 2021. A model that includes financial, market, and ESG scores is used, estimating with the methodology of Arellano and Bond (1991) and the Generalized Method of Moments (GMM). This is the first research that analyzes, with these variables, model, and estimation method, the contribution of CSR to the value of Latin American companies.

The strong direct association between ESG scores for the environmental, social, and corporate governance components suggests that companies working on CSR improvement aspects in this region involve several ESG components simultaneously. The model estimation results indicate that the value of total assets is the variable that has the greatest impact on the value of the companies, followed by net income, and that company debt is not significant. The signs of the coefficients for the total asset and net income variables are consistent with the results at the international level in Lopatta and Kaspereit (2014). The 10-year government bond rate is significant but with a different sign depending on the ESG component included in the model: positive for environmental and corporate governance and negative for social. This result implies a possible interaction between these two variables in the countries analyzed.

Regarding the disaggregated ESG scores, the corporate governance score increases the market value by 0.0029 times the value of its total assets, while the environmental score decreases it by -0.0022 times the value of its assets. The social score does not significantly affect the value of the company. These results are consistent with those of Godínez-Reyes *et al*. (2021) and Godínez-Reyes *et al*. (2022) for

Mexico. The direction of the relation between ESG variables and firm financial performance (VM) is contrary to that identified by Santos and Vázquez (2019), except for Corporate Governance (GOB).

These coefficients are similar to but smaller than those estimated by Lopatta and Kaspereit (2014), and of the same sign for the environmental score.

The proposal is to continue this research through models that enable the differentiation of the contribution of CSR to the market value of Latin American companies in comparison with other developed economies such as the United States, as well as to study in depth the interaction between the government bond rate and ESG scores.

References

Arellano, M., & Bond, S. (1991). Some Tests of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations. The Review of Economic Studies, 58(2), 277–297. https://doi.org/10.2307/2297968

Arias Fogliano de Souza Cunha, Felipe, & Samanez, C. P. (2013). Performance analysis of sustainable investments in the Brazilian stock market: A study about the corporate sustainability index (ISE). Journal of Business Ethics, 117(1), 19-36. https://doi.org/10.1007/s10551-012-1484-2

Baltagi, H.B. (2005). Econometric Analysis of Panel Data (3rd ed.). New York: John Wiley& Sons. https://doi.org/10.1017/s0266466600006150

Barber, B. M., Morse, A., & Yasuda, A. (2021). Impact investing. Journal of Financial Economics, 139(1), 162-185. https://doi.org/10.1016/j.jfineco.2020.07.008

Barros, L. A., Bergmann, D. R., Castro, F. H., & Silveira, A. D. M. D. (2020). Endogeneity in panel data regressions: methodological guidance for corporate finance researchers. Revista brasileira de gestão de negócios, 22, 437-461. https://doi.org/10.7819/rbgn.v22i0.4059

Bauer, R., Koedijk, K., & Otten, R. (2005). International evidence on ethical mutual fund performance and investment style. Journal of Banking & Finance, 29(7), 1751-1767. https://doi.org/10.1016/j.jbankfin.2004.06.035

Bauer, R., Derwall, J., & Otten, R. (2007). The ethical mutual fund performance debate: New evidence from Canada. Journal of Business Ethics, 70(2), 111-124. https://doi.org/10.1007/s10551-006-9099-0

Belghitar, Y., Clark, E., & Deshmukh, N. (2014). Does it pay to be ethical? evidence from the FTSE4 Good. Journal of Banking & Finance, 47, 54-62. https://doi.org/10.1016/j.jbankfin.2014.06.027

Blatná, D. (2006). Outliers in regression, Trutnov, 30, 1-6. Disponible en: https://statistika.vse.cz/konference/amse/PDF/Blatna.pdf Consultado: 08/09/2023.

