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The impact of corporate governance on firm performance: panel data evidence from S&P 500 Information Technology

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Abstract

This research is important for both the academic and business environments due to the extraordinary results obtained. Additionally, the significance of the study is also attributed to the addressed topic, which is intensively studied in the world of corporate finance. The primary aim of this research is to scrutinize a cohort of 66 information and technology (IT) companies, all of which are constituents of the American Standard and Poor's 500 Index (S&P 500). The study period spans two decades, covering the years 2003–2022. To summarize the outcomes, the analytical framework incorporated linear models with both fixed (fe) and random effects (re), as well as quantile regression models. This study's key outcomes highlight that firm size, sales growth, current ratio, long-term debt to capital, free cash flow, asset turnover and receivable turnover, board meeting frequency, female board representation, chief executive officer age, audit committee independence, and the presence of compensation and nomination committees, alongside a pandemic indicator, positively impact firm performance. Conversely, firm age, dividend payout ratio, effective tax rate, board size, chief executive officer duality, and corporate social responsibility committee presence have negative effects on performance. Also, regarding quantile regressions, CEO duality significantly influences companies with high profitability rates, and companies with low to medium profitability rates are more strongly and negatively influenced by board size. The implications of the core policy in this research focusing on corporate governance will consider certain rules and guidelines regarding financial transparency and protecting shareholders' interests. Additionally, it will take into account the independence of the board of directors and the presence of its committees, as well as ethical leadership practices.

Keywords Corporate finance, Corporate governance, Firm performance, Regression analysis, Quantile analysis

Introduction

Profitability has become a contentious subject, sparking fervent discussions among businesses and stakeholders. Researchers in corporate finance have embarked on exploring the factors affecting profitability indicators across different temporal landscapes, companies, and industries.

The motivation behind this study considers the fact that companies in the Information Technology sector that are integrated into the American S&P 500 stock index are globally recognized entities that underwent transformative shifts during the health crisis and experienced a positive impact, a phenomenon substantiated by this study. The critical need to analyze contemporary factors influencing the profitability of companies within this sector serves as the impetus for the selection of this research's focal sector, considering the fact that most researchers have focused their studies on other databases with companies from Europe and Asia. Authors such as Lin, Yip, Ho, and Sambasivan [14] and Rim, Nohade,

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and Etienne [28] have focused their studies on the case of these companies, emphasizing the importance of analyzing this vast field, obtaining different results. Also, the motivation for investigating the S&P 500 stock index considers the fact that this index represents a substantial portion of the American market; thus, this study is internationally relevant. Additionally, American market enterprises epitomize development, transparency, and effective regulation, fostering an environment conducive to robust corporate governance. This study incorporates key corporate governance variables to ascertain their impact on enhancing the performance levels of scrutinized companies. Researchers in the field, such as Nepal and Deb [20], Mardini and Lahyani [16], and Neves, Santos, Proença, and Pinho [21], have analyzed the domain of corporate governance and its influence on firm performance obtaining, also, different results depending on the database used.

The research question of this study aims to elucidate the corporate governance factors that influence the profitability of American companies in the IT sector, these companies being integrated into the S&P 500 stock index. This theme is of paramount significance in the contemporary landscape, as each company strives to discern the internal and external forces shaping its performance and seeks effective strategies to counter adverse influences. This recent study holds significant relevance for the stakeholders of the analyzed companies as it provides insights into the long-term trends observed within these entities. Such insights empower stakeholders to make informed decisions regarding future strategies and actions.

The novelty of this paper is based on several criteria. Firstly, it lies in its exhaustive analysis spanning two decades, from 2003 to 2022. This extensive time frame enables the acquisition of pertinent results, with the paper's database serving as a representative reservoir. Secondly, another novelty element facet lies in the deployment of quantile regression models, which are designed to scrutinize the robustness of quantitative outcomes. This approach offers a meticulous exploration of whether companies with specific profitability levels are more or less influenced by variables under scrutiny. Quantile regression models have been employed by Cyril and Singla [8] and Liu and Jiang [15] authors as well, albeit on different datasets, thereby introducing an innovative aspect to this study, given the utilized database. Thirdly, another novelty of this study lies in the use of a high number of different corporate governance independent variables, totaling nine. Fourthly, I have introduced a binary variable capturing the health crisis into the study, undoubtedly representing a novel element because it enhances the study's relevance by incorporating real-world dynamics and their implications for corporate governance frameworks.

Moreover, this study is internationally relevant as understanding the influence of various corporate governance factors on the profitability of the selected companies for analysis leads to the promotion of transparency and ethics in business management, attracting international institutional investors, establishing a fair competitive environment, and improving relationships with international stakeholders. Thus, corporate governance at the international level is crucial for the growth and sustainability of enterprise profitability in a globalized economy.

This paper is arranged as follows: The first section of the paper presents an introduction to the research. The second section highlights the most important researchers and their opinions and results about their studies. The third section includes the research hypothesis and theoretical underpinnings. The fourth section of the paper presents the research methods, including the description of the database and the econometric methods. The fifth section presents the obtained results. The sixth section presents discussions regarding the obtained results. Finally, in the seventh section, this study concludes with the most important things about the research and provides implications for academic and business contexts.

Literature review

Control variables

The first independent variable studied in this paper is firm size. Thus, Rahman and Yilun [24] conducted an examination of this variable utilizing data from 40 publicly traded companies in the Chinese market, spanning the period 2008–2018. Their chosen research methodology involved employing panel regression with fixed effects, leading them to the conclusion that a positive correlation exists between firm size and profitability. Another study by Yadav et al. [32] delved into this independent variable, scrutinizing approximately 250 non-financial companies listed, between years 1995 and 2016, across 12 industrialized and emerging economies within the Asia–Pacific region. The authors assert that this relationship was analyzed for companies of varying sizes, encompassing small, medium, and large enterprises, utilizing panel regression with fixed effects. Their findings reveal a discernible negative relationship between company size and financial performance, underscoring the notion that larger company sizes may precipitate inefficiencies. Thus, it can be mentioned that the results of the mentioned authors are different, respectively, China compared to the Asia–Pacific region.

Another indicator that holds significant relevance for a company is its longevity, namely, firm age. Authors such as Cyril and Singla [8] analyzed the company's age across

64 construction firms in India, during the period 2006–2017. Employing quantile regression as the research methodology, it was concluded that the age of the firm adversely influences its profitability. Also, Pervan, Pervan, and Ćurak [23] utilized a database comprising 200 industrial firms operating in Croatia, during the period 2006–2015. These researchers applied the generalized method of moments (GMM) model to obtain their results, being another research methodology used for a study like this. Consequently, they concluded that a positive relationship exists between the age of the firm and its profitability. Older firms in the industrial sector operate at higher profitability levels. Therefore, older firms leverage accumulated knowledge and their established reputation, achieving cost savings and, consequently, greater profitability.

The sales revenue growth rate is another important independent variable for this study. Mohan and Chandramohan [17] investigated this variable across 30 companies listed on the Bombay Stock Exchange, during the period of 2007–2016. Using panel regression, they concluded that there is a positive causal relationship between the sales revenue growth rate and a firm's profitability. In addition, Khan, Shamim, and Goyal [11] considered five telecommunications companies in India for their analysis, during the period 2004–2017, using the same research methodology as the authors mentioned earlier. Similar to other researchers in the field, they also established a positive relationship, suggesting that enterprises that consistently increase their sales are likely to generate higher revenues and subsequently expand. Additionally, the literature in the field supports this result by emphasizing that as long as a firm maintains a growing trend in its revenue, stakeholders will be inclined to take actions that favor the company, as they are motivated to contribute to its expansion and development. Thus, in Asia, the sales revenue growth rate positively influences the performance of companies.

The dividend payout ratio is an independent variable used in this study. Thus, Thafani and Abdullah [31] also analyzed 21 industrial firms listed on the Colombo Stock Exchange, during the period of 2007–2011. Using panel regression model, they established a positive relationship between variables. They outlined that shareholders become more motivated to invest in the company when they receive higher dividends. Furthermore, Nguyen et al. [22] investigated this issue involving 450 firms listed on the Vietnam Stock Exchange, over the period 2008–2019. Using panel regression as their research methodology, they found that the dividend payout ratio negatively influences profitability indicators, specifically economic and financial profitability. Vietnamese firms with a lower dividend payout ratio exhibit greater profitability. However, market expectations for such companies are unfavorable, and potential investors show limited interest. Additionally, the idea is that a high dividend payout ratio leads to a decline in financial performance as dividends are paid to shareholders from the company's profit. Thus, companies reducing dividend payments will reinvest profits, leading to an increase in financial performance.

A relevant indicator for this study is the effective tax rate. Kurawa and Saidu [12] obtained a negative relationship between the effective tax rate and firm profitability, measured through the economic profitability indicator. Their dataset comprised 27 Nigerian enterprises engaged in the production of consumer goods. The study analyzed the years from 2006 to 2016, employing panel regression as the research methodology. Similarly, Richard et al. [27] explored this subject in Nigerian companies, during the years 2012–2017, using the research methodology employed by aforementioned authors. Richard et al. [27] also identified a negative relationship between these variables.

The current ratio is another independent variable relevant for this study. Egbunike and Okerekeoti [9] focused on consumer goods manufacturing companies in Nigeria, analyzing the period from 2011 to 2017. Using panel regression with random effects as their research methodology and following the Hausman test, they revealed a positive and statistically significant relationship between the current ratio and the economic profitability rate. They argue that enterprises with liquidity have the ability to navigate changes that may arise in the market and can meet short-term obligations without issues, thus handling these obligations effectively.

Concerning long-term debt to total capital, it is noteworthy that this metric holds the potential to exert an impact on the performance of companies. Angahar and Ivarave [4] conducted a study on 10 companies in the Polish cement manufacturing market over the period 2004–2013, employing a research methodology also utilized by aforementioned authors. Consequently, the argument is put forth that a high level of indebtedness enables companies to increase production and drive operational performance. Therefore, indebted firms have the financial resources for new investments and development, ultimately leading to an increase in sales revenue and a growth in the market share held by that enterprise. Furthermore, as indebted firms are monitored by creditors, they tend to be more effectively managed, and favorable effects can be observed.

The indicator measuring the free cash flow of the company constitutes another variable examined within the realm of academic studies. Lin, Yip, Ho, and Sambasivan [14] conducted their analysis on 465 enterprises in the business-to-business sector of the IT industry over

a period of seven years, spanning from 2011 to 2017. The research methodology utilized was the generalized method of moments. They found that there is a positive and statistically significant relationship between free cash flow and firm performance. In addition, the authors Abughniem et al. [1] concentrated on 100 companies listed on the Amman Stock Exchange, over the period 2010–2015, utilizing panel regression as their research methodology. They found that there was a negative and statistically significant relationship between these variables.

Asset turnover is a relevant independent variable for this quantitative research. In his study, Munawar [18] established a statistically significant positive relationship between asset turnover and the performance of the analyzed companies. His focus was on 18 Indonesian industrial companies over the period from 2012 to 2017, employing panel regression methodology. In contrast, Lim and Rokhim [13] examined 10 pharmaceutical companies in Indonesia from 2014 to 2018, using panel regression methodology with fixed effects. They observed a negative relationship between these variables, but it was statistically insignificant.

Receivable turnover is another important variable for this paper. Thus, Amanda [3] investigated eight companies within the chemical sector of Indonesia from 2013 to 2017 by employing panel regression. This author found that receivable turnover positively influences the performance of the analyzed companies.

The final control variable under scrutiny in this study pertains to a dummy variable indicating the presence of a pandemic crisis. According to Rim, Nohade, and Etienne [28], their analysis focused on 3961 global IT companies in 2022. By employing multiple regression analyses, these scholars determined that IT firms experienced a positive impact during the health crisis. Consequently, the widespread utilization of products and services within this sector contributed to enhanced profitability for these companies.

Corporate governance variables

Board size constitutes a commonly addressed variable within corporate governance and is subject to analysis in the context of this study. Nepal and Deb [20] focused their study on 40 companies in the textile industry listed on the Bombay Stock Exchange, during the period 2015–2019. They utilized panel regression as their research methodology and concluded that a positive and statistically significant relationship exists between these variables. Consistent with the previously mentioned findings, researchers Alqatan et al. [2] analyzed nonfinancial companies within the FTSE 100 index over the period 2012–2015. The research methodology employed aligns with that used by the aforementioned researchers, and the study's results indicate a positive relationship between variables. Therefore, the larger a company's board of directors, the better decisions it will make, considering that there are more ideas that can be implemented.

