THE INTERPLAY OF INTERNAL AND EXTERNAL FACTORS ON CORPORATE PERFORMANCE DURING THE COVID-19 PANDEMIC: AN EMPIRICAL ANALYSIS OF US-LISTED COMPANIES

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Abstract

This paper investigates the interplay of internal and external factors on corporate performance during the COVID-19 pandemic, utilising the resource-based view (RBV) and system theory frameworks. The study focuses on US-listed companies and examines financial flexibility, firm size, environmental, social, and governance (ESG) scores, corporate governance, macroeconomic conditions, and industry types. Using data from over 1000 firms obtained from the Eikon Refinitiv database, the analysis covers the pandemic period (2020–2022) and extends to three years prior (2017–2019) to ensure robustness. The research identifies a negative correlation between financial flexibility and corporate performance during the pandemic. Firms with higher cash reserves and lower debt experienced less decline in stock prices and revenue shortfall, indicating the importance of maintaining financial flexibility in times of crisis.

Keywords: Corporate Performance, Internal Factors, External Factors, Resource-Based View Theory, System Theory, Return on Asset, COVID-19

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1. INTRODUCTION

The COVID-19 pandemic, originating in Wuhan, China, in December 2019, has caused a global crisis with profound health and economic impacts (Pizzi et al., 2023; Rinaldi, 2023; Rinaldi et al., 2020; Ritonga & Buanaputra, 2023). By June 30, 2023, over 767 million confirmed cases and 6.9 million lives lost underscore the severity of the pandemic (World Health Organization [WHO], n.d.). The economic fallout, surpassing the 2008 crisis, led to a 5.2% contraction in the world economy in 2020 (Baffes et al., 2020). With the WHO no longer declaring it a public health emergency, there's an opportunity to examine factors influencing firm performance during the pandemic.

It is well known that the COVID-19 pandemic has caused a devastating impact on a global scale, leaving no corner of the world untouched. Its origins trace back to December 2019 in Wuhan, China, when the first case of COVID-19 was identified (Askarany & Xin, 2024). Shortly after, on January 30 2020, the WHO declared a global emergency, recognizing the urgent need for unified action.

Beyond the staggering loss of lives, COVID-19 caused severe damage to the economy around the world (Ding et al., 2021). The economy around the world surpassed the depths of the 2008 crisis and represents the most severe global recession since the Second World War (Ellul et al., 2020). Industries faced unprecedented challenges, businesses shuttered, and millions lost livelihoods.

Given the significant decline in COVID-19 cases, a statement was made by the WHO on May 5, 2023, officially stating that the pandemic no longer constitutes a public health emergency (WHO, 2023). This pivotal moment offers an invaluable opportunity to examine the factors influencing firms' performance throughout the pandemic.

The urgency of this research is twofold. Firstly, understanding the factors that allowed some firms to maintain resilience during the crisis could provide insights into strategies for recovery in a post-COVID-19 period (Askarany & Xin, 2024). These factors include both external factors and internal factors.

Secondly, an investigation into these dynamics also better prepares firms for similar crises (Askarany & Xin, 2024). By scrutinizing the survival strategies adopted during the COVID-19 pandemic, we can create a crisis-management blueprint for firms to mitigate the impact of future global disruptions, thereby reinforcing their overall resilience and adaptive capacity.

Many studies have been conducted in the literature to investigate firm-level factors that can potentially improve firm performance in the face of the COVID-19 pandemic (Askarany & Xin, 2024). Financial flexibility appears as a crucial factor, with studies finding that firms with more significant cash holding levels and fewer loans function better during these difficult times (De Vito & Gómez, 2020; Ding et al., 2021; Fahlenbrach et al., 2021). In a substantial decrease or cessation of revenues, firms must still fulfil fixed costs such as rent and employee salaries, making those without adequate cash reserves highly vulnerable to eventual bankruptcy (Fahlenbrach et al., 2021). Furthermore, Ellul et al. (2021) argued that multinational supply chains and consumer exposure to COVID-19 considerably impact business performance. It is probably because global supply chain disruptions have emphasized the need for firms to assess their risk and develop contingency plans to ensure continuity. While existing studies focus primarily on internal factors, the paper stresses the significance of externalities and macroeconomic factors, urging a comprehensive approach to uncover comprehensive insights.

The study poses a central question:

RQ: What factors influenced firm performance during the COVID-19 pandemic (2020–2022)?

By integrating internal and external aspects, the research aims to bridge gaps in the literature, recognising the need for a nuanced understanding of the diverse corporate landscape in the face of unprecedented global challenges.

The rest of this paper is structured as follows. Section 2 reviews the relevant literature. Section 3 presents the methodology. Section 4 shows the empirical results. Section 5 summarizes discussions. Section 6 provides conclusions of our findings.

2. LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

Academic literature has extensively discussed how and to what extent internal and external factors impact firms' performances, values and stock prices (Askarany & Smith, 2003; Daryaei et al., 2022; Eghbal et al., 2023; Nassirzadeh et al., 2023; Pouryousof et al., 2023; Pouryousof et al., 2022; Tileal et al., 2023; Yazdifar et al., 2019; Zadeh et al., 2023). For example, using a multivariate linear regression model, Askarany and Yinzhen (2024) explore how environmental, social, and governance (ESG) ratings influence stock price dynamics across different sectors. Their findings suggest a negative correlation between higher ESG ratings and stock price volatility, indicating ESG is a mitigating factor during COVID-19.

Two perspectives can be used to categorise many studies on the effects of different contextual factors on organisations' performances: the theory of resource-based view (RBV) and the system theory (Cheong et al., 2021). RBV states that internal factors and some unique resources that a firm controls can help a company become more competitive and, as a result, improve corporate performance (Kozlenkova et al., 2014). It also explains how firms outperform their rivals in the same environment and industry (Mahoney, 2001). Wernerfelt (1984) was the first to put forth this idea, and many academics have since discussed it extensively (Kozlenkova et al., 2014). According to RBV, a firm's resources can include its financial, physical, and intangible assets, such as corporate governance, human resources, brand, reputation, specialised skills, knowledge, etc. If a firm can continue to manage those factors and resources, make it hard to be copied by rivals, and use them strategically, then the profitability of firms will be improved (Barney, 1991). On the other hand, the system theory states that a firm can't control external factors, such as macroeconomic factors, which can impact a firm's performance (Cheong et al., 2021; Jupe, 2009; Shaoul, 1997).

As mentioned, internal factors (firm characteristics) might affect corporate performance. During the COVID-19 pandemic, many studies argued that a firm's financial flexibility emerged as an essential internal factor impacting its performance (Hardt & Glückstad, 2024; Hüsser & Ohnmacht, 2023; Milone et al., 2023; Ren et al., 2022). For example, Ding et al. (2021) conducted research analysing over 6,700 firms across 61 countries. The results of their study were enlightening. Firms with better financial flexibility (such as higher levels of cash reserves, lower liabilities, and more undrawn credits provided by banks) exhibit a more resilient movement of their stock prices. Also, according to their research, those firms with better financial flexibility witnessed less decrease in their stock prices than those that didn't, highlighting the importance of healthy financial flexibility in defending the impact of uncertainty caused by COVID-19.