Blundell, R. y Bond, S. (1998). Initial conditions and moments restrictions in dynamic panel data models, Journal of Econometrics, 87, 115-143. https://doi.org/10.1016/s03044076(98)00009-8

Bollaín Parra, L., Torre Torres, O. V. D. L., & Martínez Torre-Enciso, M. I. (2022). Demostración del beneficio de una mayor participación de la mujer en el consejo de administración y la alta dirección de las empresas mexicanas que cotizan en bolsa. Contaduría y administración, 67(4), 229-254. https://doi.org/10.22201/fca.24488410e.2022.4813

Brammer, S., Brooks, C., & Pavelin, S. (2006). Corporate social performance and stock returns: UK evidence from disaggregate measures. Financial Management, 35(3), 97-116. https://doi.org/10.1111/j.1755-053X.2006.tb00149.x

Carroll, A. B., & Buchholtz, A. K. (2006). Business and Society: Ethics and Stakeholder Management. (6th Ed.) Mason, Ohio Thomson/South-Western. pp. xx + 745. ISBN 0324225814.

Charnes, A., Cooper, W. W., & Rhodes, E. (1978). Measuring the efficiency of decision-making units. European Journal of operational research, 2(6), 429-444. https://doi.org/10.1016/0377-2217(79)90229-7

Cook, R. D. (1977). Detection of Influential Observation in Linear Regression. Technometrics, 19(1), 15–18. https://doi.org/10.2307/1268249

Cooper, D. R., & Schindler, P. S. (2006). Business Research Methods. (9th Ed.) New York: McGraw Hill-Irwin. ISBN 0071244301.

Correa Mejía, D. A., Hernández Serna, D. P., Gutiérrez Castañeda, B. E., & Lopera Castaño, M. (2019). Aproximaciones sobre la incidencia de los reportes de sostenibilidad y gobierno corporativo en el valor de las empresas: Evidencia desde Chile y Colombia. Criterio Libre, 17(30), 231-254. https://doi.org/10.18041/1900-0642/criteriolibre.2019v17n30.5811

Cortez, M. C., Silva, F., & Areal, N. (2009). The performance of European socially responsible funds.
Journal of Business Ethics, 87(4), 573-588. https://doi.org/10.1007/s10551-008-9959-x

Cummings, L. S. (2000). The financial performance of ethical investment trusts: An australian perspective. Journal of Business Ethics, 25(1), 79-92. https://doi.org/ 10.1023/a:1006102802904

De la Torre Torres, Oscar V. & Martínez Torre-Enciso, M. I. (2015). Revisión de la inversión sustentable en la Bolsa Mexicana durante periodos de crisis. Revista Mexicana De Economía Y Finanzas: REMEF, 10(2), 115-130. https://doi.org/10.21919/remef.v10i2.71

De la Torre Torres, Oscar V. & Martínez Torre Enciso, M. Isabel. (2017). Is socially responsible investment useful in Mexico? A multi-factor and ex-ante review. Contaduría y Administración, 62(1), 222-238. https://doi.org/10.1016/j.cya.2016.09.001

Derwall, J., Guenster, N., Bauer, R., & Koedijk, K. (2005). The eco-efficiency premium puzzle. Financial Analysts Journal, 61(2), 51-63. https://doi.org/10.2469/faj.v61.n2.2716

Dyck, A., Lins, K. V., Roth, L., & Wagner, H. F. (2019). Do institutional investors drive corporate social responsibility? International evidence. Journal of Financial Economics, 131(3), 693-714. https://doi.org/10.1016/j.jfineco.2018.08.013

Edmans, A. (2011). Does the stock market fully value intangibles? employee satisfaction and equity prices. Journal of Financial Economics, 101(3), 621-640. https://doi.org/10.1016/j.jfineco.2011.03.021

El Ghoul, S., Guedhami, O., Kwok, C. C. Y., & Mishra, D. R. (2011). Does corporate social responsibility affect the cost of capital? Journal of Banking & Finance, 35(9), 2388-2406. https://doi.org/10.1016/j.jbankfin.2011.02.007

El Ghoul, S., & Karoui, A. (2017). Does corporate social responsibility affect mutual fund performance and flows? Journal of Banking & Finance, 77, 53-63. https://doi.org/10.1016/j.jbankfin.2016.10.009

Feltham, G. A., & Ohlson, J. A. (1995). Valuation and clean surplus accounting for operating and financial activities. Contemporary accounting research, 11(2), 689-731. https://doi.org/10.1111/j.1911-3846.1995.tb00462.x

Ferrell, A., Liang, H., & Renneboog, L. (2016). Socially responsible firms. Journal of Financial Economics, 122(3), 585-606. https://doi.org/10.1016/j.jfineco.2015.12.003

Friedman, M., Friedman, R. D. (1964). Capitalism and freedom. Chicago: University of Chicago Press. ISBN 0226264017.