The number of annual board meetings represents another specific variable in corporate governance investigated in this quantitative study. Using panel regression, Rashid [25] analyzed 137 companies listed on the Dhaka Stock Exchange over the period 2006–2011. He identified a positive relationship between the number of annual board meetings and company performance. Thus, the greater the number of board meetings held in a year is, the greater the likelihood that the company will perform, given the crucial topics discussed during these meetings for the company's development. In contrast, Ravivathani and Danoshana [26] found a negative and statistically significant relationship between the aforementioned variables. This suggests that an excessive number of board meetings may indicate that important topics for the company are not adequately addressed during these meetings or that board members do not agree among themselves.

In recent years, there has been growing interest in the impact of the percentage of women on the board of directors on company profitability. Consequently, researchers Brahma, Nwafor, and Boateng [7] investigated firms listed on the FTSE 100 stock index in the UK over the period 2005–2016 and established a positive relationship between variables. The research methodology employed by the aforementioned authors was panel regression. Thus, the more women there are on the board of directors, the higher the company's profitability will be, considering that women bring new ideas to the company and have a lower risk aversion compared to men.

Several studies have investigated whether chief executive officer duality has any impact on firm performance. Thus, Naciti [19] examined 362 companies across 46 different countries from 2013 to 2016, utilizing the two-step generalized method of moments, and identified a negative relationship between these variables. Therefore, when a company has a chief executive officer concurrently serving as the chairperson of the board, its financial performance tends to experience a downward trend, because it fulfills two roles, and institutional investors may view the company with distrust.

The age of the chief executive officer is a fundamental variable in corporate governance and has been examined in various papers. Therefore, Mardini and Lahyani [16] investigated this variable in the context of 120 listed companies in France over the period 2010–2017, utilizing panel regression with random effects as their research methodology. They observed that beyond a certain age, the chief executive officer has a negative impact on the

financial performance of the company. Similarly, Liu and Jiang [15], utilizing a database with 10,446 observations of selected companies from 2008 to 2016 and employing quantile regression as their research methodology, found a negative influence of this variable on the financial performance. Hence, as the executive director ages, there is a risk that some decisions may no longer align with the company's best interests.

Another important indicator at the firm level is the independence of the audit committee. Bansal and Sharma [6] investigated 235 nonfinancial enterprises listed on the Indian Stock Exchange over the period 2004–2013 by employing panel regression. They identified a positive relationship between the independence of the audit committee and financial performance. In line with the aforementioned findings, Zhou, Ansah, and Maggina [33] similarly examined the case of Greek companies from 2008 to 2012. The authors argue that the independence of the audit committee is crucial for ensuring the integrity and effectiveness of the financial reporting process within a company. When the audit committee operates independently, it can provide objective oversight of the company's financial statements and internal controls, free from undue influence or conflicts of interest. This independence enhances the credibility of the financial reporting process and strengthens investor confidence in the accuracy and reliability of the company's financial information.

Another pivotal variable in corporate governance is the presence of a corporate social responsibility committee at the firm level. Neves, Santos, Proença, and Pinho [21] scrutinized this variable in two countries, namely, Spain and Portugal. The study, which was conducted over the period from 2011 to 2018, focused on 60 companies in Spain and 33 companies in Portugal. By utilizing the generalized method of moments as their research methodology, they established a positive relationship between variables. Similarly, Sadiq, Singh, Raza, and Mohamad [29] investigated 122 enterprises listed on the Malaysian Stock Exchange from 2011 to 2019, accumulating 1098 observations in their database and obtaining a conclusion similar to that of Neves, Santos, Proença, and Pinho [21]. The authors argue that the corporate governance committee is vital in a company because it oversees governance practices, enhances board effectiveness, manages succession planning, addresses conflicts of interest, monitors compliance and ethics, and engages with shareholders to uphold transparency, accountability, and integrity.

Additionally, there are scholarly works addressing the presence of compensation committees at the firm level. Alqatan et al. [2] explored this variable in conjunction with board size, revealing a positive relationship between the presence of compensation committee and firm performance. Similarly, using panel regression model, Zraiq and Fadzil [34] examined 228 firms in the industrial and services sector in Malaysia, over the period 2015–2016, and arrived at the same conclusion as earlier authors. Consequently, the compensation committee, tasked with proposing directors' compensation within the firm, positively influences the profitability of companies, underscoring its pivotal role in corporate governance. The compensation committee is crucial in a company as it sets executive pay, aligns incentives with corporate objectives, ensures fairness and competitiveness, evaluates performance, oversees equity compensation, manages executive contracts and benefits, and ensures compliance with regulations.

Another important indicator at the company level is the presence of a nomination committee. Green and Homroy [10] investigated various corporate governance variables over the period from 2004 to 2015, analyzing firms listed in the Euro Top 100 stock index. The study uncovered a statistically significant positive association between the establishment of a nomination committee within a corporation and its financial performance. Also, the nomination committee is essential in a company as it selects board members, promotes diversity, manages board succession, evaluates director performance, ensures independence, and engages with shareholders to enhance governance practices and support the company's long-term success.

Literature gap

Considering the literature presented in this study, it can be noted that the majority of authors have utilized linear regression models with panel data. There is a limited number of studies that have employed quantile regression models. The authors who have used the quantile regression methodology, namely Cyril and Singla [8] and Liu and Jiang [15], have examined fundamental variables of corporate governance, such as board size and the number of annual board meetings. Thus, the academic literature does not contain results based on quantile regression models for indicators such as audit committee independence, the presence of corporate governance committees, remuneration committees, and nomination committees. Therefore, this study will present this research methodology and focus on the aforementioned variables, addressing this gap in the academic literature.

Another gap in the literature pertains to the focus on datasets from companies in Asia, including countries such as India, Vietnam, Nigeria, Indonesia, Sri Lanka, Malaysia, and China. Additionally, some studies have

focused on firms in Europe, including countries such as Spain, Portugal, France, Greece, and Croatia. Thus, studies conducted on companies from the USA, specifically in the IT sector, integrated only into the S&P 500 stock index, were not found in the academic literature. Therefore, by using a unique database, I will address a gap in the academic literature.

An additional gap in the literature concerns the analysis period, which is limited in some studies and more extensive in others. This study will utilize an extended period, from 2003 to 2022, based on the specified dataset.

Research hypothesis and theoretical underpinnings

This section aims to present the existing research in the field concerning this topic of interest and to formulate research hypotheses. Subsequently, the study will shift its focus toward the research methodology.

Table 1 presents a synthesis of the previously investigated studies, representing the current state of knowledge in the field. The symbol "+" denotes a positive influence of that variable on the financial performance indicators, while the symbol "-" indicates a negative influence of that variable on the financial performance indicators.

The research hypotheses for this study are as follows:

H_1: Board characteristics (board size and the number of board meetings) positively influence profitability.

H_2: Board gender diversity (the percentage of women on the board of directors) positively influences profitability.

H_3: Board committees (the independence of the audit committee, the presence of a corporate social responsibility committee, and the presence of a compensation and a nomination committee) positively influence profitability.

H_4: CEO characteristics (CEO duality and CEO age) negatively influence profitability.

Methods

Description of database and variables

This study conducts a detailed examination of IT companies listed in the S&P 500 index, a benchmark indicator renowned for its representation of the American economy and capital market trends. This analysis spans the years 2003–2022, a period marked by two major crises, the financial crisis and the health crisis, highlighting the resilience and evolution of the IT sector during these tumultuous times. The database for this research is sourced from the Thomson Reuters Eikon platform, which is characterized as an unbalanced panel database due to incomplete data reporting by some companies for specific indicators.

The selection of the IT sector for this analysis is predicated on its sustained growth and increasing significance in the post-health crisis era, reflecting its critical role in the daily lives of the global population. The widespread use of IT resources underscores the sector's current importance, necessitating a thorough investigation into emerging financial trends and the impact of recent crises on these trends. This paper aims to unveil these dynamics through comprehensive analyses and interpretations of the financial and governance indicators of companies within the IT sector.

Furthermore, Table 2 delineates the research variables and their corresponding symbols, providing an economic definition and calculation formula for each, facilitating a deeper understanding of the study's analytical framework.

The calculation formulas specified in Table 2 are consistent with those of numerous specialized publications in the field, including those authored by Anghelache [5] and Stancu and Stancu [30].

Description of econometric methods

The econometric methods employed in this research are intriguing and focus on the quantile analysis conducted in Stata software. Initially, this paper presents the descriptive statistics of the database and the correlation coefficient matrix. In addition to linear regression models without effects, linear regression models with fixed and random effects were also developed. The Hausman test was utilized to determine which model was most suitable for this research. Given the Hausman test, a significance threshold of 5% was adopted, whereby regression models exceeding this threshold are considered to have random effects, while those under this threshold, as indicated by the Hausman test, are deemed to have fixed effects. Consequently, it was decided that models with ROE and ROA as the dependent variables would be treated as fixed effects regression models, whereas models with ROIC and NM as dependent variables would be considered to have variable effects. For the dependent variable NM, there is an exception for regression model number 8, which is considered a linear regression model with random effects.

Moreover, this paper presents quantile regression models with fixed effects, examining the quantiles of 0.10, 0.25, 0.50, 0.75, and 0.90. Through this type of regression, one can test the robustness of regression models run in the Stata program, observing whether the results of the regression models are consistent across quantiles or how they vary with each quantile, thus determining the influence of the independent variables at different levels. The researchers who have utilized quantile regression models in their studies are

Table 1 Synthesis of the literature review. *Source* Author's work

Indicators	Study	Companies	Years	Methodology	Effect
Firm size	Rahman and Yilun [24]	40 companies on the Chinese market	2008–2018	Panel regression	+
	Yadav et al. [32]	250 nonfinancial companies from the Asia–Pacific area	1995–2016	Panel regression	–
Firm age	Cyril and Singla [8]	64 construction firms in India	2006–2017	Quantile regression	–
	Pervan et al. [23]	200 industrial companies in Croatia	2006–2015	GMM model	+
Sales revenue growth rate	Mohan and Chandramohan [17]	30 companies listed on the Bombay Stock Exchange	2007–2017	Panel regression	+
	Khan et al. [11]	5 telecom companies in India	2004–2017	Panel regression	+
Dividend payout ratio	Thafani and Abdullah [31]	21 industrial companies listed on the Colombo Stock Exchange	2007–2011	Panel regression	+
	Nguyen et al. [22]	450 companies listed on the Vietnam Stock Exchange	2008–2019	Panel regression	–
Effective tax rate	Kurawa and Saidu [12]	27 Nigerian companies	2006–2016	Panel regression	–
	Richard et al. [27]	15 Nigerian companies	2012–2017	Panel regression	–
Current ratio	Egbunike and Okerekeoti [9]	32 Nigerian companies	2011–2017	Panel regression	+
Long-term debt to total capital	Angahar and Ivarave [4]	10 Polish companies	2004–2013	Panel regression	+
Free cash flow	Lin et al. [14]	465 IT companies	2011–2017	GMM model	+
	Abughniem et al. [1]	100 companies listed on the Amman Stock Exchange	2010–2015	Panel regression	–
Asset turnover	Munawar [18]	18 Indonesian companies in the industrial field	2012–2017	Panel regression	+
	Lim and Rokhim [13]	10 pharmaceutical companies in Indonesia	2014–2018	Panel regression	–
Receivable turnover	Amanda [3]	8 chemical companies in Indonesia	2013–2017	Panel regression	+
COVID-19	Rim et al. [28]	3961 companies in the IT sector	2022	Multiple regression	+
Board size	Nepal and Deb [20]	40 textile companies listed on the Bombay Stock Exchange	2015–2019	Panel regression	+
	Alqatan et al. [2]	Nonfinancial companies in the FTSE 100 stock market index	2012–2015	Panel regression	+
Number of board meetings	Rashid [25]	137 companies listed on the Dhaka Stock Exchange	2006–2011	Panel regression	+
	Ravivathani and Danoshana [26]	25 companies listed on the Sri Lanka Stock Exchange	2008–2012	Panel regression	–
The percentage of women on the board of directors	Brahma et al. [7]	Companies included in the UK FTSE 100	2005–2016	Panel regression	+
CEO duality	Naciti [19]	362 companies from 46 different countries	2013–2017	GMM model	–
CEO age	Mardini and Lahyani [16]	120 listed companies in France	2010–2017	Panel regression	–
	Liu and Jiang [15]	250 Chinese companies	2008–2016	Quantile regression	–
The independence of the audit committee	Bansal and Sharma [6]	235 companies listed on the Indian Stock Exchange	2004–2013	Panel regression	+
	Zhou et al. [33]	60 Greek companies	2008–2012	Panel regression	+
The presence of the corporate social responsibility committee	Neves et al. [21]	93 companies from Spain and Portugal	2011–2018	GMM model	+
	Sadiq et al. [29]	122 companies listed on the Malaysian Stock Exchange	2011–2019	Panel regression	+
The presence of the compensation committee	Alqatan et al. [2]	Nonfinancial companies in the FTSE 100 stock market index	2012–2015	Panel regression	+
	Zraiq and Fadzil [34]	228 companies in Malaysia	2015–2016	Panel regression	+
The presence of the nomination committee	Green and Homroy [10]	Companies in the Euro Top 100 index	2004–2015	Panel regression	+

