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The Influence of Environmental, Social, and Governance (ESG) Practices on US Firms' Performance: Evidence from the Coronavirus Crisis

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Abstract

This study explores the influence of total and individual ESG practices and the coronavirus crisis on US firm performance (FP). A large and recent sample of 406 US firms that adopted ESG issues during 2016–2020 was used. This study uses the generalized least-squares (GLS) regression estimator, the dynamic analysis technique, and robustness tests. The results indicate that firms with heightened ESG practices have better performance measures. In most cases, the results suggest that firms with heightened environmental, social, and governance performances have better performance measures. The results suggest that the coronavirus crisis negatively affected FP measures. In addition, the analyses of the differences suggest significant distinctions in FP due to the coronavirus crisis. This study's findings have important implications for stakeholders. Managers could benefit from the results of this examination by recognizing the status of ESG practices and FP before and during the coronavirus crisis and identifying the linkage between the fulfillment of ESG responsibilities and FP. This study provides noteworthy practical implications that could enable managers to develop strategies and policies for adopting and enhancing ESG practices to achieve the best performance. Furthermore, the results could influence trading processes as investors and financiers pursue attractive financial returns from investments in businesses concerned with ESG issues.

Keywords Environmental · Social · Governance · ESG · Performance · Coronavirus crisis

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Introduction

The early 2000s financial crisis of the USA severely affected global markets, leading to economic obstacles that required significant levels of government intrusion and societal attention (Nicholson et al., 2011). Additionally, there have been many issues regarding ethical behavior, responsibility, supervision, and doubts regarding firm reporting as a reliable source of information for stakeholders (Alqallaf & Alareeni, 2018). Therefore, many firms seek to develop policies and strategies to provide information users with a transparent snapshot of their business responsibility procedures and initiatives by following environmental (ENV), social (SOC), and governance (GOV) criteria because of stress from officials, financial markets, and stakeholders (Habib, 2022). Enhanced transparency can help attract money and sustain investors' trust in the stock market. Simultaneously, a lack of disclosure may cause immoral behavior, manipulation, and doubt in exchange integrity, which costs firms, information users, and the economy (Demise, 2006). Consequently, firms attempt to disclose ESG issues to attract investments and enhance firm value (Habib, 2022).

ESG performance involves the integration of ENV, SOC, and GOV performance (Habib, 2022). Rezaee (2016) confirms that including and employing ESG performance in the management strategy of firms can generate value. In recent years, ESG performance has attracted decision-makers as an essential method for enhancing firm value (Habib, 2022; Malik, 2015). Therefore, some researchers believe that firms that desire to stand out in the business environment should prioritize enhancing their ESG performance (Habib, 2022; Hockerts & Moir, 2004; Vandekerckhove et al., 2008). Shiller (2013) confirms that as financial markets play a crucial role in maintaining various SOC activities, ESG information also serves investors and society. Therefore, Eccles et al. (2014) assert that disclosing ESG information to stakeholders is necessary for firms to attract long-term investors. In addition, ESG analysis provides a holistic view of the potential ENV and SOC risk areas and opportunities for firms in rapidly changing markets. Firms concentrating on ESG investments can reduce costs, enhance productivity, alleviate risk potential, deliver opportunities for revenue generation, and improve their earnings and long-term sustainability (Eccles et al., 2014; Malik, 2015; Rezaee, 2016).

Several theories have proposed explanations for the ESG issues. For example, stakeholder theory posits that corporate SOC responsibility practices may help businesses enhance their relationships with stakeholders (Bitektine & Haack, 2015; Russo & Perrini, 2010; Tu & Huang, 2015). Institutional and legitimacy theories suggest that enhancing SOC practices improves FP (Beddewela & Fairbrass, 2016; Velte, 2017). In addition, resource allocation theory suggests that businesses should determine how to allocate resources to all productive activities in a cost-effective manner (Ferrier, 1994; Li & Cui, 2008). The resource-based theory implies that large firms perform better in ESG practices. From a resource-based perspective, these resources enable firms to enhance their ESG practices (Ruf et al., 2001). Thus, it improves firm image and customer trust (Greening & Turban, 2000; Orlitzky et al., 2003). Moreover, Godfrey et al. (2009) suggest that