Frieman, J., Saucier, D.A. y Miller, S.S. (2017). Principles & methods of statistical analysis. United States: Sage Publications. ISBN 1483358607.

Geczy, C. C., Guerard, John B., Jr, & Samonov, M. (2020). Warning: SRI need not kill your Sharpe and information Ratios—Forecasting of earnings and efficient SRI and ESG portfolios. The Journal of Investing, 29(2), 110-127. https://doi.org/10.3905/joi.2020.1.115

Giese, G., Lee, L., Melas, D., Nagy, Z., & Nishikawa, L. (2019). Foundations of ESG investing: How ESG affects equity valuation, risk, and performance. Journal of Portfolio Management, 45(5), 69-83. https://doi.org/10.3905/jpm.2019.45.5.069

Gil-Bazo, J., Ruiz-Verdú, P., Santos, A. A., & P. (2010). The performance of socially responsible mutual funds: The role of fees and management companies. Journal of Business Ethics, 94(2), 243-263. https://doi.org/10.1007/s10551-009-0260-4

Gujarati, D. N., Arango Medina, G., Misas Arango, M. r. t. (1997). Econometría básica. (3ª Ed.) Colombia: McGraw-Hill Interamericana. ISBN 9586005852.

Godínez-Reyes, N. L., Gómez-Monge, R., Calderón-Gutiérrez, A., & Alfaro-Calderón, G. G. (2021). Efficiency Analysis of Mexican Stock Exchange Sustainable Firms. Revista mexicana de economía y finanzas, 17(1). https://doi.org/10.21919/remef.v17i1.481

Godínez-Reyes, N. L., Gómez-Monge, R., Alfaro-Calderón, G. G., & Calderón-Gutiérrez, A. (2022). Sustainable Value: An Empirical Research on Large Firms. In Soft Computing and Fuzzy Methodologies in Innovation Management and Sustainability (pp. 197-208). Cham: Springer International Publishing. https://doi.org/10.1007/978-3-030-96150-3_14

Gregory, A., Matatko, J., & Luther, R. (1997). Ethical unit trust financial performance: Small company effects and fund size effects. Journal of Business Finance & Accounting, 24(5), 705-725. https://doi.org/10.1111/1468-5957.00130

Hansen, L.P. (1982). Large Sample Properties of Generalized Method of Moments Estimators.

Econometrica, 50(4), 1029-1059. https://doi.org/10.2307/1912775

Hamilton, S., Jo, H., & Statman, M. (1993). Doing well while doing good? The investment performance of socially responsible mutual funds. Financial Analysts Journal, 49(6), 62-66. https://doi.org/10.2469/faj.v49.n6.62

Huguenin, J. M. (2012). Data envelopment analysis (DEA). A pedagogical guide for decision makers in the public sector. Swiss Graduate School of Public Administration, Lausanne: IDHEAP. Disponible en: https://serval.unil.ch/resource/serval:BIB_0FC432348A97.P001/REF

Ionescu, G. H., Firoiu, D., Pirvu, R., & Vilag, R. D. (2019). The impact of ESG factors on market value of companies from travel and tourism industry. Technological and Economic Development of Economy, 25(5), 820-849. https://doi.org/10.3846/tede.2019.10294

Jaramillo Arango, M., Ríos Restrepo, W. A., & Correa-Mejía, D. A. (2020). Incidencia de factores ambientales y sociales en la generación de valor: Evidencia desde las empresas MILA. Revista De La Facultad De Ciencias Económicas, 28(2), 49-65. https://doi.org/10.18359/rfce.4033