Table 2 Variable presentation. *Source* Authors' work

Dependent variables	Symbol	Meaning	Measurement
Variables related to profitability			
Return on equity	ROE	Indicates the annual return to shareholders on their investment in the company's equity	$\text{ROE} = \frac{\text{Net profit}}{\text{Equity}}$
Return on assets	ROA	Reflects the yearly financial return to shareholders from their investment in the company's assets	$\text{ROE} = \frac{\text{Net profit}}{\text{Total assets}}$
Return on invested capital	ROIC	Denotes the mean return shared by shareholders and creditors	$\text{ROIC} = \frac{\text{Net Profit} + \text{Interest} * (1 - \text{Effective tax rate})}{\text{Equity} + \text{Long term Debt}}$
Net Margin	NM	Indicates the company's ability to generate profits from sales	$\text{NM} = \frac{\text{Net profit}}{\text{Sales revenue}}$
Variables related to company size			
Firm size	FS	Firm size is calculated as the natural logarithm of sales revenue	$\text{FS} = \ln(\text{Sales Revenue})$
Variables related to the age of the company			
Firm age	FA	Firm age is the duration, in years, the firm has operated in the market	$\text{FA} = \text{Year}_t - \text{Year}_{\text{foundation}}$
Variables related to the company's sales revenue			
Sales revenue growth rate	SRGR	Denotes the year-over-year percentage change in sales revenue	$\text{SRGR} = \left(\frac{\text{Sales revenue}_t}{\text{Sales revenue}_{t-1}}\right) - 1$
Variables related to dividend policy			
Dividend payout ratio	DPR	Reflects the proportion of net profit paid as dividends to shareholders	$\text{DPR} = \frac{\text{Dividends}}{\text{Net Profit}}$
Variables concerning taxation			
Effective tax rate	ETR	Represents the ratio of corporate income tax to gross profit	$\text{ETR} = \frac{\text{Profit Tax}}{\text{Gross Profit}}$
Variables related to liquidity			
Current ratio	CR	Denotes a business's ability to settle short-term debts	$\text{CR} = \frac{\text{Current assets}}{\text{Short term liabilities}}$
Variables associated with debt			
Long-term debt to total capital	LTDTC	Indicates a company's capacity to fulfill long-term obligations	$\text{LTDTC} = \frac{\text{Long term liabilities}}{\text{Equity} + \text{Long term liabilities}}$
Variables related to cash flow			
Free cash flow	FCF	Denotes the amount a business can generate post-investment in maintenance or growth	$\text{FCF} = \text{EBIT}(1 - \tau) + \text{Depreciation} - \text{Capital expenditure} + / - \Delta\text{NWC}$
Variables related to turnover			
Asset turnover	AT	Reflects the revenue earned per unit of asset investment	$\text{AT} = \frac{\text{Sales Revenue}}{\text{Assets}}$
Receivable turnover	RT	Indicates the annual frequency of receivables collection	$\text{RT} = \frac{\text{Sales Revenue}}{\text{Receivables}}$
Variables related to board attributes			
Board size	BS	Indicates the count of directors on the board	$\text{BS} = \sum \text{number directors}$

Table 2 (continued)

Dependent variables	Symbol	Meaning	Measurement
Number of board meetings	NBM	Denotes the annual meeting frequency of directors	$NBM = \sum \text{number meetings}$
The percentage of women on the board of directors	WB	Indicates the proportion of women on the board of directors	$WB = \frac{\text{Number of women in board}}{\text{Total members of board}}$
Variables concerning CEO attributes			
CEO duality	CEO_D	Indicates whether the CEO also serves as the board's chairperson	A binary variable is set to 1 if the CEO is also the board chairperson and 0 otherwise
CEO age	CEO_A	Indicates the age of the CEO	$CEO\_A = \text{Year}_t - \text{Year}_{birth}$
Variables related to consultative committees			
Independence of the audit committee	ICA	Reflects the proportion of independent directors on the committee	$ICA = \frac{\text{Number of independent members in CA}}{\text{Total members of CA}}$
Presence of the corporate social responsibility committee	C_CSR	Indicates the presence of the committee within the firm	Binary variable: 1 if a corporate social responsibility committee exists in the firm; 0 if not
Presence of the compensation committee	C_C	Indicates the presence of the committee within the firm	Binary variable: 1 if a compensation committee exists in the firm; 0 if not
Presence of the nomination committee	C_N	Indicates the presence of the committee within the firm	Binary variable: 1 if a nomination committee exists in the firm; 0 if not
Variables related to the period of the pandemic			
COVID-19	COVID	Indicates the presence of a pandemic crisis within a year	Binary variable: 1 for the years 2020, 2021, or 2022; 0 for all other years

Source Authors' work

Cyril and Singla [8] and Liu and Jiang [15]. Furthermore, it is worth noting that the implementation of quantile regression in this study enhances the accuracy and precision of the results since it allows for the examination of each quantile individually within a certain regression model. Quantile regression is relevant because it offers robustness, flexibility, and valuable insights into the conditional distribution of the dependent variable. It provides a more comprehensive understanding of the data, allows for inference about the entire distribution, informs targeted interventions, and aids in risk management. Thus, these are the reasons why I used the methodology based on quantile regression models. Moreover, the academic literature does not present many studies that use this methodology. Furthermore, I used quantile regression models with fixed effects. Quantile regression with fixed effects is important as it controls for unobserved heterogeneity, accounts for time-invariant factors, improves causal inference, captures individual or group-specific effects, and enhances the robustness of the analysis results.

Additionally, before conducting the quantile regression models, I performed a test of error normality, namely the Jarque–Bera test. Thus, it was found that the errors follow a normal distribution, considering that the Chi-square value is 0 in all cases.

Considering the overarching structure of regression models, a synthesized exposition is offered. According to the linear regression models, Eq. 1 is defined as follows:

$$\begin{aligned}\text{Firm Performance}_{it} =& a_0 + a_1 \times \text{Financial variables} \\ &+ a_2 \times \text{Governance variables} \\ &+ a_3 \times \text{COVID} + \varepsilon_{it}\end{aligned} \tag{1}$$

where a_0 denotes the constant term; a_1, a_2, *and* a_3 represent the coefficients associated with the independent variables; and ε_{it} signifies the error terms.

The generalized form of quantile regression models is presented in a more analytical manner as follows: Let Q_τ (Firm Performance$_{it}|X_{it}$) denote the τth quantile of the dependent variable, "Firm Performance," for firm i

at time *t*, conditional on a set of independent variables X_{it} which includes "*Financial Variables*," "Governance Variables," and the impact of "*COVID*." The quantile regression model can be formally represented as:

$$Q_\tau(\text{Firm Performance}_{it} \mid X_{it}) = \beta_0(\tau) + \beta_1(\tau) \times \text{Financial Variables}_{it} + \beta_2(\tau) \times \text{Governance Variables}_{it} + \beta_3(\tau) \times \text{COVID}_{it} + \varepsilon_{it}(\tau)$$

where τ represents the quantile of interest (0.10, 0.25, 0.50, 0.75, and 0.90); $\beta_0(\tau)$, $\beta_1(\tau)$, $\beta_2(\tau)$, *and* $\beta_3(\tau)$ are the quantile-specific coefficients to be estimated; and $\varepsilon_{it}(\tau)$ is the quantile-specific error term. This model allows for the analysis of how the independent variables influence the distribution of "*Firm Performance*" across different quantiles, providing insights into the effects under various conditions, including extreme scenarios reflected by the tails of the distribution.

Additionally, "*Firm Performance*" is quantitatively characterized by a set of metrics: return on equity (ROE), return on assets (ROA), return on invested capital (ROIC), and net margin (NM). "*Financial Variables*" encompass: firm size (FS), firm age (FA), sales revenue growth rate (SRGR), dividend payout ratio (DPR), effective tax rate (ETR), current ratio (CR), long-term debt to capital (LTDTC), free cash flow (FCF), asset turnover (AT), and receivable turnover (RT). "*Governance Variables*" are identified as: board size (BS), number of board meetings (NBM), the percentage of women on the board of directors (WB), chief executive officer duality (CEO_D), chief executive officer age (CEO_A), independence of the audit committee (ICA), presence of the corporate social responsibility committee (C_CSR), presence of the compensation committee (C_C), and presence of the nomination committee (C_N). The index *i* spans firms numbered from 1 to 66, while the time frame (*t*) extends from 2003 to 2022.

Given the comprehensive research methodology, detailed results are presented in the appendices. The

Table 3 Descriptive statistics. *Source* Authors' work

Variables	Observations	Mean	Standard deviation	Minimum	Maximum	Skewness	Kurtosis
ROE	1131	.237	.466	−4.558	4.954	−.113	46.422
ROA	1120	.116	.076	−.41	.45	−.338	7.683
ROIC	543	.248	.461	−4.14	1.939	−3.276	32.955
NM	1244	.11	.18	−2.132	1.159	−4.125	44.41
FS	1255	22.167	1.626	14.438	26.7	−.215	3.623
FA	1320	32.648	28.766	−14	171	2.059	8.887
SRGR	1190	.468	2.526	−.924	24.161	7.868	65.655
DPR	1043	.224	.696	0	12.957	10.662	152.982
ETR	1099	.08	2.609	−83	12.533	−29.404	937.486
CR	1225	2.454	1.615	.602	14.047	2.215	10.336
LTDTC	1026	1.323	13.504	0	422.1	29.654	921.069
FCF	1133	20.208	1.964	9.306	25.437	−.715	5.432
AT	1209	.765	.393	.103	3.618	1.83	8.483
RT	1206	8.231	12.671	1.129	233.211	10.749	147.624
BS	970	9.694	2.051	4	16	.147	2.866
NBM	954	7.922	3.638	3	41	2.638	16.53
WB	973	17.571	11.029	0	50	.282	2.791
CEO_D	980	.605	.489	0	1	−.43	1.185
CEO_A	1320	48.129	8.449	21	69	−.102	2.663
ICA	973	99.236	4.116	50	100	−6.411	50.693
C_CSR	969	.528	.499	0	1	−.114	1.013
C_C	971	.976	.152	0	1	−6.264	40.242
C_N	981	.833	.373	0	1	−1.784	4.182
COVID	1320	.15	.357	0	1	1.96	4.843

Table 4 Correlation matrix. *Source* Authors' work

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
(1) ROE	1.000											
(2) ROA	0.396	1.000										
(3) ROIC	0.186	0.444	1.000									
(4) NM	0.256	0.631	0.346	1.000								
(5) FS	0.147	0.180	0.108	0.213	1.000							
(6) FA	0.009	−0.049	−0.083	0.150	0.178	1.000						
(7) SRGR	−0.049	−0.042	−0.050	−0.069	0.021	−0.109	1.000					
(8) DPR	−0.036	−0.132	−0.080	−0.193	0.078	0.038	−0.065	1.000				
(9) ETR	0.027	0.057	0.040	0.112	0.013	0.072	0.011	−0.583	1.000			
(10) CR	−0.145	0.236	0.116	0.262	−0.139	−0.041	0.069	0.021	0.022	1.000		
(11) LTDTC	0.700	0.025	0.000	−0.013	0.066	0.030	−0.032	0.093	0.000	−0.088	1.000	
(12) FCF	0.134	0.280	0.191	0.362	0.723	0.190	−0.021	0.081	0.022	0.003	0.056	1.000
(13) AT	0.276	0.405	0.229	−0.136	0.139	−0.181	0.093	−0.094	0.053	−0.061	0.104	−0.017
(14) RT	0.042	0.084	0.213	0.179	−0.270	−0.090	−0.026	−0.032	−0.010	−0.097	−0.039	−0.130
(15) BS	0.019	−0.072	0.016	0.001	0.375	0.215	−0.160	0.124	−0.046	−0.074	0.088	0.238
(16) NBM	−0.131	−0.110	−0.104	−0.065	0.056	−0.005	−0.007	0.122	0.027	0.006	−0.046	0.065
(17) WB	0.161	0.200	0.189	0.134	0.332	0.069	−0.064	0.014	−0.017	−0.255	−0.013	0.304
(18) CEO_D	−0.019	−0.160	−0.090	−0.079	−0.017	0.250	0.094	0.049	0.065	−0.080	0.049	−0.030
(19) CEO_A	0.129	0.198	0.082	0.249	0.244	0.097	−0.020	0.064	0.016	0.184	0.085	0.293
(20) ICA	−0.004	−0.022	−0.053	−0.094	0.190	0.048	0.014	0.070	−0.017	0.009	0.024	0.106
(21) C_CSR	0.018	0.033	−0.081	0.043	0.464	−0.035	−0.011	0.155	−0.026	0.065	0.063	0.307
(22) C_C	−0.007	−0.122	−0.075	−0.066	0.042	−0.031	0.004	0.021	−0.004	−0.038	0.017	0.014
(23) C_N	−0.082	−0.075	−0.062	−0.218	−0.162	−0.171	0.048	−0.027	−0.028	−0.056	−0.052	−0.101
(24) COVID	0.190	0.130	0.078	0.100	0.068	−0.020	0.041	−0.036	−0.066	−0.147	0.101	0.039
Variables	**(13)**	**(14)**	**(15)**	**(16)**	**(17)**	**(18)**	**(19)**	**(20)**	**(21)**	**(22)**	**(23)**	**(24)**
(13) AT	1.000											
(14) RT	−0.055	1.000										
(15) BS	0.003	−0.184	1.000									
(16) NBM	−0.125	−0.100	0.109	1.000								
(17) WB	0.097	−0.128	0.195	0.063	1.000							
(18) CEO_D	0.031	0.118	0.166	−0.018	0.089	1.000						
(19) CEO_A	−0.185	−0.144	0.068	−0.039	0.295	−0.056	1.000					
(20) ICA	0.003	−0.046	0.083	0.041	−0.059	0.121	−0.021	1.000				
(21) C_CSR	−0.002	−0.140	0.340	0.134	0.241	0.082	0.096	0.087	1.000			
(22) C_C	−0.050	0.007	0.027	0.058	0.001	0.061	−0.007	0.273	0.092	1.000		
(23) C_N	0.098	−0.197	−0.097	−0.089	−0.049	−0.122	−0.184	0.028	−0.063	0.134	1.000	
(24) COVID	−0.025	0.000	−0.010	0.021	0.455	−0.097	0.256	−0.078	0.115	−0.075	0.061	1.000