Similarly, the research conducted by Fahlenbrach et al. (2021) explored the relationship between a firm's financial flexibility and corporate performance during the COVID-19 pandemic. Their research findings suggested that firms with higher

financial flexibility (as evidenced by more cash and fewer liabilities) experienced a lower revenue shortfall. Moreover, when considering the context of the industry, it was seen that companies with greater financial flexibility demonstrated a significantly lower decrease in stock prices (around 26% less) compared to other firms with lower financial flexibility. Furthermore, Ramelli and Wagner (2020) emphasised in their study the critical role of cash reserves in determining a firm's value during the COVID-19 pandemic. Their observations were rooted in the shifting sentiments of investors and analysts, who expressed concerns about firms with limited cash and high debt levels. The above studies highlight the significance of cash and debt levels for corporate performance during COVID-19. Given the above, we propose the following hypotheses:

H1: Leverage is negatively correlated with corporate performance during the COVID-19 period.

H2: Cash holding level positively correlates with corporate performance during COVID-19.

Firm size is another factor likely to correlate with corporate performance over the COVID-19 period (Ding et al., 2021). Earlier studies have demonstrated that it is impossible to ignore the connection between firm performance and firm size (Lee, 2009; Scherer, 1973). For example, Orlitzky (2001) discovered a strong correlation between firm size and firm financial performance (FFP), as opposed to corporate social performance (CSP), which other researchers previously believed to be a factor in the relationship with FFP. Furthermore, prior research has also demonstrated that larger firms are more likely than small firms to achieve scale economics and higher efficiency, leading to better performance (Scherer, 1973). When it comes to scale economics, the cost of unit output will decrease when unit input increases as the firm grows (Chandler, 1977). This will make the firm more competitive (Lee, 2009). At a specific output level, the firm can achieve scale economics and thus achieve a higher level of profit, assuming that in the market, the unit price of inputs is unaffected by other factors, such as inputs (Gelles & Mitchell, 1996). Additionally, research demonstrates that bigger firms typically have more market power, which enables them to enter the capital market more easily (Baumol, 1967). Amato and Amato (2004) studied retailing industries in the US and found that big firms are more capable of capturing markets than middle firms as they are less competitive.

Moreover, many studies in the literature demonstrate that the correlation between the size of a firm and its corporate performance has greater significance during the COVID-19 pandemic (Bartik et al., 2020). The impact of the economic crisis and COVID-19 on small and medium-sized enterprises (SMEs) was particularly severe, primarily due to their limited access to financial and economic resources, which was further intensified during the recession compared to large firms (Eggers, 2020). SMEs that went bankrupt in 2020 were three times higher than those observed during the Great Recession (Fairlie, 2020). Bartik et al. (2020) conducted a comprehensive survey encompassing a sample size of over 5,800 small firms. They found that the financial weakness inherent in small firms rendered them particularly susceptible to the adverse impacts of the COVID-19 pandemic. In their sample, a significant proportion of firms, namely over 43%, were seen to have experienced temporary closures. Notably, this trend was particularly evident among medium-sized businesses. Many businesses allocate a monthly budget of over 10,000 dollars; however, they lack sufficient liquid assets to support their operations for a whole month. Therefore, this study proposes the following hypothesis:

H3: Firm size positively correlates with corporate performance during COVID-19.

ESG is another concept commonly used in academic accounting literature and business contexts; it typically denotes the three critical dimensions of ESG (Gillan et al., 2021). In some instances, corporate social responsibility (CSR) is usually employed interchangeably with ESG (Gillan et al., 2021). ESG encompasses integrating ESG factors into firms' operational frameworks and stakeholders' investment strategies. On the other hand, CSR pertains to the actions undertaken by a corporation to fulfil its obligations towards society and promote social responsibilities (Gillan et al., 2021). The explicit recognition of governance within the ESG framework distinguishes the two concepts.

In contrast, CSR encompasses governance in an indirect manner (Gillan et al., 2021). The earliest conception of ESG can be found in the 1950s when trade unions managing substantial pension funds identified the potential to leverage their resources to shape the broader social environment (Roberts, 1956).

During the pandemic, ESG has emerged as a significant factor influencing a firm's performance. Companies with higher ESG typically enjoy a higher performance during the pandemic (Ellul et al., 2020). ESG is an essential aspect of a firm's social and environmental responsibility. Albuquerque et al. (2020) discovered that businesses with more favourable ESG ratings tend to enjoy more prominent investor and customer loyalty, which is especially important during the COVID-19 pandemic. Their research also found that in the first phase of the new crown. However, the overall market is in a forward trend; the customer loyalty of companies with high ESG scores will translate into higher profit margins and lower stock volatility. Therefore, this study suggests the following hypothesis:

H4: Environmental, social, and governance are positively correlated with corporate performance during the COVID-19 period.

Furthermore, Ding et al. (2021) argued that certain corporate governance factors, including board size, the presence of independent board members, board compensation, and anti-takeover devices, exhibit correlations with corporate performance during the COVID-19 pandemic. While ESG scores offer an overall assessment of the corporate governance pillar, these scores provide a broad overview of governance conditions, potentially lacking in-depth details.

The academic literature examined the correlation between board size and firm performance (Guest, 2009). An educational debate exists regarding the potential effects of an overly large board size on corporate performance. Some scholars argue that such a large board size may negatively affect corporate performance (Guest, 2009), while others preserve the view that a larger board size may enhance corporate performance (Alabdullah, 2016). Providing advice and monitoring

the firm's management are two fundamental responsibilities entrusted to a board of directors (Zald, 1969). Hence, it is argued by certain scholars that the augmentation of the board of directors can yield advantages for firms (Alabdullah, 2016). First of all, a large board size has the potential to collect the acquisition of valuable information by firms, thereby enhancing their decision-making capabilities and ultimately bolstering corporate performance (Upadhyay & Sriram, 2011).

Additionally, the board of directors possesses the authority to monitor the organisation's functioning, take disciplinary actions against ineffective managers, and safeguard the interests of shareholders (Guest, 2009). Nevertheless, it is argued that larger board sizes can also adversely affect corporations. The large size of the board of directors presents challenges in achieving consensus during board meetings, as well as potential difficulties in coordinating and communicating effectively, which can ultimately decrease corporate efficiency (Jensen, 1993). Furthermore, with the expansion of the board's dimensions, the cohesiveness among its members is likely to diminish, leading to a decreased likelihood of shared objectives and, consequently, making consensus-building more challenging under these circumstances (Lipton & Lorsch, 1992). Thirdly, the enlargement of the board of directors may give rise to a potential occurrence of directors engaging in free-riding behaviour, consequently leading to an escalation in the operational costs of firms (Lipton & Lorsch, 1992). In comprehensive research conducted by Guest (2019), a study of over 2000 UK-listed firms from 1981 to 2022 suggested a significant correlation between board size and corporate performance. Additionally, it was discovered that this correlation exhibits greater strength among large firms, which usually have a larger board size. Similarly, Alqatan et al. (2019) also studied listed firms in the UK from 2012 to 2015 using regression analysis and found that board size statistically correlates with corporate performance.