Jordão, R. V. D., Ferreira, E. P., & Sousa Neto, J. A. (2018). Financial disclosure and social environmental responsibility: An empirical study on the Brazilian market. Contaduría y administración, 63(SPE2), 918-946. https://doi.org/10.22201/fca.24488410e.2018.1473

Larcker, D. F., & Rusticus, T. O. (2010). On the use of instrumental variables in accounting research. Journal of Accounting & Economics, 49(3), 186-205. https://doi.org/10.1016/j.jacceco.2009.11.004

Lee, B. K., Lessler, J., & Stuart, E. A. (2011). Weight trimming and propensity score weighting. PloS one, 6(3), e18174. doi:10.1371/journal.pone.0018174

Lopatta, K., & Kaspereit, T. (2014). The world capital markets' perception of sustainability and the impact of the financial crisis. Journal of Business Ethics, 122(3), 475-500. https://doi.org/10.1007/s10551-013-1760-9

Macías-Trejo, L. G., López-Herrera, F., & De la Torre-Torres, Oscar Valdemar. (2020). La eficiencia media-varianza de un portafolio sobre ponderado en acciones socialmente responsables de México y Estados Unidos. Estudios Gerenciales, 36(154), 91-99. https://doi.org/10.18046/j.estger.2020.154.3476

Mallin, C. A., Saadouni, B., & Briston, R. J. (1995). The financial performance of ethical investment funds. Journal of Business Finance & Accounting, 22(4), 483-496. https://doi.org/10.1111/j.1468-5957.1995.tb00373.x

Méndez Sáenz, A. B., Rodríguez García, Martha del Pilar, & Cortez Alejandro, K. A. (2019). Factores determinantes de la responsabilidad social empresarial (RSE). Caso aplicado a México y Brasil. Análisis Económico,34(86),197-217 https://doi.org/10.24275/uam/azc/dcsh/ae/2019v34n86/Mendez

Nirino, N., Santoro, G., Miglietta, N., & Quaglia, R. (2021). Corporate controversies and company's financial performance: Exploring the moderating role of ESG practices. Technological Forecasting & Social Change, 162, 120341. https://doi.org/10.1016/j.techfore.2020.120341

Ohlson, J. A. (1995). Earnings, book values, and dividends in equity valuation. Contemporary accounting research, 11(2), 661-687. https://doi.org/10.1111/j.1911-3846.1995.tb00461.x

Ortas, E., Moneva, J. M., & Salvador, M. (2012). Does socially responsible investment equity indexes in emerging markets pay off? evidence from brazil. Emerging Markets Review, 13(4), 581-597. https://doi.org/10.1016/j.ememar.2012.09.004

Pesaran, M. H., Schuermann, T., & Weiner, S. M. (2004). Modeling regional interdependencies using a global error-correcting macroeconometric model. Journal of Business & Economic Statistics, 22(2), 129-162. https://doi.org/ 10.1198/073500104000000019

Pesaran, M. H. (2015). Testing weak cross-sectional dependence in large panels. Econometric reviews, 34(6-10), 1089-1117. https://doi.org/10.1080/07474938.2014.956623

Rathner, S. (2013). The influence of primary study characteristics on the performance differential between socially responsible and conventional investment funds: A meta-analysis. Journal of Business Ethics, 118(2), 349-363. https://doi.org/10.1007/s10551-012-1584-z

Renneboog, L., Ter Horst, J., & Zhang, C. (2008). The price of ethics and stakeholder governance: The performance of socially responsible mutual funds. Journal of corporate finance, 14(3), 302-322. https://doi.org/10.1016/j.jcorpfin.2008.03.009

Roodman, D. (2009). How to do xtabond2: An Introduction to difference and system GMM in stata. The Stata Journal, 9(1), 86-136. https://doi.org/10.2139/ssrn.982943

Rousseeuw, P.J. y Leroy, A.M. (2003). Robust Regression and Outlier Detection. New Jersey: J. Wiley. ISBN 0-471-48855-0.