ESG investment is considered a form of a reputational hazard coverage. Sharfman and Fernando (2008) state that ESG can mitigate residual firm hazards. In addition, a survey by Allianz (2019) found that approximately 79% of Americans supported the notion of investing in firms that heeded important issues, about 74% stated that ESG investments initiated them to feel confidence, and about 69% mentioned that GOV issues are also necessary for their decision to invest (Allianz, 2019). Customers desire to ensure that firms they buy from have clear ESG strategies and policies because buying choices are linked to SOC concerns, which means that firms must concentrate on establishing and enhancing ESG performance to get and keep investors and customers in addition to issues of product costs, competitive prices, product quality, and after-sales services. According to an Allianz report, one-third of customers choose firms based on their SOC responsibility policies (Allianz, 2019). Moreover, the KPMG's global organization found that 96% of the world's largest traded firms are already disclosing information on their ESG performance. In addition, some firms believe that publishing their performance in this field shows the importance of ESG for the market and potential investors and that focusing on ESG matters ensures long-term FP and investment (KPMG, 2020).

In addition, previous studies have attempted to discover the influence of ESG performance on FP, but their focus was on a single aspect of ESG dimensions, that is, ENV, SOC, and GOV (Adegbite et al., 2019; Barnett & Salomon, 2012; Elsayed & Paton, 2005; Hu et al., 2018; Qiu et al., 2016; Smith et al., 2007). However, focusing on only one dimension without considering others may not be appropriate for the comprehensive assessment of ESG practices. Only a few ESG studies have examined all ESG sub-dimensions and their influence on FP through multiple indicators related to accounting measurements while neglecting market-based measurements (Ahmad et al., 2021; Han et al., 2016; Sassen et al., 2016; Tarmuji et al., 2016; Velte, 2017). Moreover, the impact of the coronavirus pandemic has had great consequences on all economic aspects, whether on a macro- or micro-scale (Fauci et al., 2020). Therefore, this study explores the influence of total and individual ESG practices on market-based performance indicators, focusing on the coronavirus crisis's statistical influence on firms' market value. Because of the significance of firms' current and prospective investments, this study focuses on market-based performance indicators, as investors care about past, current, and future market prices, and firm market value. Orlitzky et al. (2003) and Ullmann (1985) demonstrate that market-based performance indicators are superior to accounting-based performance indicators because they focus on a firm's ability to generate future earnings rather than on historical performance. Furthermore, accounting adjustments and management manipulations are unlikely to affect market-based performance metrics. Therefore, these indicators are essential for investors to invest in a firm. In addition, this examination is significant for decision-makers to recognize the efficiency of businesses' performance and ESG practices during the pandemic and take adequate corrective actions to improve ESG practices and firm value. Additionally, the results could influence trading processes as investors and financiers pursue attractive financial returns from investments in businesses concerned with ESG issues.

The primary motivation for this study was for multiple reasons. Firstly, ESG practices play a critical role in helping businesses enhance their relationships with stakeholders (Bitektine & Haack, 2015; Habib, 2022; Russo & Perrini, 2010; Tu & Huang, 2015). Secondly, ESG practices should be enhanced to achieve the best performance (Eccles et al., 2014; Habib, 2022; Malik, 2015; Rezaee, 2016). Therefore, this study explores the influence of ESG practices on market-based performance indicators, as investors care about market measures when making their investment decisions. Thirdly, most studies have attempted to explore a single aspect of ESG dimensions and neglected the remaining aspects, although ESG issues are interrelated, and concentration on one dimension may lead to unsatisfactory (Adegbite et al., 2019; Barnett & Salomon, 2012; Elsayed & Paton, 2005; Hu et al., 2018; Qiu et al., 2016; Smith et al., 2007). Therefore, the current examination focuses on total and individual ESG practices to provide comprehensive information regarding these practices, which could be beneficial for managers in identifying the link between the fulfillment of ESG responsibilities and FP. Finally, the great consequences of the emergence and spread of the coronavirus pandemic on all economic aspects necessitate the need to verify the statistical impact of the crisis on the progress of FP.