subsequent chapter delves into interpreting the econometric outcomes and their economic relevance.

Results

Descriptive statistics and correlation analysis

This subsection presents the descriptive statistics and correlation matrix for the dataset analyzed in this quantitative study. Table 3 outlines the database's descriptive statistics, indicating that variables with a standard deviation exceeding their mean are volatile, in contrast to those with lower standard deviations. Specifically, the long-term debt to total capital and receivable turnover are volatile because their standard deviation surpasses the mean, with the paper also listing minimum and maximum values for the analyzed variables.

Skewness, which assesses distribution asymmetry, shows significant deviations from zero for certain indicators, such as the dividend payout ratio and the ratio of long-term debt to total capital, indicating skewed distributions. Indicators such as return on equity and

Table 5 The outcomes of panel data linear regression models with fixed (*fe*) and random effects (*re*). *Source* Authors' work

	(1) ROE fe	(2) ROE fe	(3) ROA fe	(4) ROA fe	(5) ROIC re	(6) ROIC re	(7) NM re	(8) NM fe
FS	.175*** (.039)		.019*** (.004)		.046 (.031)		.006 (.005)	
FA	.012 (.018)	.015 (.019)	− .003* (.002)	− .004** (.002)	0 (.001)	0 (.001)	.001*** (0)	.003 (.004)
SRGR	.043 (.076)	.057 (.079)	.045*** (.008)	.038*** (.008)	− .008 (.013)	− .008 (.014)	− .001 (.002)	.03* (.016)
DPR	.019 (.021)	.015 (.027)	− .006** (.003)	− .004* (.002)	− .024 (.025)	− .024 (.025)	− .031*** (.005)	− .029*** (.005)
ETR	.004 (.006)	.003 (.006)	0 (.001)	0 (.001)	− .001 (.004)	− .001 (.004)	− .002** (.001)	− .003** (.001)
CR	.003 (.015)	− .008 (.015)	.01*** (.002)	.009*** (.001)	.034** (.015)	.03** (.015)	.022*** (.003)	.019*** (.003)
AT	.092 (.075)	.074 (.078)	.129*** (.008)	.131*** (.008)	.407*** (.084)	.428*** (.087)	− .002 (.012)	.038** (.016)
RT	− .003** (.001)	− .004*** (.001)	.001** (.001)	.001* (.001)	.013*** (.004)	.012*** (.004)	.003*** (.001)	.003** (.001)
BS	0 (.012)	.008 (.012)	− .002 (.001)	− .001 (.001)	− .006 (.012)	− .004 (.012)	− .001 (.002)	− .002 (.003)
NBM	.004 (.005)	.005 (.005)	0 (0)	0 (0)	− .001 (.005)	− .002 (.005)	.002 (.001)	.002 (.001)
WB	− .003 (.002)	− .002 (.002)	0 (0)	0 (0)	.002 (.002)	.002 (.002)	.001* (0)	.001 (0)
CEO_D	− .059 (.043)	− .041 (.044)	− .013*** (.005)	− .01** (.004)	− .107** (.05)	− .109** (.051)	− .011 (.008)	− .013 (.009)
CEO_A	− .021 (.018)	− .021 (.018)	.007*** (.002)	.007*** (.002)	.005 (.005)	.005 (.006)	.001 (.001)	− .002 (.004)
ICA	− .002 (.004)	− .001 (.004)	0 (0)	0 (0)	.001 (.005)	.002 (.006)	.003*** (.001)	.003*** (.001)
C_CSR	.042 (.042)	.054 (.043)	− .001 (.005)	− .001 (.004)	− .068 (.053)	− .062 (.052)	− .001 (.008)	− .004 (.009)
C_C	.242** (.109)	.226** (.111)	.005 (.013)	.002 (.013)	.076 (.295)	.062 (.298)	.001 (.027)	.003 (.027)
C_N	.053 (.046)	.051 (.048)	.01** (.005)	.012** (.005)	.05 (.069)	.059 (.069)	.007 (.009)	.007 (.01)
COVID	.112** (.046)	.123*** (.047)	− .001 (.005)	− .003 (.005)	.014 (.04)	.017 (.04)	.007 (.009)	.008 (.01)
FCF		.086*** (.023)		.022*** (.002)		.04** (.017)		.019*** (.005)
LTDTC			0 (0)	0 (0)	.004 (.005)	.004 (.005)	.001*** (0)	.001 (.001)
_cons	− 3.163*** (.9)	− 1.25* (.654)	− .599*** (.098)	− .579*** (.061)	− 1.356* (.78)	− 1.262* (.688)	.136 (.121)	− .08 (.131)
Observations	818	799	698	681	355	349	718	701
R^2	0.0112	0.0256	0.0582	0.0715	0.1783	0.1949	0.2639	0.0862
F-stat	3.489	3.007	0.0000	34.999				7.858
Prob > *F*	0.0000	0.0000	0.0000	0.0000				0.0000
F Test	4.42	4.18	12.48	12.56				4.23
Prob > *F*	0.0000	0.0000	0.0000	0.0000				0.0000
Wald Stat					67.09	69.67	155.09	
Prob > chi2					0.0000	0.0000	0.0000	
Jarque–Bera normality test	1.1e + 04	2.9e + 04	8839	6723				1.8e + 04
Chi(2)	0	0	0	0				0
Hausman chi2	44.46	65.171	93.04	143.695	17.628	15.041	12.314	236.80
p value Hausman	0.0005	0.0000	0.0000	0.0000	0.5474	0.7200	0.8718	0.0000

Standard errors are shown in parentheses

***, **, and * denote statistical significance at 1, 5, and 10%, respectively

CEO age exhibit negative skewness, suggesting left-skewed distributions, whereas others have positive skewness, indicating right-skewed distributions.

Kurtosis, reflecting distribution peakedness, reveals platykurtic distributions (kurtosis below 3) for metrics such as CEO age and board size and leptokurtic distributions (kurtosis above 3) for others, denoting peaked distributions.

Correlation matrix is exhibited in Table 4.

In this analysis, correlations above 0.7 were deemed to reflect a strong positive association, while values of approximately -0.7 indicated a strong negative association. My findings highlighted a pronounced positive correlation of 0.700 between the long-term debt to total capital ratio and return on equity and a notable positive correlation of 0.723 between free cash flow and

firm size. To avoid collinearity, long-term debt to total capital was excluded from models predicting return on equity, and free cash flow was omitted from models considering firm size as the independent variable. Separate regression analyses were thus conducted for these variables, ensuring the integrity of the model estimations by addressing potential collinearity concerns.

Regression models

In light of the results obtained from the regression models, these findings hold significance in terms of the indicators applied in this study. Therefore, as a preliminary step, this paper presents linear regression models without effects through the Stata program. In Appendix 1, one can observe the linear regression models without effects that were obtained. In Appendix 2, the obtained linear regression models with fixed and random effects can be observed, as well as the results of the Hausman test. Table 5 synthesizes the regression models suitable for this research according to the Hausman test. Notably, all quantile regression models are documented in the appendices of this study.

From the perspective of robustness analysis in quantitative research, this study focuses on comparing the outcomes of regression models without effects to those with effects and examining the extent to which previously identified statistical relationships are maintained. Moreover, to enhance the robustness of the analysis of the quantitative results, quantile regressions with fixed effects were implemented in Stata, encompassing quantiles of 0.10, 0.25, 0.50, 0.75, and 0.90. This approach facilitates the observation of the independent variable's impact on the dependent variable across each quantile, including where statistical significance is most pronounced or lost and the intensity of influence a specific variable has on the dependent variable at each quantile.

Subsequent section will present discussions based on the implementation of quantile regression models in Stata. An extended version of these models is detailed in Appendix 3, showcasing all quantile regression models executed for each initial model considered in this study.

Discussion

From the perspective of firm size, the influence of this independent variable remains positive in both regression models with effects and those without effects. In terms of quantile analysis, it was found that company size has a positive and statistically significant influence, particularly on enterprises recording lower or even medium profitability rates, according to the 50th quantile. However, for companies with higher profitability rates, referring to the regression models at the 90th quantile, the influence of company size is not statistically significant, as is its loss of intensity. Thus, companies with low or medium profitability rates tend to be more influenced by this indicator, considering that as they expand and develop, they are likely to achieve much greater financial performance. Moreover, companies that already have high profitability rates are not influenced by the size of the enterprise, with the indicator being statistically insignificant in these cases. Thus, company size has a positive impact on profitability rates, which is also supported by researchers Rahman and Yilun [24].

Regarding firm age, the results of models without effects are consistent with those of models with effects, except for regression models with effects where economic profitability is the dependent variable, in which the influence of company age becomes negative and statistically significant. However, the net margin rate is positively and significantly affected. Referencing quantile regression, it has been established that company age negatively influences companies with lower or median financial and economic profitability rates, specifically at the 10th, 25th, and 50th quantiles. Conversely, companies with high financial and economic profitability rates, referring to the 75th and 90th quantiles, are not significantly influenced by this indicator. Furthermore, it was found that company age negatively affects companies with high returns on invested capital, while regarding the net margin dependent variable, the influence is positive and intensifies as the net margin of firms increases, although this influence is not statistically significant. Generally, new companies entering the market are more significantly influenced by this indicator, considering that competitors and larger firms can reduce their market position, negatively impacting their profit year-over-year, a finding also reported by Cyril and Singla [8].

Another indicator analyzed is the sales revenue growth rate, which exhibited a negative and statistically insignificant relationship in models without effects, whereas models with effects displayed a positive and statistically significant relationship. It was also observed that companies with medium and high profitability rates, referring to the 50th, 75th, and 90th quantiles, tend to show a positive and statistically significant influence on the revenue growth rate. Furthermore, the greater the companies' financial performance, the greater the impact of the sales revenue growth rate. Consequently, larger firms are more affected by the revenue growth rate due to their size and relevant market shares, a fact also supported by researchers Mohan and Chandramohan [17] and Khan, Shamim, and Goyal [11].

The influence of the dividend payout ratio on profitability rates remains positive and statistically significant in both models without effects and those with effects. Moreover, following the implementation of fixed-effect quantile regression models, it was observed that companies with low or medium performance rates are more negatively and significantly impacted by this indicator, with a greater intensity of influence. Considering that dividends are distributed from a company's profit, enterprises with lower profitability rates are more adversely affected by this practice than are firms with high profitability rates, which have a greater capacity for dividend distribution, referring to the 50th, 75th, and 90th quantiles, a fact also supported by researchers Nguyen et al. [22].

Concerning the effective tax rate, the results indicate that its influence remains negative in both models with effects and regression models without effects. Quantile regression models have shown that enterprises with medium profitability, referring to the 50th quantile, or high profitability, considering the 75th and 90th quantiles, are more significantly impacted by taxation. Thus, the negative impact intensity is greater among larger enterprises, a fact also supported by researchers Kurawa and Saidu [12] and Richard et al. [27].