Rousseeuw, P.J. y van Zomeren, B.C. (1990). Unmasking Multivariate Outliers and Leverage Points. Journal of the American Statistical Association 85, 1990. 633-639. https://doi.org/10.2307/2289995

Santos, J. J. G., & Vázquez, O. H. Z. (2019). Is the relationship between CSR activities and financial performance of organizations a short-term result? An answer with a panel data analysis. Contaduría y administración, 64(4), 4. http://doi.org/10.22201/fca.24488410e.2020.2035

Sauer, D. A. (1997). The impact of social-responsibility screens on investment performance: Evidence from the domini 400 social index and domini equity mutual fund. Review of Financial Economics, 6(2), 137-149. https://doi.org/10.1016/S10583300(97)90002-1

Schröder, M. (2004). The performance of socially responsible investments: Investment funds and indices. Financial Markets and Portfolio Management, 18(2), 122-142. https://doi.org/10.1007/s11408-004-0202-1

Schröder, M. (2007). Is there a difference? the performance characteristics of SRI equity indices. Journal of Business Finance & Accounting, 34(1-2), 331-348. https://doi.org/10.1111/j.1468-5957.2006.00647.x

Semenova, N., HaSSel, L. G., & Nilsson, H. (2010). The Value Relevance of Environmental and Social Performance: Evidence from Swedish SIX 300 Companies. Liiketaloudellinen Aikakauskirja, 3, 265-292. Disponible en: https://search.ebscohost.com/login.aspx?direct=true&AuthType=sso&db=bth&AN=57350557&lang=es&site=ehost-live Consultado: 02/10/2023.

Stanny, E., & Ely, K. (2008). Corporate environmental disclosures about the effects of climate change. Corporate social responsibility and environmental management, 15(6), 338-348. https://doi.org/10.1002/csr.175

Statman, M. (2000). Socially responsible mutual funds. Financial Analysts Journal, 56(3), 30-39. https://doi.org/10.2469/faj.v56.n3.2358

Wooldridge, J. M. (2010). Econometric analysis of cross section and panel data. (2nd Ed.) Cambridge, MA: MIT Press. ISBN 0262296799

Yoo, S., & Managi, S. (2022). Disclosure or action: Evaluating ESG behavior towards financial performance. Finance Research Letters, 44, 102108. https://doi.org/10.1016/j.frl.2021.102108

Annex

Components of the main Latin American stock indices

Table A1
Components of the Sao Paulo Stock Exchange Index (IBovespa) of Brazil

ABEV3	BRKM5	ECOR3	GOLL4	LWSA3	SANB11
ASAI3	BRML3	EGIE3	HAPV3	MGLU3	SBSP3
AZUL4	BTOW3	ELET3	HGTX3	MRFG3	SULA11
B3SA3	CCRO3	ELET6	HYPE3	MRVE3	SUZB3
BBAS3	CIEL3	EMBR3	IGTA3	MULT3	TAEE11
BBDC3	CMIG4	ENBR3	IRBR3	NTCO3	TIMS3
BBDC4	COGN3	ENEV3	ITSA4	PCAR3	TOTS3
BBSE3	CPFE3	ENGI11	ITUB4	PETR3	UGPA3
BEEF3	CPLE6	EQTL3	JBSS3	PETR4	USIM5
BIDI11	CRFB3	EZTC3	JHSF3	PRIO3	VALE3
BPAC11	CSAN3	FLRY3	KLBN11	QUAL3	VIVT3
BRAP4	CSNA3	GGBR4	LAME4	RADL3	VVAR3
BRDT3	CVCB3	GNDI3	LCAM3	RAIL3	WEGE3
BRFS3	CYRE3	GOAU4	LREN3	RENT3	YDUQ3
ABEV3	BRKM5	ECOR3	GOLL4	LWSA3	SANB11
ASAI3	BRML3	EGIE3	HAPV3	MGLU3	SBSP3
AZUL4	BTOW3	ELET3	HGTX3	MRFG3	SULA11

Note: the stock with the ticker symbol LWSA3 was eliminated from the sample because it did not have ESG scores during the analysis period.
Source: created by the author with information from LSEG Data & Analytics