Additionally, this examination contributes to the existing body of knowledge. Firstly, to our knowledge, this examination is one of the first to assess the effect of firm ESG activities on market-based performance before and during the coronavirus crisis. Secondly, it is justified to revisit the influence of ESG performance on FP, especially in the USA, due to the scarcity of related research. Thirdly, this study defines total and individual ESG practices without neglecting any aspect to provide comprehensive information on the overall performance of firms in terms of these practices. Fourthly, the results may also be helpful for decision-makers in raising their cognition of the significance of ESG practices in achieving the best performance, and the importance of combining them into all parts of the business. Finally, this study provides noteworthy practical outcomes, enabling decision-makers to adopt a mix of ESG practices to enhance continuous improvement processes and firm value.

Literature Review and Hypothesis Formulation

Previous studies that have explored the influence of ESG practices on FP have yielded inconclusive results, and most have attempted to explore a single aspect of ESG dimensions, neglecting the rest of its (Adegbite et al., 2019; Barnett & Salomon, 2012; Elsayed & Paton, 2005; Hu et al., 2018; Qiu et al., 2016; Smith et al., 2007). There is no doubt that ESG issues are interrelated and focusing on one dimension may lead to unsatisfactory results. In addition, few studies have focused on all ESG sub-dimensions and their influence on FP (Ahmad et al., 2021; Habib, 2022; Han et al., 2016; Sassen et al., 2016; Tarmuji et al., 2016; Velte, 2017). Given the importance of these issues, the findings are necessary for users of accounting information to increase their awareness of ESG performance, disclosure scores, and firm status from a comprehensive perspective.

Adegbite et al. (2019) investigate the linkage between SOC performance and FP in 314 UK-listed firms during 2002–2015, and the results confirm the existence of a nonlinear link between SOC and FP. Hu et al. (2018) explore the connection between SOC responsibility and firm value by applying it to a sample of Chinese manufacturing firms from 2010 to 2015, and the findings indicate that SOC responsibility is positively connectedwith firm value. Han et al. (2016) investigate the linkage between ESG practices and FP by applying it to a sample of Korean firms from 2008 to 2014. The results show mixed results, as ENV and GOV performance correlates with FP indicators, whereas SOC performance does not show any significant evidence of FP indicators. Qiu et al. (2016) examine the linkage between ENV and SOC disclosures and FP for a sample of firms listed on the FTSE350 index during 2005–2009, and the findings suggest that firms with more economic resources make more comprehensive disclosures and achieve better FP. Barnett and Salomon (2012) explore the connection between corporate SOC performance and FP for 1214 firms from 1998 to 2006, and the findings confirm a nonlinear relationship between corporate SOC performance and FP. Smith et al. (2007) examine the link between ENV disclosure and the performance of Malaysian firms, and their findings imply that ENV disclosure negatively affects FP. Elsayed and Paton (2005) examine the influence of ENV performance on FP using dynamic and static panel data on 227 UK firms covering 1994 to 2000, and the findings imply that ENV performance has a neutral influence on FP. In addition, the static panel data estimates demonstrate a weak but significant negative influence on the return on assets. At the same time, there is no important impact on the Tobin's *Q* ratio or return on sales. Additionally, dynamic panel data estimates provide limited proof that ENV affects FP.