From the perspective of the current ratio of the analyzed companies, its influence is positive and significant in both regression models without effects and those with effects. Additionally, quantile regression revealed that firms with medium or high financial performance indicators are more intensively influenced by current ratio, maintaining a positive impact, considering the 50th, 75th, and 90th quantiles. Thus, these companies can more easily meet their short-term obligations, a result also found by researchers Egbunike and Okerekeoti [9].

Another independent variable analyzed for robustness is long-term debt to total capital. The influence of this variable on profitability rates remains positive and significant in both models with effects and models without effects. Furthermore, analyzing the results of quantile regression models revealed that companies with low, medium, or high profitability rates are positively and significantly influenced by indebtedness, considering the 10th, 50th, and 90th quantiles. However, firms with higher profitability rates are more intensively influenced by this independent variable, although the coefficient associated with the independent variable loses its statistical significance, aligning with the findings obtained by researchers Angahar and Ivarave [4].

From the perspective of free cash flow, it is observed that both in models with effects and in models without effects, a positive and statistically significant influence is maintained. Thus, referring to quantiles, as companies exhibit higher profitability rates, the intensity with which this dependent variable influences the dependent variables decreases. Consequently, companies with higher profitability rates, considering 90th quantile, tend to be less influenced by the free cash flow indicator, with the statistical significance of the specified independent variable also diminishing, a fact also supported by Lin, Yip, Ho, and Sambasivan [14].

Considering the asset turnover rate, it is observed that in both models with effects and without effects, a positive and statistically significant influence is maintained. From the perspective of quantile regressions, the greater the profitability of companies, the greater the intensity of the influence of the asset turnover rate, with the coefficient associated with the independent variable being greater, considering the 90th quantile. Thus, firms with higher financial performance rates tend to also have a more advantageous asset turnover rate, a fact also supported by researcher Munawar [18].

Regarding the accounts receivable turnover rate, a similarly positive and statistically significant influence is observed across both models with effects and models without effects. Quantile regression analysis sheds light on a consistent notion, akin to that of the asset turnover rate, suggesting that companies with higher profitability margins are subject to a more substantial influence from the accounts receivable turnover rate. However, this influence becomes statistically insignificant, indicating a nuanced impact of this metric on company performance across different profitability levels, a fact also supported by Amanda [3].

The last control indicator examined in the study, addressing the robustness of regression models, is the dummy variable capturing the pandemic crisis. Thus, in both models with effects and without effects, the influence is predominantly positive. Furthermore, the outcomes of quantile regression models reveal that enterprises with high profitability rates were more significantly impacted by the health crisis, albeit in a positive manner and statistically significant in some instances. This can be attributed to the notion that large enterprises, which also possess relatively high profitability rates, were favored by the pandemic context, especially the companies referenced in this, a fact also supported by Rim, Nohade, and Etienne [28].

From the standpoint of corporate governance indicators, particularly board size, it was found in models without effects that board size negatively and significantly impacts economic profitability. In models with effects, this metric similarly affects the profitability of companies in the technology sector, although the impact is not statistically significant. Quantile regression analysis reveals that companies with low to medium profitability rates

are more strongly and negatively influenced by this independent variable, which is statistically significant, with the intensity of this influence diminishing as company profitability rates align with the 75th and 90th quantiles. This result does not validate the hypothesis 1 of the current study for this specific variable.

Regarding the number of annual board meetings, this independent variable's influence on profitability rates is positive, except for the indicator showing the return on invested capital where the influence is negative, although the results are not statistically significant, according to linear regression models with effects. For linear regression models without effects, it was observed that the influence on the financial, economic profitability, and return on invested capital rates is negative, with the independent variable being statistically significant in the case of financial profitability. Therefore, the results are consistent only in models where the dependent variable is the return on invested capital. From the perspective of quantile regression models, this variable more intensely influences companies with higher profitability rates, yet the determined influences are not statistically significant, considering the 75th and 90th quantiles. Consequently, hypothesis 1 is validated regarding this indicator, a fact also supported by researchers Rashid [25].

Considering the percentage of women on the board of directors, a positive and statistically significant influence was observed in models without effects for all analyzed profitability rates, except for financial profitability, where the influence is negative but not statistically significant. In models with effects, the influence remains positive but loses its statistical significance, becoming significant only in models with net margin as the dependent variable. According to the quantile regression models, the positive influence of this independent variable is no longer statistically significant. However, companies with higher profitability rates tend to be more significantly influenced by this independent variable, considering the 90th quantile. Hence, hypothesis 2 is confirmed, as supported by the findings of the authors Brahma, Nwafor, and Boateng [7].

Regarding variables related to the characteristics of the chief executive officer, one key variable considers the CEO's duality within the enterprise, with its negative and significant impact persisting across both models without effects and those with effects. Quantile regression analysis of the relationship between this specified independent variable and known profitability rates shows that this variable significantly influences companies with high profitability rates, specifically at the 75th and 90th quantiles, both in terms of magnitude and statistical significance. Consequently, companies with higher profitability rates are more profoundly affected by the presence of a CEO who also serves as the chairperson of the board compared to firms with lower profitability rates. Therefore, hypothesis 4 is substantiated by the authors' findings Naciti [19] for this specific indicator.

Another variable related to chief executive officer characteristics is age, which has a positive and significant influence in both models without effects and those with effects. From the quantile models perspective, companies with higher profitability rates are less influenced by CEO age, whereas companies with lower profitability rates are more significantly impacted by this indicator, considering the 10th and 25th quantiles. Additionally, some models have shown a negative influence, although the coefficient associated with the independent variable is not significant from an econometric standpoint. This result does not validate hypothesis 4 of the current study regarding this variable.

From the standpoint of advisory committee presence within the analyzed enterprises, the first committee discussed in this paper is the audit committee, specifically its independence within the firm. Consequently, the positive influence of this independent variable is observed in both regression models without effects and those with effects. Regarding quantile regressions, it appears that the impact of the independent variable on performance rates is significantly greater and statistically significant for enterprises with higher profitability rates, specifically referring to the 75th and 90th quantiles in this instance. Therefore, hypothesis 3 is confirmed, a conclusion corroborated by researchers Bansal and Sharma [6] and Zhou et al. [33].

Another significant factor at the enterprise level is the corporate social responsibility committee, which has a negative influence in regression models without effects and a positive influence in models with effects, although these effects are not statistically significant. Also, a detailed examination of this variable through quantile regression reveals that enterprises with higher profitability rates tend to be more negatively and intensely influenced by this independent variable, although the associated coefficient of the independent variable is statistically insignificant. This result does not validate hypothesis 3 of the current study regarding this variable.

Regarding the presence of the compensation committee within the company, it is observed that the influence is positive and statistically significant, a result consistent across both models without effects and those with effects. Furthermore, quantile regression models indicate that this committee significantly influences companies with both low and high profitability rates. Companies with medium profitability rates, referring to the 50th quantile, exhibit less influence from the compensation committee's presence, although the influence remains positive. This result confirms hypothesis 3 of this research and is also

in line with the findings obtained by Alqatan et al. [2] and Zraiq and Fadzil [34].

From the perspective of the last committee examined, namely, the nomination committee, it exerts a positive influence on the performance rates of companies, a result consistent across both regression models without effects and those with effects. Therefore, in terms of quantile regression models, companies with higher profitability rates are significantly more affected by this independent variable, with the influence being more intensified and significant, considering the 75th and 90th quantiles. Therefore, the obtained result aligns with hypothesis 3 as well as with the findings of researchers Green and Homroy [10] regarding this specific variable.

Therefore, the outcomes of the quantitative research conducted in this study are intriguing, revealing that most of the initial hypotheses were validated, although some quantitative research hypotheses were not confirmed following the econometric analysis. Therefore, it is noteworthy that differences exist between models with effects and those without effects, but quantile regression allowed for a more detailed examination of the regression models' robustness and the consistency of model outcomes across different quantiles.

Conclusions

In the context of this quantitative research, the principal variables influencing the profitability of firms in the IT sector, which are included in the S&P 500 index, were meticulously examined. As a result, the study undertook an in-depth examination of 66 corporations over a period extending from 2003 to 2022. The principal aim of this research was to delineate the correlation between key independent variables identified in the scholarly literature and corporate performance. To fulfill this objective, a comprehensive methodological approach encompassing both linear and quantile regression models was utilized.

Synthesizing the main results of this investigation, several indicators were identified as having a positive influence on corporate performance, including firm size, sales revenue growth rate, current ratio, long-term debt to total capital ratio, free cash flow, asset turnover, receivable turnover, number of board meetings, percentage of women on the board, CEO age, audit committee independence, compensation committee presence, nomination committee presence, and the dummy variable representing the COVID-19 crisis. Conversely, variables such as company age, dividend payout ratio, effective tax rate, board size, CEO duality, and the presence of a corporate social responsibility committee were found to have negative effects on corporate performance. Additionally, quantile regression models played a crucial role in testing the robustness of the obtained results, a fact that was observed throughout the study. Considering the dynamic advancement of entities within the technological domain and the heightened investor enthusiasm for tracking their progress, such research becomes crucial for a wide array of stakeholders. Moreover, the results indicate that investors harbor positive anticipations concerning the future earnings potential of these firms, highlighting their acute interest in the developmental path of organizations in the IT industry.

In light of the policy recommendations and practical implications derived from this study, it is imperative for the analyzed firms to consider the determinants of performance, given their substantial influence on profitability. First, corporations should continuously evaluate the impact of external events on their performance metrics as well as on other financial indicators, which could culminate in negative repercussions for profitability rates. Secondly, businesses must strive to be as transparent as possible to ensure good corporate governance. The better a firm's corporate governance, the more attractive it will be to institutional investors. Thirdly, firms should aim for greater independence of the board of directors and advisory committees to make objective decisions, free from influence by company members. Fourthly, there is a great need for women to be represented on the board of directors so that decisions can be made diversely, leveraging women's risk aversion as a strength for businesses, as decisions are made more cautiously.

Acknowledging the limitations of this research, attention was centered on 20 independent variables that impact the profitability of IT sector firms listed on the S&P 500 within the time frame of 2003–2022. Consequently, the findings of this quantitative analysis hold significance for the specific entities and the duration under review rather than extending to a broader temporal scope.

Looking forward to future research avenues, an expansion into the investigation of various independent variables across both microeconomic and macroeconomic dimensions is proposed. At the microeconomic level, considerations could include the CEO's tenure and independence of all consultative committees. Macroeconomic factors such as unemployment rates and inflation rates could also be explored. Furthermore, there is scope for extending the temporal analysis and enhancing the research methodology through the adoption of other relevant regression techniques like GMM models or others.

Appendix

Appendix 1 The results of the pooled data regression models regarding the determinants of company performance. *Source* Authors' work