Table A2
Components of the Chilean General Share Price Index (S&P/CLX IGPA)

AESGENER	CCU	ENAEX	INVERCAP	RIPLEY
AGUASA	CENCOSHOPP	ENELAM	ITAUCORP	SALFACORP
ALMENDRAL	CENCOSUD	ENELCHILE	MALLPLAZA	SALMOCAM
ANDINAA	CHILE	ENELGXCH	MANQUEHUE	SECURITY
ANDINAB	CMPC	ENTEL	MASISA	SK

ANTARCHILE	COLBUN	FALABELLA	MULTIFOODS	SMSAAM
BCI	CONCHATORO	FORUS	NORTEGRAN	SMU
BESALCO	COPEC	HF	NUEVAPOLAR	SOCOVESA
BLUMAR	CRISTALES	HITES	OROBLANCO	SONDA
BSANTANDER	ECL	IAM	PARAUCO	SQMB
CAMANCHACA	EISA	ILC	PAZ	TRICOT
CAP	EMBONORB	INGEVEC	QUINENCO	VAPORES
				WATTS

NOTE: ANDINA's issuing company is considered only once, although it owns series A and B shares. Shares with ticker symbol ENAEX, HF, SMU, NORTEGRAN, ALMENDRAL, MULTIOODS, INVERCAP, BLUMAR, SALMOCAM, WATTS, CAMANCHACA, TRICOT, SOCOVESA, CRISTALES, PAZ, EISA, INGEVEC, MANQUEHUE, HITES, and NUEVAPOLAR are not included in the analysis because they did not have ESG scores during the analysis period. Source: created by the author with information from LSEG Data & Analytics

Table A3
Components of the Colombia Equity Index (COLEQTY) of Colombia

ECO	BPO	CIC	FHT	NCH
ARG	BVC	CLH	GAA	PMG
ARG_p	CAR_p	CNE	GAA_p	SCA
BBO	CCB	CON	GEB	SIS
BGA	CCB_p	CREDIFAMI	IMI	SIS_p
BIC	CEL	DVI_p	ISA	TPL
BIC_p1	CFV	ENK	LVS_p	VAL
BOC	CFV_p	ETB	MAS	VLL

NOTE: BIC, GAA, SIS, CFV, ARG, and CCB issuers are considered only once, although each is listed with two types of share series. Shares with ticker symbol SCA, BOC, CEL, BPO, MAS, VLL, LVS, CAR, ENK, VAL, CREDIFAMI, and FHT are not included in the analysis because they did not have an ESG score during the analysis period.
Source: created by the author with information from LSEG Data & Analytics

Table A4
Components of the Mexican Price and Quotations Index (S&P/BMV PQI)

AC	BOLSAA	GCC	LABB	Q
ALFAA	CEMEXCPO	GFINBURO	LIVEPOLC1	RA
ALSEA	CUERVO	GFNORTEO	MEGACPO	SITESB1
AMXL	ELEKTRA	GMEXICOB	OMAB	TLEVISACPO
ASURB	FEMSAUBD	GRUMAB	ORBIA	VESTA
BBAJIOO	GAPB	KIMBERA	PENOLES	WALMEX
BIMBOA	GCARSOA1	KOFUBL	PINFRA	

NOTE: The share with the ticker symbol SITESB1 is not included in the analysis as it did not have an ESG score during the analysis period.
Source: created by the author with information from LSEG Data & Analytics

Statistical summary of the variables used in the sample

Table A5
Descriptive statistics of the variables

Variable	VM	IN	DT	ln(AT)	BONO	AMB	SOC	GOB
Mean	0.91	0.04	0.29	22.54	0.09	45.75	52.33	50.74
Std. dev.	0.92	0.15	0.17	1.60	0.03	27.66	25.58	22.73
Minimum	0.00	-6.26	0.00	8.21	0.03	0.00	0.31	0.24
Maximum	7.98	1.07	1.57	26.93	0.16	96.29	96.86	96.03
N	2405	2525	2514	2526	2670	1618	1618	1618
N*	265	145	156	144	0	1052	1052	1052

Note: The total sample was used without eliminating extreme values with the transformed variables.
N* refers to the number of missing observations.
Source: created by the author, based on the statistical analysis performed in STATA

Table A6
Statistical summary of the variables.