Furthermore, aside from the potential influence that the size of a firm's board may have on its overall performance, independent directors on the board may also correlate with corporate performance. Independent directors are individuals who are not subject to the influence of corporate insiders or management members, and they can express their independent viewpoints and effectively stand for the interests of shareholders (Fuzi et al., 2016). Consequently, they can supervise the board's and top managers' performance to maximise shareholder interests, including independent directors with industry-specific backgrounds and substantial professional knowledge can significantly contribute to developing corporate strategies and enhance their ability to critically evaluate and counter unjust proposals put forth by other directors during board meetings (Fuzi et al., 2012). Nevertheless, there is agreement among scholars regarding a significant positive correlation between the number of independent directors and corporate performance, or sometimes even a negative correlation (Epps & Ismail, 2009). Garg's (2007) analysis of the board size and the proportion of independent directors in Indian companies concluded that independent directors do not necessarily result in an associated boost in corporate performance or efficiency.

Similarly, the research conducted by Hermalin and Weisbach (1991) revealed no statistically significant correlation between the proportion of independent directors and corporate performance. Furthermore, apart from the observed correlation with corporate performance, the association between the proportion of independent directors and earnings management appears to be ambiguous (Johari et al., 2009). Abdul Rahman and Haneem Mohamed Ali (2006) researched the corporate governance mechanism in Malaysia and revealed a lack of significant correlation between the independence of the board of directors and earning management. One possible explanation for the failure of the board of directors to effectively fulfil its supervisory role is the excessive influence exerted by managers and executive directors overboard affairs.

Moreover, it is observed that firms with executives with greater entrenchment levels tend to experience adverse effects in the stock market (Ding et al., 2021). The analysis conducted by Ding et al. (2021) demonstrates a negative correlation between firm performance and applying anti-takeover devices as metrics for executive defensive measures. Furthermore, empirical research has shown that organisational compensation policies significantly influence corporate behaviour and performance (Rau, 2017). Therefore, this study proposes the following hypothesis based on what has been discussed before:

H5: Corporate governance (including board size, independent board members, board compensation, and anti-takeover devices) positively correlates with corporate performance during the COVID-19 period.

The type of industry a firm has become a crucial factor correlated with corporate performance during the COVID-19 pandemic, especially in the aftermath of the lockdowns imposed by governments worldwide (Ding et al., 2021; Koren & Peto, 2020). This underscores the importance of understanding the unique characteristics inherent to each industry and how they shape businesses to function, compete, and adapt to external shocks. Every industry has attributes, operational norms, and competitive dynamics. These characteristics, deeply ingrained in firms' business models, dictate how they operate daily (Dwivedi et al., 2020). Moreover, industry type influences how businesses respond to external challenges, such as economic downturns, technological disruptions, and, as recently witnessed, global health crises (COVID-19) (Pappas, 2015). Furthermore, Koren and Peto (2020) studied how social distance and lockdown policies impacted different industries during COVID-19 and identified the 50 most affected industries using the North American Industry Classification System (NAICS) code. Therefore, this study introduces the following hypothesis:

H6: Industry type (industries negatively impacted by social distancing and lockdown policies) negatively correlates with corporate performance during COVID-19.

In addition to the previously mentioned internal factors, some external factors that firms cannot control also significantly impacted the firm's performance during the pandemic, such as macroeconomic factors (Egbunike & Okerekeoti, 2018). Inflation is typically considered one of

the most significant macroeconomic factors among all those macroeconomic factors. (Ding et al., 2021). Inflation refers to an economic phenomenon in which the purchasing power of money decreases due to a general increase in the prices of goods and services. (Modigliani & Cohn, 1979). The causes of inflation have triggered a broader debate in the academic literature, with different explanations depending on the assumptions and the country or region where the economic entity is. (Frisch, 1977). The quantity theory of money is one conceivable explanation. According to the quantity theory of money, changes in the amount of money in circulation play a crucial role in determining changes in the price level (Humphrey, 1974). The first economist who used dynamic analysis to examine how the amount of money in circulation impacts the level of prices was David Hume, who started a long debate in the academic literature according to this theory (Totonchi, 2011). The second conceivable explanation is the demand-pull theory introduced by the most famous economist, John Maynard Keynes. According to the demand-pull theory, the main driver of inflation is an increase in aggregate demand, which includes government spending, investment, and consumer spending (Totonchi, 2011). However, it is essential to note that scholars argue whether Keynes' theory applies to all situations, as demand-pull theory, according to some scholars, only works in certain circumstances (Trevithick, 1975).

Besides demand-pull inflation, the third type of inflation is referred to as cost-push inflation, and it is caused by union-mandated wage and compensation increases and employers' increased profits (Porter, 1959). The cost of goods and services rises when unions pressure employers to accept significant wage increases, and employers are forced to raise their prices to cover these costs, which leads to a rise in prices (Throop, 1968). To make up for the rising cost of living brought on by rising prices, wages must be raised again, which triggers another round of cost-push inflation and creates a vicious cycle (Totonchi, 2011). From the 1950s to the 1970s, cost-push inflation was believed to be the primary driver of inflation and was named "new inflation" (Totonchi, 2011). In addition to inflation, as mentioned above, other inflation types and theories in the academic literature, such as structural inflation, monetary theory of inflation, etc., will not be reviewed in this study.

In addition, inflation could also cause a permanent depression in firms as the high inflation rate can lead to a rise in the cost of inputs such as raw materials, labour, and energy. Suppose firms cannot cover these increased costs to consumers through higher prices. In that case, it can decrease their profit margins, making it difficult for them to operate and remain competitive in the long run (Modigliani & Cohn, 1979).

"If a firm is levered, inflation can exert a permanently depressing effect on reported earnings — even to the point of turning real profits into growing losses" (Modigliani & Cohn, 1979, p. 24).

Given the above, this study proposes the following hypothesis:

H7: The inflation rate negatively correlates with corporate performance during COVID-19.

The unemployment rate is another significant macroeconomic factor correlated to a firm's performance in multiple ways (Boyd et al., 2005). One way the unemployment rate can impact firms is by influencing the stock price or return on assets (ROA) (Issah & Antwi, 2017). While the relationship between unemployment and the stock price and ROA is complex and can vary depending on the situation, many studies in the literature have found that the relationship between unemployment rate and firm performance (measured by stock price or ROA) is strong (Kuehn et al., 2017). Gonzalo and Taamouti (2017) investigated the correlation between anticipated and unanticipated unemployment rates in the US, as well as their impact on stock prices within a short time, which was achieved through the application of nonparametric Granger causality analysis and quantile regression-based tests. They found a significant correlation between the unemployment rate and stock prices, as higher levels of unemployment typically correspond with lower interest rates, thereby stimulating upward movement in the stock market. Similarly, Kuehn et al. (2017) used a partial equilibrium labour search model to account for changes in stock returns. They found that labour friction impacts stock price and that companies with low labour friction have higher future returns than firms with high labour friction.

Furthermore, Boyd et al. (2005) argued that surprisingly high unemployment can raise stock prices during an economic expansion but lower stock value during a contraction, as during an economic development, high unemployment might signal an increase in demand for goods and services, leading to higher profits for firms, whereas, during an economic contraction, high unemployment can indicate a decrease in demand, resulting in lower profits and a decline in stock prices (Boyd et al., 2005). Therefore, this study proposes the following hypothesis:

H8: The unemployment rate negatively correlates with corporate performance during COVID-19.

3. RESEARCH METHODOLOGY

This study relies on rigorous data collection from the comprehensive Eikon Refinitiv database to analyze the performance and characteristics of publicly traded firms registered in the US. The dataset spans from the year 2017 to 2022. Given the ongoing financial year of 2023, our data set remains current until the end of the previous calendar year, December 31, 2022.