	(1) ROE	(2) ROE	(3) ROA	(4) ROA	(5) ROIC	(6) ROIC	(7) NM	(8) NM
FS	0.015 (0.015)		0.006*** (0.002)		0.053*** (0.019)		0.013*** (0.003)	
FA	0 (0.001)	0 (0.001)	0 (0)	0 (0)	−0.001 (0.001)	−0.001 (0.001)	0*** (0)	0*** (0)
SRGR	−0.005 (0.009)	−0.006 (0.009)	−0.001 (0.001)	−0.002 (0.001)	−0.007 (0.007)	−0.007 (0.007)	−0.001 (0.002)	−0.002 (0.002)
DPR	0.017 (0.021)	0.012 (0.027)	−0.008** (0.003)	−0.009*** (0.003)	−0.014 (0.03)	−0.016 (0.03)	−0.028*** (0.006)	−0.03*** (0.005)
ETR	0.004 (0.005)	0.003 (0.006)	0 (0.001)	0 (0.001)	0.002 (0.005)	0.001 (0.005)	−0.001 (0.001)	−0.002 (0.001)
CR	−0.001 (0.011)	−0.002 (0.011)	0.014*** (0.001)	0.013*** (0.001)	0.062*** (0.015)	0.055*** (0.015)	0.027*** (0.002)	0.026*** (0.002)
AT	0.186*** (0.043)	0.186*** (0.042)	0.058*** (0.006)	0.061*** (0.005)	0.212*** (0.058)	0.233*** (0.058)	−0.052*** (0.009)	−0.046*** (0.009)
RT	−0.004*** (0.001)	−0.004*** (0.001)	0.002*** (0)	0.001*** (0)	0.012*** (0.002)	0.011*** (0.002)	0.003*** (0)	0.003*** (0)
BS	0.009 (0.009)	0.008 (0.009)	−0.002** (0.001)	−0.003*** (0.001)	0.007 (0.01)	0.009 (0.009)	0 (0.002)	0 (0.002)
NBM	−0.012*** (0.004)	−0.012*** (0.005)	−0.001 (0.001)	−0.001* (0.001)	−0.003 (0.005)	−0.004 (0.005)	0 (0.001)	0 (0.001)
WB	−0.002 (0.002)	−0.003 (0.002)	0.001*** (0)	0.001** (0)	0.009*** (0.002)	0.008*** (0.002)	0.001*** (0)	0.001** (0)
CEO_D	−0.028 (0.032)	−0.022 (0.032)	−0.018*** (0.004)	−0.017*** (0.004)	−0.082** (0.039)	−0.09** (0.039)	−0.009 (0.007)	−0.007 (0.007)
CEO_A	0.001 (0.002)	0.001 (0.002)	0.001*** (0)	0.001*** (0)	0 (0.003)	0 (0.003)	0.001 (0)	0.001 (0)
ICA	0.002 (0.004)	0.003 (0.004)	0 (0.001)	0 (0)	0.002 (0.006)	0 (0.006)	0.003*** (0.001)	0.004*** (0.001)
C_CSR	0.05 (0.037)	0.042 (0.036)	0.001 (0.005)	−0.003 (0.004)	−0.157*** (0.049)	−0.133*** (0.046)	−0.006 (0.008)	−0.007 (0.007)
C_C	0.093 (0.109)	0.097 (0.11)	0.016 (0.017)	0.016 (0.016)	0.279 (0.341)	0.242 (0.344)	0.015 (0.028)	0.015 (0.027)
C_N	0.074* (0.044)	0.079* (0.044)	0 (0.006)	0 (0.005)	0.021 (0.056)	0.001 (0.055)	0.004 (0.009)	0.006 (0.009)
COVID	0.166*** (0.044)	0.185*** (0.045)	0.001 (0.006)	0.008 (0.006)	−0.027 (0.044)	−0.009 (0.045)	−0.002 (0.009)	0.005 (0.009)
FCF		0.028** (0.011)		0.012*** (0.001)		0.04*** (0.011)		0.016*** (0.002)
LTDTC			0 (0)	0 (0.001)	0.005 (0.006)	0.004 (0.006)	0.001*** (0)	0.001 (0.001)
_cons	−0.054 (0.481)	−0.193 (0.476)	−0.11* (0.063)	−0.174*** (0.057)	−0.872 (0.641)	−0.657 (0.675)	0.091 (0.102)	0.101 (0.096)
Observations	818	799	698	681	355	349	718	701
R-squared	0.088	0.095	0.336	0.402	0.225	0.236	0.308	0.348
RMSE	0.413	0.416	0.05	0.047	0.323	0.322	0.083	0.08
Adj R^2	0.067	0.074	0.318	0.385	0.181	0.192	0.289	0.33
F-stat	4.277	4.528	18.076	23.397	5.112	5.357	16.356	19.136
Mean VIF	1.33	1.29	1.40	1.28	1.37	1.32	1.40	1.28
Jarque–Bera normality test	8.2e + 04	7.9e + 04	64.77	127.3	5319	5990	1.8e + 04	2.7e + 04
Chi(2)	0	0	0	0	0	0	0	0

Standard errors are shown in parentheses

***, **, and * denote statistical significance at 1, 5, and 10%, respectively

Appendix 2 The results of the regression models with fixed and random effects regarding the determining factors of company performance and the execution of the Hausman test. *Source* Authors' work

	(1) ROE fe	(2) ROE re	(3) ROE fe	(4) ROE re	(5) ROA fe	(6) ROA re	(7) ROA fe	(8) ROA re
FS	0.175*** (0.039)	0.055** (0.022)			0.019*** (0.004)	0.013*** (0.003)		
FA	0.012 (0.018)	0 (0.001)	0.015 (0.019)	0 (0.001)	−0.003* (0.002)	0 (0)	−0.004** (0.002)	0 (0)
SRGR	0.043 (0.076)	−0.007 (0.011)	0.057 (0.079)	−0.006 (0.011)	0.045*** (0.008)	0 (0.002)	0.038*** (0.008)	−0.001 (0.002)
DPR	0.019 (0.021)	0.008 (0.02)	0.015 (0.027)	0.005 (0.026)	−0.006** (0.003)	−0.008*** (0.003)	−0.004* (0.002)	−0.007*** (0.003)
ETR	0.004 (0.006)	0.003 (0.005)	0.003 (0.006)	0.002 (0.005)	0 (0.001)	0 (0.001)	0 (0.001)	0 (0.001)
CR	0.003 (0.015)	−0.004 (0.012)	−0.008 (0.015)	−0.007 (0.013)	0.01*** (0.002)	0.009*** (0.002)	0.009*** (0.001)	0.008*** (0.001)
AT	0.092 (0.075)	0.134** (0.057)	0.074 (0.078)	0.147*** (0.057)	0.129*** (0.008)	0.115*** (0.007)	0.131*** (0.008)	0.114*** (0.007)
RT	−0.003** (0.001)	−0.003*** (0.001)	−0.004*** (0.001)	−0.004*** (0.001)	0.001** (0.001)	0.002*** (0)	0.001* (0.001)	0.001*** (0)
BS	0 (0.012)	0 (0.011)	0.008 (0.012)	0.003 (0.01)	−0.002 (0.001)	−0.003** (0.001)	−0.001 (0.001)	−0.003** (0.001)
NBM	0.004 (0.005)	−0.001 (0.005)	0.005 (0.005)	−0.001 (0.005)	0 (0)	0 (0.001)	0 (0)	0 (0)
WB	−0.003 (0.002)	−0.003 (0.002)	−0.002 (0.002)	−0.003 (0.002)	0 (0)	0 (0)	0 (0)	0 (0)
CEO_D	−0.059 (0.043)	−0.033 (0.037)	−0.041 (0.044)	−0.027 (0.038)	−0.013*** (0.005)	−0.015*** (0.004)	−0.01** (0.004)	−0.014*** (0.004)
CEO_A	−0.021 (0.018)	0.001 (0.003)	−0.021 (0.018)	0.001 (0.003)	0.007*** (0.002)	0.003*** (0)	0.007*** (0.002)	0.003*** (0)
ICA	0.002 (0.004)	0.001 (0.004)	0.001 (0.004)	0.001 (0.004)	0 (0)	0 (0)	0 (0)	0.001 (0)
C_CSR	0.042 (0.042)	0.028 (0.038)	0.054 (0.043)	0.039 (0.038)	−0.001 (0.005)	−0.003 (0.004)	−0.001 (0.004)	−0.004 (0.004)
C_C	0.242** (0.109)	0.191* (0.107)	0.226** (0.111)	0.193* (0.108)	0.005 (0.013)	0.001 (0.014)	0.002 (0.013)	0.005 (0.013)
C_N	0.053 (0.046)	0.051 (0.044)	0.051 (0.048)	0.059 (0.045)	0.01** (0.005)	0.005 (0.005)	0.012** (0.005)	0.006 (0.005)
COVID	0.112** (0.046)	0.137*** (0.043)	0.123*** (0.047)	0.148*** (0.044)	−0.001 (0.005)	0.003 (0.005)	−0.003 (0.005)	0.003 (0.005)
FCF			0.086*** (0.023)	0.04*** (0.015)			0.022*** (0.002)	0.017*** (0.002)
LTDTC					0 (0)	0 (0)	0 (0)	0 (0.001)
_cons	−3.163*** (0.9)	−1.061* (0.563)	−1.25* (0.654)	−0.693 (0.494)	−0.599*** (0.098)	−0.358*** (0.076)	−0.579*** (0.061)	−0.37*** (0.055)
Observations	818	818	799	799	698	698	681	681
R^2	0.0112	0.0685	0.0056	0.0810	0.0582	0.2732	0.0715	0.3425
F-stat	3.489		3.007		29.252		34.999	
Prob > *F*	0.0000		0.0000		0.0000		0.0000	
F Test	4.42		4.18		12.48		12.56	
Prob > *F*	0.0000		0.0000		0.0000		0.0000	
Wald Stat		50.80		50.12		434.79		515.43
Prob > chi2		0.0001		0.0001		0.0000		0.0000
Jarque–Bera normality test	1.1e + 04		2.9e + 04		8839		6723	
Chi(2)	0		0		0		0	
Hausman chi2	44.46		65.171		93.04		143.695	
p value Hausman	0.0005		0.0000		0.0000		0.0000	

Standard errors are shown in parentheses

***, **, and * denote statistical significance at 1, 5, and 10%, respectively

	(1) ROIC fe	(2) ROIC re	(3) ROIC fe	(4) ROIC re	(5) NM fe	(6) NM re	(7) NM fe	(8) NM re
FS	0.049	0.046			−0.005	0.006		
	(0.059)	(0.031)			(0.009)	(0.005)		
FA	0.012	0	0.011	0	0.004	0.001***	0.003	0***
	(0.042)	(0.001)	(0.042)	(0.001)	(0.004)	(0)	(0.004)	(0)
SRGR	0.029	−0.008	0.044	−0.008	0.047***	−0.001	0.03*	−0.002
	(0.081)	(0.013)	(0.079)	(0.014)	(0.016)	(0.002)	(0.016)	(0.002)
DPR	−0.02	−0.024	−0.018	−0.024	−0.032***	−0.031***	−0.029***	−0.031***
	(0.026)	(0.025)	(0.026)	(0.025)	(0.005)	(0.005)	(0.005)	(0.005)
ETR	−0.002	−0.001	−0.002	−0.001	−0.003**	−0.002**	−0.003**	−0.002**
	(0.004)	(0.004)	(0.004)	(0.004)	(0.001)	(0.001)	(0.001)	(0.001)
CR	0.031*	0.034**	0.028*	0.03**	0.02***	0.022***	0.019***	0.021***
	(0.017)	(0.015)	(0.017)	(0.015)	(0.003)	(0.003)	(0.003)	(0.003)
AT	0.614***	0.407***	0.622***	0.428***	0.037**	−0.002	0.038**	−0.009
	(0.115)	(0.084)	(0.118)	(0.087)	(0.016)	(0.012)	(0.016)	(0.012)
RT	0.013**	0.013***	0.013**	0.012***	0.003***	0.003***	0.003**	0.003***
	(0.005)	(0.004)	(0.005)	(0.004)	(0.001)	(0.001)	(0.001)	(0.001)
BS	−0.008	−0.006	−0.007	−0.004	−0.001	−0.001	−0.002	−0.002
	(0.014)	(0.012)	(0.014)	(0.012)	(0.003)	(0.002)	(0.003)	(0.002)
NBM	−0.002	−0.001	−0.002	−0.002	0.002**	0.002	0.002	0.001
	(0.005)	(0.005)	(0.005)	(0.005)	(0.001)	(0.001)	(0.001)	(0.001)
WB	0	0.002	0.001	0.002	0.001*	0.001*	0.001	0.001
	(0.003)	(0.002)	(0.003)	(0.002)	(0)	(0)	(0)	(0)
CEO_D	−0.08	−0.107**	−0.077	−0.109**	−0.014	−0.011	−0.013	−0.009
	(0.066)	(0.05)	(0.066)	(0.051)	(0.009)	(0.008)	(0.009)	(0.008)
CEO_A	−0.001	0.005	0.001	0.005	−0.001	0.001	−0.002	0.001
	(0.042)	(0.005)	(0.042)	(0.006)	(0.004)	(0.001)	(0.004)	(0.001)
ICA	0.004	0.001	0.004	0.002	0.002***	0.003***	0.003***	0.003***
	(0.006)	(0.005)	(0.006)	(0.006)	(0.001)	(0.001)	(0.001)	(0.001)
C_CSR	−0.048	−0.068	−0.046	−0.062	−0.001	−0.001	−0.004	−0.005
	(0.059)	(0.053)	(0.058)	(0.052)	(0.009)	(0.008)	(0.009)	(0.008)
C_C	0.022	0.076	0.043	0.062	0.006	0.001	0.003	0.002
	(0.32)	(0.295)	(0.32)	(0.298)	(0.027)	(0.027)	(0.027)	(0.027)
C_N	0.059	0.05	0.063	0.059	0.004	0.007	0.007	0.008
	(0.086)	(0.069)	(0.085)	(0.069)	(0.01)	(0.009)	(0.01)	(0.009)
COVID	0.021	0.014	0.019	0.017	0.01	0.007	0.008	0.009
	(0.048)	(0.04)	(0.049)	(0.04)	(0.009)	(0.009)	(0.01)	(0.009)
FCF			0.038	0.04**			0.019***	0.015***
			(0.025)	(0.017)			(0.005)	(0.003)
LTDTC	0.004	0.004	0.004	0.004	0.001***	0.001***	0.001	0.001
	(0.005)	(0.005)	(0.005)	(0.005)	(0)	(0)	(0.001)	(0.001)
_cons	−2.111	−1.356*	−1.864*	−1.262*	0.298	0.136	−0.08	0.069
	(1.365)	(0.78)	(0.965)	(0.688)	(0.198)	(0.121)	(0.131)	(0.101)
Observations	355	355	349	349	718	718	701	701
R^2	0.0150	0.1783	0.0209	0.1949	0.0436	0.2639	0.0862	0.3251
F-stat	3.502		3.59		7.46		7.858	
Prob > *F*	0.0000		0.0000		0.0000		0.0000	
F Test	5.92		5.88		4.79		4.23	
Prob > *F*	0.0000		0.0000		0.0000		0.0000	
Wald Stat		67.09		69.67		155.09		186.02