Variable		Mean	Std. dev.	Min	Max	Observations	
idemp_ren	overall	231.573	106.0959	101	433	N =	2670
	between		106.3752	101	433	n =	178
	within		0	231.573	231.573	T =	15
idper_col	overall	2014	4.321303	2007	2021	N =	2670
	between		0	2014	2014	n =	178
	within		4.32130	2007	2021	T =	15
VM	overall	.9148066	.9148066	.000089	7.976378	N =	2405
	between		.7627804	.0347994	4.716074	n =	178
	within		.5655621	-1.627206	6.067938	T-bar =	13.511 2
IN	overall	.04265	.04265	-6.26089	1.069559	N =	2525
	between		.059034	-.4184984	.2987489	n =	178
	within		.1349415	-5.799742	.9737412	T-bar =	14.185 4
TA	overall	22.53606	1.602865	8.205856	26.93338	N =	2526
	between		1.476092	18.64163	26.66325	n =	178
	within		.593879	12.10029	27.27552	T-bar =	14.191
BONO	overall	.0860051	.0860051	.0323402	.1649	N =	2670
	between		.0262812	.0500473	.1127167	n =	178
	within		.0189422	.0413385	.1381885	T =	15
AMB	overall	45.75277	27.66051	0	96.293|	N =	1618
	between		24.48508	0	85.75891	n =	178
	within		13.83972	-26.55308	99.84188	T-bar =	9.0898 9

SOC	overall	52.32946	25.58438	.3068469	96.86204	N =	1618
	between		21.89754	2.300811	93.03129	n =	178
	within		14.13204	-22.27703	106.5395	T-bar =	9.0898
GOB	overall	50.73737	22.72817	.2388102	96.02469	N =	1618
	between		20.16665	1.708239	91.63713	n =	178
	within		12.22273	-14.5161	94.01652	T-bar =	9.0898

Note: The total sample was used without eliminating extreme values with the transformed variables.
Source: created by the author, based on the statistical analysis performed in STATA

Hausman-Gujarati endogeneity test (1995)

The procedure was performed to apply the Hausman-Gujarati test (Gujarati, 1995, Ch. 19.5) to test for endogeneity between the variables market value (VM) and net income (IN).

First, forecasts are generated for the residuals of the market value variable (rVMf) by estimating the autoregressive model of order 4 for the VM variable:

$$VM_{it} = VM_{it-1} + VM_{it-2} + VM_{it-3} + VM_{it-4} + {}_{it}$$

C1

In this way, the variable VM is instrumentalized. This process is repeated for the variable IN, generating the residuals (rINf) with the autoregressive model of order 4:

$$IN_{it} = IN_{it} + IN_{it-1} + IN_{it-2} + IN_{it-3} + IN_{it-4} + {}_{it}$$

C2

Secondly, a regression is estimated with the instruments, where the dependent variable is VM, and the explanatory variable is IN in the current period and lagged from 1 to 4 periods, also including in the model the residuals (rVMf) of the regression in (C1):

$$VM_{it} = IN_{it} + IN_{it-1} + IN_{it-2} + IN_{it-3} + IN_{it-4} + rMMf_{it} + {}_{it} \quad \text{(C3)}$$

This process is repeated for the variable IN, with the residuals (rINf) of the model in (C2):

$$IN_{it} = VM_{it} + VM_{it-1} + VM_{it-2} + VM_{it-3} + VM_{it-4} + rINf_{it} + {}_{it}$$

C4

Third, the F-test is performed for the regression in (C3) and (C4) to check that the estimated residuals differ from zero. By obtaining P-value = 0, it is concluded that the variables are endogenous.

The Hausman-Gujarati test was also applied to the pairs of variables DT and IN, ln(AT) and IN, and ln(AT) and DT, obtaining the same result for all.