The Eikon Refinitiv database is a comprehensive repository offering a wide range of financial data. Furthermore, this platform provides an extensive array of up-to-date and past market data, delivers the most recent news updates, presents crucial fundamental data and trading information, and encompasses the ever-changing domains of the Forex and stock markets. Moreover, this comprehensive database encompasses over 30,000 companies across 180 countries or regions. This platform enables users to retrieve a company's historical financial data and a wide variety of other essential information. Within the framework of this research, the majority of the necessary data can be sourced from the Eikon Refinitiv database. The use of the Eikon Refinitiv database is consistent with much other research in the literature (Demers et al., 2021; Fasan et al., 2021; Noja et al., 2020; Ramelli & Wagner, 2020).

The study employs regression analysis to test hypotheses related to firm performance ROA during the COVID-19 pandemic and the pre-COVID period. Internal and external factors are independent variables, including *cash holding*, *total debt*, *ESG scores*, *corporate governance*, *inflation rate*, and *unemployment rate*.

Two time periods are considered: the COVID-19 pandemic period (January 1, 2020–December 31, 2022) and the pre-COVID period (January 1, 2017–December 31, 2019).

ROA is the primary dependent variable, calculated as net income divided by total assets, providing a comprehensive measure of firm profitability.

The study uses the Eikon Refinitiv database for data collection, covering over 30,000 companies in more than 180 countries.

Variables like *total leverage*, *current leverage*, *cash holding level*, and *ESG scores* are defined and sourced from Eikon Refinitiv.

Corporate governance variables include *board size*, *board independence*, and *board compensation*.

An *industry exposure* dummy variable is constructed to assess the impact of industry type on corporate performance during COVID-19.

Inflation rate data is obtained from the Federal Reserve, and *unemployment rate* data is sourced from the Bureau of Labor Statistics.

Reference papers for each independent variable are provided in Table 1.

Table 1. Independent variables and reference

Variable	*Reference*
Total leverage	Ding et al. (2021), Fahlenbrach et al. (2021)
Total current leverage	Ding et al. (2021), Fahlenbrach et al. (2021)
Firm size	Bartik et al. (2020), Cowling et al. (2020), Clampit et al. (2022), Ding et al. (2021)
Cash	Ding et al. (2021), Fahlenbrach et al. (2021), Nason and Patel (2016), Ramelli and Wagner (2020)
ESG	Albuquerque et al. (2020), Ellul et al. (2020), Ding et al. (2021)
Board size	Alqatan et al. (2019), Ding et al. (2021), Guest (2019), Ning et al. (2010)
Independent board members	Ding et al. (2021), Garg (2007)
Board compensation	Murphy (2013), Ding et al. (2021), Rau (2017)
Anti-takeover devices	Ding et al. (2021)
Industry exposure	Koren and Peto (2020)
Inflation rate	Egbunike and Okerekeoti (2018), Ding et al. (2021)
Unemployment rate	Boyd et al. (2005), Ding et al. (2021), Gonzalo and Taamouti (2017), Kuehn et al. (2017)

To investigate the relationship between internal and external factors and corporate performance, this study adopts the regression models suggested by Egbunike and Okerekeoti (2018).

Firstly, to test the relationship between internal factors (including *total leverage*, total *current leverage*, *cash*, *firm size*, *ESG*, *independent board members*, *board compensation*, *anti-takeover* devices, and *industry exposure*) and *corporate performance*, this study introduces the regression model by following Egbumike and Okerekeoti (2018), where *i* and *t* indicate the firms and years, respectively. The summary statistics can be found in Table 2.

Model 1:

$$\begin{aligned} ROA_{i,t} = \alpha + \beta_1 Total\ leverage_{i,t} + \beta_2 Total\ current\ leverage_{i,t} + \beta_3 Cash + \beta_4 Firm\ size_{i,t} \\ + \beta_5 Cash_{i,t} + \beta_6 ESG_{i,t} + \beta_7 Environmental\ pillar\ score_{i,t} + \beta_8 Social\ pillar\ score_{i,t} \\ + \beta_9 Governance\ pillar\ score_{i,t} + \beta_{10} Board\ size_{i,t} + \beta_{11} Independent\ board\ members_{i,t} \\ + \beta_{12} Board\ compensation_{i,t} + \beta_{13} Anti-takeover\ devices_{i,t} + \beta_{14} Industry\ exposure_{i,t} + \mu \end{aligned} \quad (1)$$

Similarly, this study uses the following regression mode to evaluate the relationship between external factors and *ROA* by following Egbunike and Okerekeoti (2018), where *i* and *t* indicate the firms and years, respectively:

Model 2:

$$ROA_{i,t} = \alpha + \beta_1 Inflation_{i,t} + \beta_2 Unemployment_{i,t} + \mu \quad (2)$$

Moreover, to comprehensively examine the correlation between internal and external factors and corporate performance, this study follows Egbunike and Okerekeoti (2018). It integrates Model 1 and Model 2, introducing the following model, where *i* and *t* indicate the specific firms and years, respectively:

Model 3:

$$\begin{aligned} ROA_{i,t} = \alpha + \beta_1 Total\ leverage_{i,t} + \beta_2 Total\ current\ leverage_{i,t} + \beta_3 Cash + \beta_4 Firm\ size_{i,t} \\ + \beta_5 Cash_{i,t} + \beta_6 ESG_{i,t} + \beta_7 Environmental\ pillar\ score_{i,t} + \beta_8 Social\ pillar\ score_{i,t} \\ + \beta_9 Governance\ pillar\ score_{i,t} + \beta_{10} Board\ size_{i,t} + \beta_{11} Independent\ board\ members_{i,t} \\ + \beta_{12} Board\ compensation_{i,t} + \beta_{13} Anti-takeover\ devices_{i,t} + \beta_{14} Industry\ exposure_{i,t} \\ + \beta_{15} Inflation_{i,t} + \beta_{16} Unemployment_{i,t} + \mu \end{aligned} \quad (3)$$

Table 2 provides a statistical summary of the independent and dependent variables employed in this study. The N represents the count of non-missing observations for each variable, measuring the data's completeness. The mean and standard deviation are calculated across these non-missing observations, offering insights into the central tendency and dispersion of the data for each variable, respectively. Additionally, the table reports the 25th and 75th percentiles of the distribution for each variable. These percentiles, also known as the first and third quartiles, provide a deeper understanding of the data's distribution by indicating the values below which a quarter and three-quarters of the data fall, respectively.

Table 3 provides regression analysis results, examining the relationship between internal and external factors and corporate performance during the COVID-19 pandemic. The dependent variable is the *ROA*, calculated as the net income after taxes divided by total assets. COVID-19 represents the annual growth rate of confirmed COVID-19 cases within a given US state. To evaluate a firm's internal factors, this study incorporates *firm size*, *total leverage*, *total current leverage*, *cash*, *ESG*, *environmental score, social score, governance score*, *board size*, *independent board members*, *board compensation*, *anti-takeover devices*, and *industry exposure*. External factors are measured using the *inflation rate*, *unemployment rate*, and gross domestic product growth (*GDP growth*). The analysis spans from December 31, 2020, to December 31, 2022. The first column is the regression result of Model 1, the second column is the regression result of Model 2, and the third column is the regression result of Model 3.