	(1) ROIC fe	(2) ROIC re	(3) ROIC fe	(4) ROIC re	(5) NM fe	(6) NM re	(7) NM fe	(8) NM re
Prob > chi2		0.0000		0.0000		0.0000		0.0000
Jarque–Bera normality test	114.8		101.9		1.5e + 04		1.8e + 04	
Chi(2)	0		0		0		0	
Hausman chi2	17.628		15.041		12.314		236.80	
p value Hausman	0.5474		0.7200		0.8718		0.0000	

Source Authors' work

Standard errors are shown in parentheses

***, **, and * denote statistical significance at 1, 5, and 10%, respectively

Appendix 3 The results of fixed-effect quantile regression models regarding the determinants of firm performance

Model 1	(1) ROE Q10	(2) ROE Q25	(3) ROE Q50	(5) ROE Q75	(5) ROE Q90
FS	0.426	0.296	0.186	0.042	−0.126
	(6.195)	(3.805)	(4.319)	(7.609)	(12.344)
FA	−0.039	−0.013	0.009	0.038	0.072
	(1.719)	(1.055)	(1.198)	(2.11)	(3.424)
SRGR	0	0.022	0.041	0.065	0.094
	(6.228)	(3.822)	(4.337)	(7.64)	(12.399)
DPR	0.077	0.047	0.022	−0.011	−0.05
	(2.476)	(1.52)	(1.725)	(3.039)	(4.931)
ETR	0.01	0.007	0.004	0	−0.004
	(0.284)	(0.175)	(0.198)	(0.349)	(0.566)
CR	0.021	0.011	0.003	−0.007	−0.019
	(0.735)	(0.451)	(0.512)	(0.901)	(1.463)
AT	−0.099	0	0.083	0.193	0.321
	(9.41)	(5.775)	(6.555)	(11.546)	(18.737)
RT	0.003	0	−0.003	−0.006	−0.01
	(0.149)	(0.092)	(0.104)	(0.183)	(0.297)
BS	0.017	0.008	0.001	−0.01	−0.021
	(1.26)	(0.773)	(0.878)	(1.546)	(2.509)
NBM	0.003	0.004	0.004	0.005	0.006
	(0.447)	(0.275)	(0.312)	(0.549)	(0.891)
WB	0.005	0.004	0.003	0.001	0.001
	(0.218)	(0.134)	(0.152)	(0.267)	(0.433)
CEO_D	0.007	−0.028	−0.057	−0.094	−0.139
	(4.339)	(2.663)	(3.022)	(5.323)	(8.639)
CEO_A	0.002	−0.01	−0.02	−0.033	−0.048
	(1.52)	(0.933)	(1.059)	(1.865)	(3.027)
ICA	−0.005	0.004	0.002	0	0.003
	(0.286)	(0.175)	(0.199)	(0.35)	(0.569)
C_CSR	−0.013	0.016	0.04	0.071	0.108
	(3.756)	(2.305)	(2.616)	(4.609)	(7.479)
C_C	0.365	0.301	0.248	0.177	0.094
	(10.389)	(6.375)	(7.236)	(12.745)	(20.685)
C_N	0.077	0.065	0.054	0.04	0.024
	(4.113)	(2.524)	(2.864)	(5.045)	(8.188)
COVID	−0.037	0.041	0.105	0.191	0.29
	(5.107)	(3.135)	(3.558)	(6.268)	(10.171)
Observations	818	818	818	818	818

Source Authors' work

Standard errors are shown in parentheses

***, **, and * denote statistical significance at 1, 5, and 10%, respectively

Model 2	(1) ROE Q10	(2) ROE Q25	(3) ROE Q50	(4) ROE Q75	(5) ROE Q90
FA	−0.03	−0.009	0.014	0.039	0.074
	(0.453)	(0.307)	(0.3)	(0.469)	(0.801)
SRGR	0.04	0.048	0.057	0.066	0.079
	(1.877)	(1.271)	(1.241)	(1.941)	(3.317)
DPR	0.016	0.016	0.015	0.015	0.014
	(0.965)	(0.653)	(0.638)	(0.998)	(1.706)
ETR	0.005	0.004	0.003	0.002	0
	(0.112)	(0.076)	(0.074)	(0.116)	(0.198)
CR	−0.008	−0.008	−0.008	−0.008	−0.008
	(0.205)	(0.139)	(0.136)	(0.212)	(0.362)
AT	−0.178	−0.056	0.069	0.21	0.408
	(3.013)	(2.042)	(1.995)	(3.12)	(5.329)
RT	0.001	−0.001	−0.003	−0.006	−0.01
	(0.04)	(0.027)	(0.026)	(0.041)	(0.07)
BS	0.036	0.022	0.008	−0.008	−0.031
	(0.381)	(0.258)	(0.252)	(0.394)	(0.673)
NBM	0.002	0.003	0.005	0.006	0.009
	(0.14)	(0.095)	(0.093)	(0.145)	(0.247)
WB	0.004	0.004	0.003	0.001	0

Model 2	(1) ROE Q10	(2) ROE Q25	(3) ROE Q50	(4) ROE Q75	(5) ROE Q90
	(0.065)	(0.044)	(0.043)	(0.067)	(0.114)
CEO_D	0.039	0	−0.04	−0.085	−0.148
	(1.344)	(0.911)	(0.89)	(1.391)	(2.377)
CEO_A	0.001	−0.01	−0.021	−0.033	−0.05
	(0.403)	(0.273)	(0.267)	(0.417)	(0.712)
ICA	0.002	0.002	0.001	0	0.001
	(0.081)	(0.055)	(0.054)	(0.084)	(0.144)
C_CSR	0.049	0.051	0.054	0.057	0.062
	(1.108)	(0.75)	(0.733)	(1.146)	(1.958)
C_C	0.304	0.266	0.227	0.183	0.121
	(2.958)	(2.003)	(1.957)	(3.059)	(5.23)
C_N	0.079	0.065	0.051	0.036	0.014
	(1.245)	(0.843)	(0.823)	(1.287)	(2.201)
COVID	−0.024	0.047	0.119	0.202	0.317
	(1.515)	(1.027)	(1.004)	(1.569)	(2.68)
FCF	0.187	0.139	0.088	0.032	−0.048
	(0.872)	(0.592)	(0.578)	(0.904)	(1.543)
Observations	799	799	799	799	799

Source Authors' work

Standard errors are shown in parentheses

***, **, and * denote statistical significance at 1, 5, and 10%, respectively

Model 3	(1) ROA Q10	(2) ROA Q25	(3) ROA Q50	(4) ROA Q75	(5) ROA Q90
FS	0.03***	0.026***	0.02***	0.014*	0.009
	(0.011)	(0.008)	(0.006)	(0.008)	(0.012)
FA	−0.004	−0.004*	−0.003**	−0.002	−0.002
	(0.003)	(0.002)	(0.002)	(0.002)	(0.003)
SRGR	0.026	0.033**	0.045***	0.057***	0.066***
	(0.02)	(0.015)	(0.011)	(0.015)	(0.021)
DPR	−0.012	−0.009*	−0.006	−0.002	0
	(0.007)	(0.006)	(0.004)	(0.006)	(0.008)
ETR	−0.001	−0.001	0	0	0
	(0.001)	(0.001)	(0)	(0.001)	(0.001)
CR	0.01***	0.01***	0.01***	0.01***	0.01***
	(0.004)	(0.003)	(0.002)	(0.003)	(0.004)
AT	0.096***	0.109***	0.128***	0.147***	0.162***
	(0.026)	(0.019)	(0.014)	(0.019)	(0.027)
RT	0.001	0.001*	0.001**	0.001	0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
BS	−0.005*	−0.004*	−0.002	−0.001	0.001
	(0.003)	(0.002)	(0.002)	(0.002)	(0.003)
NBM	0	0	0	0	0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
WB	0	0	0	0	0
	(0)	(0)	(0)	(0)	(0.001)
CEO_D	−0.006	−0.009	−0.013**	−0.016**	−0.019*

Model 3	(1) ROA Q10	(2) ROA Q25	(3) ROA Q50	(4) ROA Q75	(5) ROA Q90
	(0.01)	(0.007)	(0.005)	(0.007)	(0.01)
CEO_A	0.007***	0.007***	0.007***	0.006***	0.006**
	(0.003)	(0.002)	(0.001)	(0.002)	(0.003)
ICA	0	0	0	0	0
	(0.001)	(0)	(0)	(0)	(0.001)
C_CSR	−0.001	−0.001	−0.001	0	0
	(0.009)	(0.007)	(0.005)	(0.007)	(0.009)
C_C	0.01	0.004	0.004	0.013	0.019
	(0.026)	(0.019)	(0.014)	(0.019)	(0.027)
C_N	0.001	0.003	0.01	0.016*	0.021
	(0.013)	(0.009)	(0.007)	(0.009)	(0.013)
COVID	−0.007	−0.005	−0.001	0.002	0.005
	(0.01)	(0.007)	(0.005)	(0.007)	(0.01)
GI	0*	0	0	0	0
	(0)	(0)	(0)	(0)	(0)
Observations	698	698	698	698	698

Source Authors' work

Standard errors are shown in parentheses

***, **, and * denote statistical significance at 1, 5, and 10%, respectively

Model 4	(1) ROA Q10	(2) ROA Q25	(3) ROA Q50	(4) ROA Q75	(5) ROA Q90
FA	−0.005**	−0.005**	−0.004***	−0.003	−0.002
	(0.003)	(0.002)	(0.001)	(0.002)	(0.003)
SRGR	0.021	0.028*	0.038***	0.048***	0.056***
	(0.021)	(0.016)	(0.012)	(0.015)	(0.022)
DPR	−0.011	−0.008	−0.004	0	0.003
	(0.008)	(0.006)	(0.004)	(0.006)	(0.008)
ETR	0	0	0	0	0
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
CR	0.008**	0.008***	0.009***	0.009***	0.009**
	(0.003)	(0.003)	(0.002)	(0.002)	(0.004)
AT	0.101***	0.113***	0.13***	0.148***	0.162***
	(0.026)	(0.019)	(0.014)	(0.018)	(0.026)
RT	0.001	0.001	0.001	0.001	0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
BS	−0.004	−0.003	−0.002	0	0.001
	(0.003)	(0.002)	(0.002)	(0.002)	(0.003)
NBM	0	0	0	0	0
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
WB	0	0	0	0	0
	(0.001)	(0)	(0)	(0)	(0.001)
CEO_D	−0.004	−0.006	−0.01*	−0.013*	−0.016*
	(0.01)	(0.007)	(0.005)	(0.007)	(0.01)
CEO_A	0.008***	0.007***	0.007***	0.006***	0.006**
	(0.002)	(0.002)	(0.001)	(0.002)	(0.002)
ICA	0	0	0	0	0

Model 4	(1) ROA Q10	(2) ROA Q25	(3) ROA Q50	(4) ROA Q75	(5) ROA Q90
	(0)	(0)	(0)	(0)	(0)
C_CSR	0	0	−0.001	−0.002	−0.003
	(0.009)	(0.007)	(0.005)	(0.006)	(0.009)
C_C	0.023	0.015	0.003	0.009	0.019
	(0.024)	(0.018)	(0.013)	(0.017)	(0.024)
C_N	0.002	0.006	0.012	0.018*	0.023*
	(0.013)	(0.01)	(0.007)	(0.009)	(0.013)
COVID	−0.004	−0.004	−0.003	−0.002	−0.001
	(0.01)	(0.008)	(0.005)	(0.007)	(0.01)
FCF	0.026***	0.025***	0.022***	0.019***	0.017**
	(0.007)	(0.005)	(0.004)	(0.005)	(0.007)
GI	0.002**	0.001**	0.001	0	−0.001
	(0.001)	(0.001)	(0)	(0.001)	(0.001)
Observations	681	681	681	681	681