In addition, Ademi and Klungseth (2022) investigate the linkage between ESG performance and FP using a sample of 150 US firms from 2017 to 2020. The results show a positive influence on FP. Al Amosh et al. (2022) examine the influence of ESG disclosure on FP using a sample of 124 firms in levant countries from 2012 to 2019. These results demonstrate a positive impact on FP. Buallay and Al Marri (2022) examine the influence of ESG disclosure on telecommunications and information technology sector performance in 41 countries using a sample of 1844 observations from 2008 to 2017. The results show that there is a negative influence on market performance, but no significant influence on operational and FP. Habib (2022) examines the impact of ESG performance on corporation value by employing a sample of 964 US firm-year observations from 2016 to 2019. The results show a positive impact on corporation value. Kalia and Aggarwal (2022) examine the influence of ESG practices on the FP of healthcare firms using a sample of 468 firms in 2020. The results indicate a positive influence on FP in developed economies and a negative influence on developing economies. Nguyen et al. (2022) examine the influence of ESG practices on FP using a sample of 57 US firms. The results reveal a positive influence on FP. Nurim et al. (2022) examine the influence of ESG activities on FP using a sample of 139 Indonesian firms from 2013 to 2019. The results confirm that FP consistently influences ESG performance and that ESG performance mediates the relationship between FP and firm value. Rahi et al. (2022) examine the influence of ESG practices on FP using a sample of 39 financial firms in Sweden, Denmark, Finland, and Norway from 2015 to 2019. The results demonstrate a

positive influence on FP in terms of return on assets and a negative influence on FP in terms of return on equity, return on invested capital, and earnings per share. Carnini Pulino et al. (2022) examine the influence of ESG disclosure on FP by employing a sample of 263 Italian-listed corporations from 2011 to 2020. The outcomes show a positive influence on FP. Wasiuzzaman et al. (2022) analyze the connection between ESG practices and FP by employing a sample of 668 corporations in the energy sector from 2009 to 2016. These outcomes show a negative influence on FP. Ahmad et al. (2021) investigate the influence of ESG on FP by employing a sample of 351 UK corporations from 2002 to 2018. The outcomes reveal that there is a significantly favorable influence on FP. Chen et al. (2021) examine the influence of ESG responsibility on FP by employing a sample of 311 Chinese-listed corporations from 2008 to 2019. The outcomes show that the influence of ESG fulfillment on FP is dynamic and long term, as a firm's FP is significantly and negatively influenced by ESG fulfillment in the short term because of the opportunity and incurred costs; however, a firm's FP is significantly and positively influenced by ESG fulfillment in the long term. Alareeni and Hamdan (2020) examine the influence of ESG on the operational, financial, and market performance of the listed US S&P 500 firms from 2009 to 2018. The results confirm a positive connection between ESG disclosure and FP. Velte (2017) investigates the linkage between ESG performance and FP in Germany during 2010–2014. The results demonstrate that ESG performance influences return on assets but does not influence Tobin's *Q* ratio, and GOV performance has the most potent impact compared to the other sub-dimensions. Sassen et al. (2016) investigate the influence of ESG on firm risk in Europe from 2002 to 2014. The results confirm that higher ESG minimizes firm risk, SOC performance has an unfavorable consequence on all risk measures, ENV performance reduces firm idiosyncratic risk, and the firm's GOV dimension has no significant influence on firm risk. Tarmuji et al. (2016) investigate the influence of ESG on FP by using samples from Malaysia and Singapore from 2010 to 2014. The results show that ESG practices influence FP. Based on the outcomes of ESG practices, we propose the following hypotheses:

H1a. ESG practices positively influence FP during the study period.
H1b. ENV practices positively influence FP performance during the study period.
H1c. SOC practices positively influence FP performance during the study period.
H1d. GOV practices positively influence FP performance during the study period.

Moreover, the impact of the coronavirus pandemic has had significant repercussions on all aspects of the economy, whether on a macro- or micro-scale (Fauci et al., 2020; Habib & Kayani, 2022; Habib & Mourad, 2022). Considerable activities have been suspended due to the crisis in order to restrict the consequences of the crisis and mitigate its harmful influence. When governments make assertive efforts to handle the emerging health dangers posed by the pandemic, corporate managers face considerable challenges in managing ESG practices. This demonstrates the critical role of resilient decision-makers in enhancing ESG practices and FP. In addition, the author has not found any prior research related to this issue in the context of the coronavirus crisis. Accordingly, this study is one of the first attempts to explore

the influence of ESG practices on FP during a crisis. Based on the consequences of the crisis, we propose the following hypotheses:

H2. The coronavirus crisis negatively influence FP during the study period.
H3. On average, there were noteworthy differences in FP due to the crisis.
H4. On average, there were noteworthy differences in a firm's total and individual ESG practices due to the crisis.