Table 2. Statistics summary of variables

Variable	*N*	*Minimum*	*Maximum*	*Standard deviation*	*25th percentile*
ROA (net income)	3432	-4.877	1.484	0.292	-0.054
Total leverage	3432	0.019	6.416	0.326	0.404
Total current leverage	3432	0.006	2.466	0.145	0.111
Cash	3432	0	0.995	0.255	0.041
Firm size	3432	14.992	27.0362	1.928	20.283
Board size	3432	3	70	2.422	8
Board compensation	3432	-2.765	566.01	9.713	-0.009
Anti-takeover devices	3432	0	11	1.907	5
Independent board members	3432	25	100	10.933	76.923
Industry exposure	3432	0	1	0.491	0
ESG	3432	1	100	28.186	18
Environmental pillar score	3432	0	98.126	28.531	2.961
Social pillar score	3432	0.800	97.762	21.764	31.179
Governance pillar score	3432	3.641	99.463	20.602	40.157
Inflation rate	3432	1.23	8	2.765	1.23
Unemployment rate	3432	3.6	8.1	1.856	3.6
GDP growth	3432	-2.8	5.9	3.562	-2.8

*Note: The symbols ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.*

For more information about definitions and sources of variables in this table, please see Appendix.

Table 4 also provides regression analysis results, examining the relationship between internal and external factors and corporate performance during the pre-COVID-19 pandemic, which spans from December 31, 2017, to December 31, 2019. Other components and measurements are the same as in Table 3.

Table 3. Regression results of the relationship between internal factors, external factors, and ROA during COVID-19 (Part 1)

Independent variable	*ROA (net income)*		
	(1)	*(2)*	*(3)*
Total leverage	-0.20321*** (0.01456)		-0.20065*** (0.01455)
Total current leverage	-0.09448*** (0.03163)		-0.09822*** (0.0363)
Firm size	0.04499*** (0.00372)		0.04564*** (0.00374)
Cash	-0.41598*** (0.02187)		-0.41213*** (0.02188)
ESG	-0.0020*** (0.000343)		-0.00222*** (0.00035)
Environmental pillar score	-0.00063** (0.00027)		-0.00068** (0.00027)
Social pillar score	-0.00152*** (0.00036)		-0.00169*** (0.00037)
Governance pillar score	-0.00045 (0.00031)		-0.00061* (0.00032)
Board size	-0.00589*** (0.00210)		-0.0059*** (0.00210)
Independent board members	0.00043 (0.00045)		0.00041 (0.00045)
Board compensation	0.00048 (0.00042)		0.00047 (0.00042)

Table 3. Regression results of the relationship between internal factors, external factors, and ROA during COVID-19 (Part 2)

Independent variable	*ROA (net income)*		
	(1)	*(2)*	*(3)*
Anti-takeover devices	-0.00058 (0.00232)		-0.0009 (0.00232)
Industry exposure	-0.02189** (0.00865)	-	-0.02262*** (0.00864)
Inflation rate	-0.04303*** (0.01438)	-0.04303*** (0.01438)	-0.03610*** (0.01181)
Unemployment rate	-0.06964*** (0.02143)	-0.06964*** (0.02143)	-0.05892*** (0.01759)
Number of observations	3432	3432	3432
Adjusted R-squared	0.3328	0.013	0.1499
Number of firms	1144	1144	1144

*Note: The symbols ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.*

Table 4. Regression results of the relationship between internal factors, external factors, and ROA during pre-COVID-19

Variable	*ROA (net income)*		
	(1)	*(2)*	*(3)*
Total leverage	-0.18687*** (0.01356)		-0.18612*** (0.01356)
Total current leverage	-0.10579*** (0.0319)		-0.1083*** (0.03192)
Firm size	0.05760*** (0.00381)		0.05729*** (0.00381)
Cash	-0.45751*** (0.02150)		-0.4594*** (0.02150)
ESG	-0.00208*** (0.00040)		-0.00201*** (0.00040)
Environmental pillar score	-0.00151*** (0.00028)		-0.00148*** (0.00028)
Social pillar score	-0.00166*** (0.00042)		-0.00158*** (0.00042)
Governance pillar score	-0.00044 (0.00035)		-0.00038 (0.00035)
Anti-takeover devices	0.00140 (0.00235)		0.00172 (0.00236)
Board size	-0.01005*** (0.00231)		-0.01014*** (0.00231)
Independent board members	0.00073* (0.00041)		0.00074* (0.00040)
Inflation rate	0.00914 (0.02197)	0.00914 (0.02197)	0.01535 (0.01516)
Unemployment rate	0.00926 (0.01919)	0.00926 (0.01919)	0.02832 (0.01507)
Number of observations	3432	3432	3432
Adjusted R-squared	0.002	0.3911	0.3917

*Note: The symbols ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.*

4. RESULTS

This section discusses the regression analysis results, providing a comprehensive overview of the statistical findings and insights derived from the analysis, which will enable a deeper understanding of the relationships between internal factors, external factors, and corporate performance. Overall, this study accepts *H1, H3, H6, H7*, and *H8* and rejects *H2, H4*, and *H5*.

4.1. Internal factors and corporate performance

This section discusses the relationship between internal factors and corporate performance, as discussed in previous sections. This study accepts the *H1* and *H6* but rejects the *H2, H4*, and *H5*. Following is a discussion of each internal factor.

4.1.1 Financial flexibility, firm size and ROA

This study explores the relationship between financial flexibility, macroeconomic variables, and firm performance during and before the COVID-19 pandemic. Despite variations in economic conditions, certain factors consistently impact corporate performance.

- Financial flexibility during COVID-19: *Total leverage* and *total current leverage* negatively correlate with corporate performance during the COVID-19 pandemic.

The relationship between cash and *ROA* is non-linear, forming a U-shaped curve.

Acceptance of *H1* (negative correlation with leverage) and rejection of *H2* (linear correlation with cash).

- RBV perspective: RBV suggests debt as a resource, but during crises like COVID-19, high debt levels pose financial risks. Excessive debts limit a firm's ability to invest, hindering performance.

Cash reserves are essential for dealing with risk, but their excess may indicate a conservative approach, potentially limiting growth and innovation.

- Regression analysis results: *Total leverage*, *total current leverage*, and *cash* holdings negatively correlate with performance. Larger firms exhibit

a positive correlation with performance. External factors (macroeconomic indicators) minimally affect these relationships.

• Pre-COVID-19 period (2017–2019): Financial flexibility indicators maintain negative correlations with performance, consistent with COVID-19. *Firm size* continues to exhibit a positive correlation with performance.

• Two-stage least squares (2SLS) regression analysis: Addresses endogeneity issues, estimating "*cash hat*" devoid of endogeneity. Results show consistent negative correlations between financial flexibility indicators and firm performance. External factors minimally affect these relationships.

• Complex dynamics of cash and performance: Contrary to other studies, more cash is linked to poorer performance. Results suggest a U-shaped relationship between cash reserves and performance. Optimal cash reserves exist, and their benefits may diminish beyond a certain threshold.

• Methodological approach: 2SLS regression analysis employs peer *cash* holdings as an instrumental variable. Control variables include *total leverage*, *total current leverage*, *capital intensity, slack*, and *firm size*.