Source Authors' work

Standard errors are shown in parentheses

***, **, and * denote statistical significance at 1, 5, and 10%, respectively

Model 5	(1) ROIC Q10	(2) ROIC Q25	(3) ROIC Q50	(4) ROIC Q75	(5) ROIC Q90
FS	−0.014	0.02	0.045	0.083	0.111
	(0.196)	(0.11)	(0.12)	(0.226)	(0.321)
FA	0.102	0.053	0.018	−0.036	−0.076
	(0.145)	(0.075)	(0.086)	(0.164)	(0.232)
SRGR	0.099	0.061	0.033	−0.01	−0.041
	(0.197)	(0.11)	(0.121)	(0.227)	(0.322)
DPR	0.007	−0.008	−0.018	−0.034	−0.046
	(0.083)	(0.046)	(0.051)	(0.095)	(0.136)
ETR	0.002	0	−0.001	−0.004	−0.005
	(0.009)	(0.005)	(0.006)	(0.011)	(0.015)
CR	0.014	0.024	0.03	0.041	0.048
	(0.041)	(0.023)	(0.025)	(0.047)	(0.067)
AT	0.286	0.465*	0.594**	0.793	0.939
	(0.506)	(0.257)	(0.299)	(0.57)	(0.804)
RT	0.007	0.011	0.013	0.016	0.019
	(0.019)	(0.011)	(0.012)	(0.022)	(0.031)
BS	−0.028	−0.017	−0.009	0.003	0.011
	(0.054)	(0.03)	(0.033)	(0.062)	(0.088)
NBM	0.002	0	−0.001	−0.003	−0.005
	(0.009)	(0.005)	(0.006)	(0.011)	(0.015)
WB	0.003	0.002	0.001	0.001	0.002
	(0.008)	(0.004)	(0.005)	(0.009)	(0.013)
CEO_D	−0.226	−0.146	−0.088	0.001	0.066
	(0.313)	(0.17)	(0.19)	(0.358)	(0.507)
CEO_A	−0.074	−0.034	−0.005	0.039	0.072
	(0.126)	(0.066)	(0.075)	(0.143)	(0.202)
ICA	0.007	0.005	0.004	0.002	0.001

Model 5	(1) ROIC Q10	(2) ROIC Q25	(3) ROIC Q50	(4) ROIC Q75	(5) ROIC Q90
	(0.028)	(0.016)	(0.017)	(0.032)	(0.046)
C_CSR	−0.04	−0.044	−0.047	−0.052	−0.055
	(0.118)	(0.068)	(0.073)	(0.137)	(0.195)
C_C	0.483	0.209	0.009	0.298	0.523
	(0.891)	(0.467)	(0.532)	(1.011)	(1.429)
C_N	0.004	0.034	0.055	0.088	0.113
	(0.161)	(0.09)	(0.099)	(0.185)	(0.263)
COVID	−0.029	−0.002	0.018	0.048	0.071
	(0.155)	(0.087)	(0.095)	(0.179)	(0.254)
GI	0.001	0.003	0.004	0.005	0.006
	(0.011)	(0.006)	(0.007)	(0.013)	(0.018)
Observations	355	355	355	355	355

Source Authors' work

Standard errors are shown in parentheses

***, **, and * denote statistical significance at 1, 5, and 10%, respectively

Model 6	(1) ROIC Q10	(2) ROIC Q25	(3) ROIC Q50	(5) ROIC Q75	(5) ROIC Q90
FA	0.097	0.052	0.011	−0.035	−0.079
	(0.149)	(0.076)	(0.116)	(0.206)	(0.296)
SRGR	0.09	0.066	0.044	0.02	−0.004
	(0.193)	(0.11)	(0.155)	(0.274)	(0.402)
DPR	0.003	−0.008	−0.018	−0.03	−0.041
	(0.087)	(0.049)	(0.069)	(0.123)	(0.18)
ETR	0.001	−0.001	−0.002	−0.003	−0.004
	(0.009)	(0.005)	(0.007)	(0.012)	(0.018)
CR	0.015	0.022	0.028	0.035	0.042
	(0.039)	(0.022)	(0.031)	(0.055)	(0.08)
AT	0.292	0.462*	0.622	0.796	0.967
	(0.549)	(0.275)	(0.426)	(0.757)	(1.084)
RT	0.007	0.01	0.013	0.016	0.019
	(0.02)	(0.011)	(0.016)	(0.029)	(0.042)
BS	−0.029	−0.017	−0.007	0.005	0.016
	(0.058)	(0.032)	(0.046)	(0.081)	(0.119)
NBM	0.002	0	−0.002	−0.004	−0.006
	(0.01)	(0.006)	(0.008)	(0.015)	(0.021)
WB	0.004	0.002	0.001	0.001	0.003
	(0.009)	(0.005)	(0.007)	(0.012)	(0.018)
CEO_D	−0.224	−0.148	−0.077	0.001	0.076
	(0.328)	(0.177)	(0.259)	(0.459)	(0.667)
CEO_A	−0.071	−0.034	0.001	0.039	0.076
	(0.131)	(0.068)	(0.103)	(0.182)	(0.262)
ICA	0.007	0.006	0.004	0.003	0.001
	(0.029)	(0.017)	(0.023)	(0.041)	(0.06)
C_CSR	−0.045	−0.046	−0.046	−0.047	−0.048
	(0.123)	(0.071)	(0.099)	(0.175)	(0.258)
C_C	0.421	0.182	0.044	0.29	0.53

Model 6	(1) ROIC Q10	(2) ROIC Q25	(3) ROIC Q50	(5) ROIC Q75	(5) ROIC Q90
	(0.883)	(0.46)	(0.692)	(1.228)	(1.771)
C_N	0.02	0.042	0.063	0.085	0.107
	(0.151)	(0.085)	(0.121)	(0.214)	(0.313)
COVID	−0.034	−0.007	0.019	0.048	0.075
	(0.162)	(0.09)	(0.129)	(0.229)	(0.335)
FCF	0.005	0.022	0.038	0.056	0.073
	(0.07)	(0.037)	(0.055)	(0.097)	(0.141)
GI	0.002	0.003	0.004	0.005	0.006
	(0.011)	(0.006)	(0.009)	(0.016)	(0.023)
Observations	349	349	349	349	349

Source Authors' work

Standard errors are shown in parentheses

***, **, and * denote statistical significance at 1, 5, and 10%, respectively

Model 7	(1) NM Q10	(2) NM Q25	(3) NM Q50	(5) NM Q75	(5) NM Q90
FS	0.019	0.009	−0.005	−0.018	−0.033
	(0.02)	(0.014)	(0.011)	(0.014)	(0.021)
FA	0.001	0.002	0.004	0.006	0.008
	(0.008)	(0.006)	(0.004)	(0.005)	(0.008)
SRGR	0.029	0.037	0.047**	0.056**	0.067
	(0.038)	(0.028)	(0.02)	(0.026)	(0.041)
DPR	−0.036*	−0.034**	−0.032***	−0.03**	−0.028
	(0.02)	(0.014)	(0.011)	(0.013)	(0.021)
ETR	−0.001	−0.002	−0.003	−0.004	−0.005
	(0.006)	(0.004)	(0.003)	(0.004)	(0.006)
CR	0.021**	0.02***	0.02***	0.019***	0.018*
	(0.009)	(0.006)	(0.005)	(0.006)	(0.009)
AT	0.066**	0.053**	0.037**	0.022	0.004
	(0.03)	(0.022)	(0.016)	(0.02)	(0.032)
RT	0.002	0.002	0.003***	0.004***	0.005**
	(0.002)	(0.001)	(0.001)	(0.001)	(0.002)
BS	−0.002	−0.002	−0.001	−0.001	0
	(0.006)	(0.004)	(0.003)	(0.004)	(0.006)
NBM	0.003	0.002	0.002	0.001	0.001
	(0.003)	(0.002)	(0.002)	(0.002)	(0.003)
WB	0	0.001	0.001	0.001	0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
CEO_D	−0.018	−0.017	−0.014	−0.012	−0.01
	(0.019)	(0.014)	(0.01)	(0.013)	(0.021)
CEO_A	0.002	0.001	−0.001	−0.003	−0.006
	(0.008)	(0.006)	(0.004)	(0.005)	(0.008)
ICA	0.002	0	0.002	0.005*	0.007*
	(0.004)	(0.003)	(0.002)	(0.002)	(0.004)
C_CSR	0	0	−0.001	−0.001	−0.002
	(0.019)	(0.014)	(0.01)	(0.013)	(0.021)
C_C	0.018	0.007	0.006	0.019	0.034

Model 7	(1) NM Q10	(2) NM Q25	(3) NM Q50	(5) NM Q75	(5) NM Q90
	(0.035)	(0.026)	(0.019)	(0.024)	(0.038)
C_N	0.007	0.006	0.004	0.003	0.001
	(0.023)	(0.017)	(0.012)	(0.016)	(0.025)
COVID	0.002	0.005	0.01	0.014	0.019
	(0.022)	(0.016)	(0.012)	(0.015)	(0.023)
GI	0.001**	0.001***	0.001***	0.001**	0.001
	(0.001)	(0)	(0)	(0)	(0.001)
Observations	718	718	718	718	718

Source Authors' work

Standard errors are shown in parentheses

***, **, and * denote statistical significance at 1, 5, and 10%, respectively

Model 8	(1) NM Q10	(2) NM Q25	(3) NM Q50	(4) NM Q75	(5) NM Q90
FA	0	0.001	0.003	0.004	0.005
	(0.011)	(0.005)	(0.014)	(0.027)	(0.041)
SRGR	0.017	0.023	0.029	0.036	0.044
	(0.055)	(0.026)	(0.067)	(0.129)	(0.196)
DPR	−0.033	−0.031**	−0.029	−0.026	−0.024
	(0.03)	(0.014)	(0.037)	(0.07)	(0.106)
ETR	0	−0.001	−0.003	−0.004	−0.006
	(0.01)	(0.005)	(0.012)	(0.023)	(0.035)
CR	0.019	0.019***	0.019	0.019	0.019
	(0.013)	(0.006)	(0.016)	(0.03)	(0.046)
AT	0.078*	0.059***	0.039	0.017	−0.007
	(0.046)	(0.022)	(0.057)	(0.108)	(0.164)
RT	0.001	0.002	0.003	0.004	0.005
	(0.003)	(0.002)	(0.004)	(0.007)	(0.011)
BS	−0.003	−0.003	−0.002	−0.002	−0.001
	(0.009)	(0.004)	(0.011)	(0.02)	(0.031)
NBM	0.002	0.002	0.002	0.001	0.001
	(0.004)	(0.002)	(0.005)	(0.01)	(0.015)
WB	0	0	0.001	0.001	0.001
	(0.002)	(0.001)	(0.002)	(0.004)	(0.006)
CEO_D	−0.014	−0.013	−0.013	−0.012	−0.011
	(0.029)	(0.013)	(0.035)	(0.067)	(0.102)
CEO_A	0.002	0	−0.001	−0.003	−0.005
	(0.011)	(0.005)	(0.014)	(0.027)	(0.04)
ICA	0.002	0	0.003	0.005	0.008
	(0.005)	(0.002)	(0.006)	(0.012)	(0.019)
C_CSR	0.002	−0.001	−0.004	−0.007	−0.011
	(0.029)	(0.014)	(0.036)	(0.068)	(0.103)
C_C	0.021	0.01	0.003	0.017	0.032
	(0.052)	(0.025)	(0.064)	(0.122)	(0.186)
C_N	0.011	0.009	0.007	0.004	0.001
	(0.034)	(0.016)	(0.042)	(0.08)	(0.122)
COVID	0.003	0.005	0.007	0.01	0.013

Model 8	(1) NM Q10	(2) NM Q25	(3) NM Q50	(4) NM Q75	(5) NM Q90
	(0.032)	(0.015)	(0.039)	(0.075)	(0.114)
FCF	0.03	0.025**	0.019	0.013	0.007
	(0.024)	(0.011)	(0.029)	(0.055)	(0.084)
GI	0.001	0.001	0.001	0.001	0.001
	(0.002)	(0.001)	(0.003)	(0.006)	(0.009)
Observations	701	701	701	701	701

Source Authors' work

Standard errors are shown in parentheses

***, **, and * denote statistical significance at 1, 5, and 10%, respectively

Abbreviations

AT	Asset turnover
BS	Board size
CEO	Chief executive officer
CEO_A	Chief executive officer age
CEO_D	Chief executive officer duality
C_C	Presence of the committee compensation committee
C_N	Presence of the committee nomination committee
COVID	COVID-19
CR	Current ratio
C_CSR	Presence of the corporate social responsibility committee
DPR	Dividend payout ratio
ETR	Effective tax rate
FA	Firm age
FCF	Free cash flow
fe	Regression models with fixed effects
FS	Firm size
FTSE	The financial times stock exchange
GMM	Generalized method of moments
ICA	Independence of the audit committee
IT	Information Technology
LTDTC	Long-term debt to total capital
NBM	Number of board meetings
NM	Net Margin
ROA	Return on assets
re	Regression models with random effects
ROE	Return on equity
ROIC	Return on invested capital
RT	Receivable turnover
S&P 500	Standard and Poor's 500
SRGR	Sales revenue growth rate
WB	The percentage of women on the board of directors

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Declarations

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