Data and Methodology

The current study uses a large and recent sample of US firms. Table 1 lists the sample size and characteristics, representing 403 firms with 2015 firm-year observations. These firms are listed on the NASDAQ Capital Market (NASDAQ-CM), New York Stock Exchange (NYSE), and NYSE American Exchange (NYSE-AM), whose annual data were obtained using Standard and Poor's DataStream from 2016 to 2020.

Many types of research are subjective regarding FP measurement, as each indicator concentrates on a unique component with inherent biases and limitations. Orlitzky et al. (2003) argued that the indicators related to accounting measurements are essential metrics of firm efficiency; nonetheless, investors care about past, current, and future market prices and firm market value. Their choices were based on the observations of these signs. Additionally, Ullmann (1985) states that market-based performance indicators are superior to indicators based on accounting because investors focus on a firm's capacity to generate future earnings instead of prior FP. Moreover, market-based performance indicators are unlikely to be influenced by

Table 1 Sample size and characteristics

Panel A: Sample description		
Description	Number	Percentage
Initial sample	547	100%
Inadequate data	144	26.3%
Final sample	403	73.7 %
Panel B: Decomposition of the final sample		
Sector classification	Number	Percentage
Communication services	14	3.5%
Consumer discretionary	39	9.7%
Consumer staples	25	6.2%
Financials	96	23.8%
Healthcare	39	9.7%
Industrials	61	15.1%
Information technology	52	12.9%
Materials	25	6.2%
Real estate	28	6.9%
Utilities	24	6%

accounting changes and management manipulation. These indicators are crucial to investors' decisions to buy stocks. Thus, this study uses market-based performance indicators as dependent variables, that is, market value (MV), total enterprise value (TEV), and Tobin's Q ratio, because accounting adjustments and management manipulations are unlikely to affect market-based performance metrics. Table 2 presents the definitions of the dependent, independent, and control variables.

To explore the influence of total and individual ESG practices on market-based performance indicators, focusing on the coronavirus crisis's statistical influence on firms' market value, we assign the study models as follows:

$$DepVar_{i,t} = \beta_0 + \beta_1 ESG_{i,t} + \beta_2 COV_{i,t} + \beta_3 SIZE_{i,t} + \beta_4 AGE_{i,t} + \beta_5 LEV_{i,t} + \alpha \quad (1)$$

To further examine ESG performance, this study also examines the influence of the sub-dimensions of ESG performance, that is, ENV, SOC, and GOV performance, as follows:

$$DepVar_{i,t} = \beta_0 + \beta_1 ENV_{i,t} + \beta_2 SOC_{i,t} + \beta_3 GOV_{i,t} + \beta_4 COV_{i,t} + \beta_5 SIZE_{i,t} + \beta_6 AGE_{i,t} + \beta_7 LEV_{i,t} + \alpha \quad (2)$$

As mentioned in the above equations, the dependent variables are proxied by the MV, TEV, and Tobin's Q ratio. A natural log is considered for the variables to mitigate skewed data from being more normally distributed and to achieve a constant variance. Specifically, MV is measured by multiplying a firm's outstanding ordinary shares by its current share price at the end of the period. TEV is measured as the sum of market capitalization, the market value of debt, and preferred stock after excluding cash and cash equivalents at the end of the period. Tobin's Q ratio is measured by dividing the market value of a firm by its total assets at the end of the period. ESG is the sum of the ENV, SOC, and GOV practice scores obtained from Standard and Poor's DataStream. The score is between 0 and 100, with the first quartile (0–25) indicating poor relative ESG performance. The second quartile (> 25–50) indicates satisfactory relative ESG performance. The third quartile (> 50–75) indicates good relative ESG performance. The last quartile (> 75–100)