• Conclusion: Findings emphasise the fundamental role of financial flexibility and firm size in shaping corporate performance, consistent across economic conditions. Contrasting results on the relationship between cash and performance highlight this association's nuanced and non-linear nature, suggesting an optimal cash reserve level exists.

Table 5. Statistics summary of variables in 2SLS analysis

Variable	*N*	*Mean*	*Std. dev.*	*Min*	*Max*	*25th percentile*	*75th percentile*
Cash	8021	0.2174	0.2436	0	0.9938	0.0384	0.3165
ROA	8021	-0.0876	0.9526	-59.2475	2.0733	-0.0698	0.0710
Total leverage	8021	0.6117	0.4998	-0.1228	21.4258	0.3887	0.7471
Total current leverage	8021	0.2301	0.3460	0.0007	12.6576	0.1113	0.2703
Slack	8021	3.9694	88.2159	-251.9706	6667.52	0.1214	0.4584
Capital intensity	8021	-0.5948	17.1563	-1192.75	6.2379	-0.0981	-0.0197
Firm size (employees)	8021	7.6128	2.1360	0	14.2905	6.1538	9.1564
Peer cash ratio	8021	0.2220	0.1482	0...91	0.4939	0.0934	0.3198

This extended research utilises 2SLS regression analysis from 2017 to 2022, dividing the period into pre-COVID-19 (2017–2019) and COVID-19 (2020–2022) phases. The goal is to compare the relationship between *ROA* and *cash* reserves during economic instability and stability. Descriptive statistics in Table 4 support the analysis.

The 2SLS method addresses endogeneity issues, employing instrumental variables to estimate a purified variable, *cash hat*, devoid of endogeneity. Table 6 presents results for the relationship between *cash* and *ROA* from December 31, 2020, to December 31, 2022, with *ROA* as the dependent variable and *firm size, total leverage, total current leverage, slack*, and *capital intensity* as control variables.

Table 6. 2SLS regression results

Variable	*ROA*		
	(1)	(2)	(3)
Cash hat	1.14269*** (0.18341)	0.87590*** (0.31686)	1.06699*** (0.19751)
Cash hat-sq	-2.66076*** (0.29875)	-1.91644*** (0.51564)	-2.70888*** (0.32933)
Total leverage	-0.51310*** (0.03737)	-0.19764*** (0.51564)	-0.42721*** (0.02515)
Total current leverage	0.51310*** (0.03737)	-0.79898*** (0.67526)	-0.35228*** (0.03537)
Firm size (employees)	0.08280*** (0.00710)	0.08194*** (0.05492)	0.08231*** (0.00763)
Slack	0.000179 (0.000138)	-0.000282 (0.000168)	0.00109* (0.0005667)
Capital intensity	0.000489 (0.000651)	-0.000065 (0.000911)	0.00186 (0.00127)
Number of observations	8008	4030	3978
Adjust R-squared	0.1775	0.0981	0.3278

*Note: The symbols ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.*

This study employs the 2SLS method, introducing a squared variable (*cash hat-sq*) to explore the potential non-linear relationship between *cash* reserves and *ROA*. The regression analysis, detailed in Table 6, indicates a positive association between *cash hat* and *ROA* during the pre-COVID-19 period. However, during the COVID-19 pandemic, though the positive relationship persists, the coefficient slightly decreases. Figure 1 illustrates a U-shaped curve, suggesting that *ROA* peaks at a cash ratio of 0.22, highlighting the intricate dynamics between profitability and liquidity. This non-linear trend aligns with previous research and underscores the need for strategic cash management.

Extending the analysis to the three years preceding the pandemic (2017–2019) reveals a consistent U-shaped curve (see Figure 2). The pattern persists despite a slight shift in the peak during COVID-19. Over six years (2017–2022), *cash hat* maintains a significant positive relation with *ROA*, supported by a robust coefficient within the 99% confidence interval. However, the squared

variable, *cash hat-sq* consistently exhibits a negative correlation with *ROA*, emphasising the non-linear nature of the relationship. These findings affirm the study's hypothesis of a U-shaped curvature, implying that excessively high and low cash reserves impact *ROA*, with an optimal mid-point indicating minimal influence. This underscores the critical importance of effective cash management strategies for firms, especially in turbulent economic times.

Figure 1. U-shaped curve of *cash* and *ROA* during COVID-19

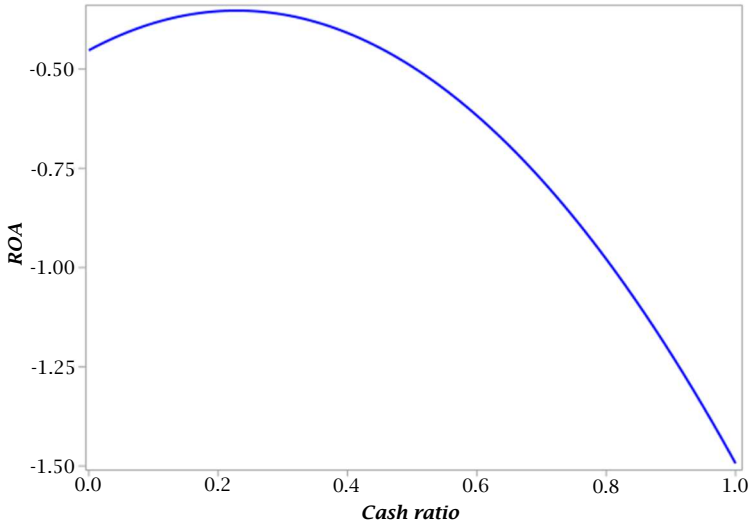
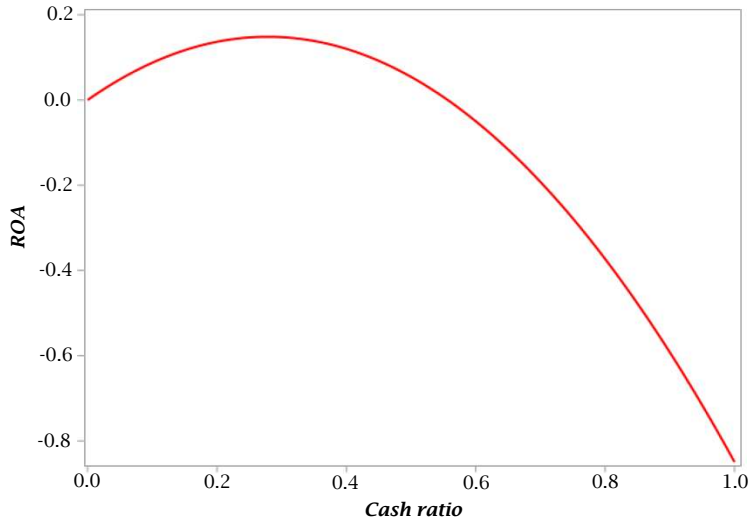


Figure 2. U-shaped curve of *cash* and *ROA* during the time of 2017–2022



4.1.2 Environmental, social, and governance and return of assets

This study examines the relationship between (*ESG*) factors and corporate performance during COVID-19 and pre-COVID-19. The results show a consistent negative correlation between the total ESG score, *environmental pillar score*, *social pillar score*, and corporate performance. However, the governance pillar score does not correlate statistically with performance. The negative correlation persists even when external factors are considered, with a slight enhancement in the association. The study expands the analysis to the three years before the pandemic (2017–2019), revealing similar negative correlations between *ESG* factors and corporate performance. This consistency underscores the robustness of the findings, suggesting a stable relationship between certain *ESG* factors and corporate performance over time. The study rejects the hypothesis that there is no relationship between *ESG* factors and corporate performance, emphasising the need for a comprehensive understanding of these associations given the limited resources available to firms.