Table 2 Definition of Variables

Variable	Definition
MV	Market value of firm *i* in period *t*
TEV	Total enterprise value of firm *i* in period *t*
Tobin's *Q*	Tobin's *Q* ratio of firm *i* in period *t*
ESG	ESG performance score of firm *i* in period *t*
ENV	Environmental performance score of firm *i* in period *t*
SOC	Social performance score of firm *i* in period *t*
GOV	Governance performance score of firm *i* in period *t*
COV	Coronavirus crisis of firm *i* in period *t*
SIZE	Size of firm *i* in period *t*
AGE	Age of firm *i* until period *t*
LEV	Financial leverage of firm *i* in period *t*

indicates excellent relative ESG performance. The sub-dimensions of ESG performance are interrelated and have the same importance because firms cannot concentrate on only one dimension to improve their overall ESG performance (Ahmad et al., 2021; Habib, 2022; Han et al., 2016; Sassen et al., 2016; Tarmuji et al., 2016; Velte, 2017). ENV, SOC, and GOV are the environmental, social, and governance performance scores, respectively. COV is measured by a dummy variable taking the value of one for the time of the coronavirus crisis and zero otherwise. The control variables considered are firm size (SIZE), age (AGE), and financial leverage (LEV). SIZE is measured as the natural log of a firm's total assets at the end of the period. AGE is measured as the natural log of a firm's age until the end of a period. LEV is measured by dividing a firm's debt by its assets at the end of the period.

This study used a generalized least-squares (GLS) regression estimator, which is considered a generalization of the ordinary least-squares (OLS) estimator and is used to obtain more accurate inferences for model parameters and overcome the issue of heteroscedasticity (González-Coya & Perron, 2022; Hsiao, 2007; Kaufman, 2013). Furthermore, this study adopted additional analyses using a dynamic analysis technique as a more general model. It is based on the Arellano-Bover/Blundell–Bond generalized method of moments (GMM) system estimator. This technique allows the dependent variable as a lagged variable included in the model to outline the dynamic effects in the panel data analysis, and it allows error terms to have autoregressive dependence over time (Ahmad et al., 2021; Elsayed & Paton, 2005; Geroski et al., 1997). In addition, this study adopted robustness tests to verify the validity of the findings.

Empirical Results

Descriptive Statistics

Table 3 demonstrates the summary statistics of the examination variables before and during the coronavirus pandemic crisis.

The average MV was 6.02 and 5.83, with a standard deviation of 0.97 and 1.01, before and during the coronavirus crisis, respectively. This indicates that US firms' market values decreased because of the coronavirus crisis. The average TEV was 5.40 and 5.25, with a standard deviation of 0.72 and 0.64, before and during the coronavirus crisis, respectively. This indicates that US firms' total enterprise values decreased because of the coronavirus crisis. The average Tobin's Q was 4.81 and 4.56, with a standard deviation of 1.26 and 1.28, before and during the coronavirus crisis, respectively. This indicates that US firms' Tobin's Q ratios decreased because of the coronavirus crisis. In addition, the average ESG was 3.31 and 3.28, with a standard deviation of 0.57 and 0.62, before and during the coronavirus crisis, respectively. This indicates that US firms' environmental, social, and governance performance decreased because of the coronavirus crisis. The average ENV was 2.80 and 2.56, with a standard deviation of 1.38 and 1.63, before and during the coronavirus crisis, respectively. This indicates that US firms' environmental performance decreased because of the coronavirus crisis. The average SOC was 2.80 and 2.75,

Table 3 Descriptive statistics

Variables	Crisis status	Mean	Std. Dev.	Min.	Max.
MV	Before	6.022	0.965	3.980	10.652
	During	5.832	1.007	3.759	10.078
TEV	Before	5.403	0.721	4.118	8.741
	During	5.253	0.641	4.371	7.497
Tobin's *Q*	Before	4.808	1.264	0.788	8.736
	During	4.562	1.278	0.774	7.516
ESG	Before	3.309	0.571	1.386	4.466
	During	3.283	0.622	1.792	4.454
ENV	Before	2.695	1.376	0.000	4.564
	During	2.563	1.630	0.000	4.554
SOC	Before	2.803	0.979	0.000	4.511
	During	2.748	1.035	0.000	4.500
GOV	Before	3.627	0.391	2.079	4.466
	During	3.551	0.428	2.398	4.466
SIZE	Before	9.790	1.412	5.280	14.804
	During	10.04	1.388	5.666	15.035
AGE	Before	3.739	1.348	1.946	5.460
	During	3.785	1.346	2.398	5.464
LEV	Before	5.306	1.037	1.987	9.139
	During	5.399	1.031	2.439	9.130