4.1.3 Corporate governance and return of assets

This study concludes that contrary to the hypothesis, there is no significant overall relationship between corporate performance and selected governance factors, except for *board size*. The analysis, presented in Table 3, column 1, reveals a negative correlation between *board size* and corporate performance, with a one standard deviation increase in *board size* linked to a 0.0059-unit decrease in performance. This relationship persists even with

the introduction of external factors in column 3, indicating stability over time (2017–2019) and resilience during COVID-19. However, independent board members, *board compensation*, and *anti-takeover devices* do not correlate statistically significantly with corporate performance. The findings emphasise the intricate connection between corporate governance structures and external factors, with the study suggesting the need for a comprehensive understanding of these associations to formulate effective governance strategies.

4.1.4 Industry exposure and return of assets

This study observes a stable and evident relationship between *industry exposure* and corporate performance during COVID-19, irrespective of considering external factors. Different industries, based on the RBV, experience varied impacts from COVID-19. The second column of Table 3 indicates a negative correlation between *industry exposure* and corporate performance, with a one standard deviation increase resulting in a 0.02189-unit decrease in performance. This holds within a 99% confidence interval. The impact remains negative when external factors are considered. Industries heavily dependent on face-to-face interactions, like tourism, suffer, while the technology and healthcare sectors benefit. The results emphasise the importance of managing *industry exposure* for firms to maximise performance regardless of external circumstances.

The study also notes the resilience of specific industries during the pandemic. The information technology (IT) industry benefits significantly, transitioning to digital platforms and educational institutions adopting online methods, which experience increased demand for digital tools and services. SMEs embracing remote work and those proficient in digital tools show greater resilience. Pharmaceutical and medicine manufacturing industries outperform others due to the increased demand for drugs and medical equipment. The research broadens the focus on industries that might benefit from the pandemic, providing a comparative analysis of IT, pharmaceuticals, and telecommunications. Using regression analysis in Table 7, the study examines the correlation between internal and external factors and *ROA* during the COVID-19 period for these three industries, using three-digit NAICS industry codes.

Table 7. Relationship between internal factors, external factors and *ROA* during COVID-19 for selected industry

Variable	*ROA (net income)*		
	(1)	*(2)*	*(3)*
Total leverage	-0.10947*** (0.03032)		-0.10925*** (0.03037)
Total current leverage	-0.53185*** (0.06648)		-0.52607*** (0.067)
Firm size	0.08522*** (0.0092)		0.08367*** (0.00931)
Cash	-0.40296*** (0.04778)		-0.40856*** (0.04805)
ESG	-0.00569*** (0.00098)		-0.00531*** (0.00104)
Environmental pillar score	-0.00213*** (0.00068)		-0.002*** (0.00068)
Social pillar score	-0. 00422*** (0.00095)		-0.00392*** (0.00099)
Governance pillar score	-0.0022** (0.0009)	-	-0.00197*** (0.00093)
Board size	-0.00533 (0.00408)		-0.00543 (0.00408)
Independent board members	0.00218* (0.00118)		-0.00224 (0.00118)
Board compensation	0.0006 (0.00054)		0.00063 (0.00054)
Anti-takeover devices	-0.00544 (0.00605)		-0.00519 (0.00606)
Inflation rate	-0.06850* (0.04024)	-0.06850* (0.04024)	-0.002956 (0.02928)
Unemployment rate	0.08741 (0.05995)	0.08741 (0.05995)	0.03815 (0.04353)
Number of observations	900	900	900
Adjusted R-squared	0.0048	0.4808	0.481

*Note: The symbols ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.*

Column 2 in Table 7 shows no clear association between external factors (*inflation* and *unemployment rates*) and firm performance. This contrasts with the first column, where internal factors like *total leverage*, *cash, firm size*, and *ESG* scores exhibit significant correlations within the 99% confidence interval. For instance, a one standard deviation increase in *total leverage* is linked to a 0.10947-unit decrease in corporate performance, and a similar increase in *firm* size correlates with a 0.085-unit increase. *Total current leverage* shows a stronger negative correlation in selected industries. The third column considers internal and external factors, with results consistent with the first. The relationship between *financial flexibility, firm size*, and *firm performance* remains statistically related within a 99% confidence interval. However, there's no substantial change in the correlation between the *inflation rate* and the *unemployment rate*. Notably, *board size* correlates with corporate performance in most industries during COVID-19. Overall, internal factors play a more significant role in firm performance within selected industries during the pandemic.

4.2. External factors and corporate performance

The study explores the correlation between macroeconomic factors and corporate performance during COVID-19. Table 3 shows a negative correlation within the 99% confidence interval for the inflation and *unemployment rates*, although the correlation strength is relatively low. A one standard deviation increase in inflation is associated with a 0.043-unit decrease in corporate performance, and a similar rise in unemployment correlates with a 0.06964-unit decrease. A slightly diminished negative correlation remains when considering internal and external factors (column 3 in Table 3). The sample expansion to include 2017–2019 (Table 4) shows no substantial correlation between inflation, unemployment, and corporate performance. The study suggests heightened corporate performance responsiveness to macroeconomic indicators during economic recessions.

The theoretical framework aligns with system theory, viewing firms as dynamic systems interacting with their external environment. The *inflation* and *unemployment rates*, crucial macroeconomic indicators, impact corporate performance. Firstly, rising inflation can increase production costs, reduce profit margins, and necessitate pricing adjustments. Moreover, persistent inflation may erode consumer purchasing power, negatively affecting business sales. Secondly, an increase in unemployment signals an economic slowdown, reducing consumer spending on non-essential items and potential threats to business operations due to social discontent and instability.

5. DISCUSSION OF THE RESULTS

This discussion delves into the complex relationships between internal and external factors and their influence on corporate performance during the COVID-19 pandemic. The study explores critical findings related to financial flexibility, debt levels, cash holdings, industry exposure, ESG considerations, and macroeconomic factors.

A statistical relationship is identified between a firm's financial flexibility, size, and corporate performance, holding true during pre-COVID-19 and pandemic periods.

Total and current leverage correlate negatively with corporate performance, aligning with existing literature. Excessive debt levels may lead to increased interest expenses, negatively impacting profitability.

Contrary to some literature, higher cash reserves are associated with a decline in corporate performance during COVID-19.

A nuanced exploration using 2SLS analysis reveals a non-linear relationship, indicating an inverse U-shaped pattern. Beyond a certain threshold, excessive cash reserves might signal inefficiency or reluctance to pursue transformative actions.

Due to social distancing measures, industries reliant on face-to-face operations experienced a negative impact on corporate performance during the pandemic.

Sensitive correlations between total current leverage and corporate performance are observed in industries less affected by the pandemic, emphasising the role of asset and liability structures in maintaining stability.

A surprising negative correlation is found between ESG scores and corporate performance during the pandemic, diverging from prior studies.

The short-term focus on survival during crises may overshadow the long-term benefits of ESG investments, highlighting the complexity of the relationship between ESG and firm performance.

During the COVID-19 pandemic, a negative relationship is established between inflation, unemployment rates, and corporate performance. Firms appear more vulnerable to macroeconomic changes during crises. In contrast, the pre-pandemic Period lacks a statistically confident association between macroeconomic factors and corporate performance.

The study's focus on US-based businesses limits broad applicability to diverse global contexts. Using only two macroeconomic variables (inflation and unemployment) and an annual data collection frequency presents limitations.

Future research should diversify sample sources internationally, incorporate additional external factors, and increase the frequency of data collection for a more nuanced understanding.

This discussion provides valuable insights into the intricate relationships shaping corporate performance during the COVID-19 pandemic. The nuanced findings highlight the need for adaptive strategies in the face of diverse internal and external influences. Future research directions are suggested to enhance the comprehensive understanding of these relationships, facilitating more informed responses to potential economic downturns in the future.

As for the governance pillar score and performance, the governance pillar score does not statistically correlate with performance in this study, which can be attributed to several factors. Governance scores typically offer a broad overview of governance conditions, potentially lacking the depth needed to capture specific elements that directly impact performance. For example, while governance scores may reflect compliance with best practices and regulatory standards, they might not adequately measure the effectiveness of governance mechanisms in enhancing decision-making or strategic execution. Moreover, governance factors such as board size, independence, and compensation practices can have complex and sometimes conflicting influences on performance. Larger boards, while potentially bringing diverse perspectives, may also suffer from coordination and communication challenges, leading to inefficiencies. Although expected to provide oversight, independent directors may lack the detailed company-specific knowledge needed to drive performance improvements. Additionally, the study's period, focusing on the volatile period of the COVID-19 pandemic may have further obscured the relationship between governance scores and performance, as companies prioritised immediate survival over long-term governance improvements. Thus, the lack of a significant statistical correlation suggests that governance scores alone may not be a reliable predictor of corporate performance, highlighting the need for more nuanced and detailed governance assessments.

6. CONCLUSION

This research, rooted in management control systems, strategic planning, and corporate performance sustainability, illuminates the intricate dynamics between internal and external factors during the challenging COVID-19 era. Employing regression analysis on a dataset of over 1,000 US-listed companies sourced from the Eikon Refinitiv database, the study underscores the central role of management control systems. It emphasises the importance of integrating strategic and operational facets, particularly in managing financial flexibility, encompassing total leverage, current leverage, and cash holdings across various business domains.

Aligned with the RBV theory, the study reveals a statistically negative relationship between financial flexibility and corporate performance during the pandemic. This accentuates the adaptive role of management control systems in responding to external shocks and aligning performance with resource management.

The study explores the intricate interplay between cash management and corporate performance by unravelling a non-linear relationship with an inverted U-shaped curve. This highlights the strategic and operational dimensions integral to effective management control systems.

The research underscores the significance of a firm's size within management control systems, confirming its positive correlation with performance. It positions size as a resource base, emphasising the role of internal and external service providers in sustaining corporate performance.

Incorporating ESG factors into management control systems is essential for sustainable corporate performance. These considerations contribute to maintaining a company's reputation and competitive advantage.

Exploring corporate governance, the research identifies a statistical relationship between board size and firm performance. In contrast, factors like independent board members, board compensation, and anti-takeover mechanisms exhibit unrelated correlations, emphasising the complexity of strategic and operational elements within management control systems.

The study highlights the industry-specific sensitivity of total current leverage and corporate performance, demonstrating the adaptability of management control systems across diverse sectors. Integration of macroeconomic factors, such as inflation and unemployment rates, underscores the influence of external elements, highlighting the pivotal role of management control systems in adapting to uncontrollable factors.

The robustness test reinforces the study's consistency, emphasising the imperative for adaptable and sustainable management control systems in navigating change and unforeseen disruptions.

While enriching our understanding of management control systems, the study acknowledges limitations, focusing solely on US businesses. Future research avenues include broadening the scope to different regions and incorporating additional macroeconomic variables and shorter time intervals to enhance insights during crises like the COVID-19 pandemic.

This research has several limitations that must be acknowledged. Firstly, the study's focus on US-based businesses restricts the generalizability of the findings to different global contexts. The unique economic, regulatory, and cultural environment in the US may not reflect the conditions in other countries, thus limiting the applicability of the results internationally. Secondly, the study spans a limited period, primarily focusing on the pre-COVID-19 and COVID-19 periods. This temporal scope may not capture long-term trends and effects that could provide a more comprehensive understanding of the relationships examined.

Additionally, the use of the 2SLS method, while robust, may still be susceptible to potential biases and limitations inherent in any econometric approach, such as model specification errors or omitted variable bias. Furthermore, relying on secondary data sources for ESG scores and financial metrics may introduce inaccuracies or inconsistencies due to variations in data collection and reporting standards. Finally, the study's emphasis on specific governance factors, such as board size and independent directors, overlooks other potentially influential aspects of corporate governance, such as shareholder activism or executive compensation structures, which could also impact corporate performance.

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APPENDIX

Table A.1. Variables definitions

Variable	*Definition*	*Source*
ROA (net income)	The ratio of net income to total assets.	Eikon Refinitiv
ROA (OP)	The ratio of operating income to total assets.	
Total leverage	The ratio of total liabilities to total assets. Total liabilities are the combined debts and obligations that a firm owes.	
Total current leverage	The ratio of current liabilities to total assets. Current liabilities are a firm's debts or obligations due within 12 months.	
Cash	The ratio of the total amount of cash and short-term investments to total assets.	
Cash hat	The predicted value of the average peers' cash of a firm.	
Cash hat-sq	The square value of the cash hat.	
Slack	The ratio of the total amount of selling, general, and administrative expenses to revenue. Revenue encompasses sales of merchandise, manufactured goods, and services and the distribution of regulated energy resources contingent on a firm's industrial domain.	
Capital intensity	The ratio of capital expenditures to revenue. Revenue encompasses sales of merchandise, manufactured goods services, and the distribution of regulated energy resources, contingent on a firm's industrial domain.	
Firm size	The natural logarithm of the total assets of a firm.	
Firm size (employees)	The natural logarithm of the total amount of employees of a firm.	
ESG	Equal to the ESG score. ESG score is an overall firm score based on self-reported ESG information.	
Environmental pillar score	Equal to the environmental pillar score.	
Social pillar score	Equal to the social pillar score.	
Governance pillar score	Equal to the governance pillar score.	
Board size	The total number of board members at the end of the fiscal year.	
Independent board members	Percentage of independent board members as reported by the firm.	
Board compensation	Total compensation of board members.	
Anti-takeover devices	The number of anti-takeover devices.	
Industry exposure	It is equal to 1 if a firm's NAICS code is consistent with the 50 listed industries, otherwise 0.	
Inflation	Equal to the inflation rate reported by the Federal Reserve System.	Federal Reserve System, the central banking system of the United States
Unemployment rate	This is equal to the unemployment rate reported by the Bureau of Labor Statistics at the end of the year.	Bureau of Labor Statistics
GDP growth	Equal to the GDP growth rate of the United States that the World Bank reported.	World Bank

Note: The definitions of variables gained from the Eikon Refintiv database this Appendix used are from the Eikon Refintiv database (including total liabilities, current liabilities, ESG score, the environmental pillar score, the social pillar score, and the governance pillar score).