with a standard deviation of 0.98 and 1.04, before and during the coronavirus crisis, respectively. This indicates that US firms' social performance decreased because of the coronavirus crisis. The average GOV was 3.63 and 3.55, with a standard deviation of 0.39 and 0.43, before and during the coronavirus crisis, respectively. This indicates that US firms' governance performance decreased because of the coronavirus crisis.

Correlation Analysis

Table 4 presents the correlation matrices, variance inflation factors, and tolerance values. Table 4 panel A presents the pairwise correlation coefficient results for the first set of model variables. The COV was negatively, but insignificantly, correlated with ESG performance. SIZE, AGE, and LEV significantly and positively correlated with ESG performance. This finding suggests that firms with higher size, age, and financial leverage have better ESG performance. In addition, SIZE was significantly and positively correlated with the coronavirus crisis. This finding suggests that firms with larger sizes suffered more because of the crisis. The results show no explanatory variables with coefficients greater than 0.80. Table 4 panel B presents the variance inflation factors (VIF) and tolerance values of the first model variables. The results confirm that multicollinearity did not emerge between the explanatory variables, as the highest VIF value was 1.48 with a tolerance value of

Table 4 Correlation matrices, variance inflation factors, and tolerance values

Panel A: Total ESG performance (model 1)							
Variables	ESG	COV	SIZE	AGE	LEV		
ESG	1.000						
COV	-0.018	1.000					
SIZE	0.325***	0.072***	1.000				
AGE	0.129***	0.036	0.500***	1.000			
LEV	0.051**	0.014	0.101***	0.226***	1.000		
Panel B: Values of variance inflation factor and tolerance (model 1)							
VIF	1.12	1.01	1.48	1.06	1.39		
Tolerance	0.891	0.993	0.678	0.948	0.718		
Panel C: Sub-dimensions of ESG performance (model 2)							
Variables	ENV	SOC	GOV	COV	SIZE	AGE	LEV
ENV	1.000						
SOC	0.780***	1.000					
GOV	0.684***	0.800***	1.000				
COV	-0.037*	-0.022	-0.076***	1.000			
SIZE	0.238***	0.253***	0.278***	0.072***	1.000		
AGE	-0.017	0.102***	0.140***	0.036	0.500***	1.000	
LEV	0.015	0.071***	0.048**	0.014	0.101***	0.226***	1.000
Panel D: Values of variance inflation factor and tolerance (model 2)							
VIF	2.76	3.99	2.99	1.02	1.47	1.06	1.46
Tolerance	0.362	0.251	0.335	0.981	0.681	0.944	0.683

Notes: *p < 0.1; **p < 0.05; ***p < 0.01.

0.678. Table 4 panel C presents the pairwise correlation coefficient results for the second model variable. SOC and GOV were significantly and positively correlated with ENV performance. Likewise, GOV was significantly and positively correlated with SOC performance. This finding suggests that firms with higher social and governance performances have better environmental performance. Similarly, firms with higher governance performance have better social performance. COV was significantly and negatively correlated with ENV and GOV, whereas the correlation with SOC was negative but insignificant. This finding suggests that the sub-dimensions of ESG performance, especially environmental and governance, were affected by the coronavirus crisis. SIZE was significantly and positively correlated with ENV, SOC, and GOV. This finding suggests that firms with higher sizes have better environmental, social, and governance performance. AGE and LEV were significantly and positively correlated with SOC and GOV. This finding suggests that firms with higher age and financial leverage have better social and governance performance. Correspondingly, the results show no explanatory variables with coefficients greater than 0.80. Table 4 panel D presents the VIF and tolerance values of the second model variables. The results confirm that multicollinearity did not emerge between

the explanatory variables, as the highest VIF value was 3.99 with a tolerance value of 0.251.

Regression Analyses

This section presents and discusses the results of the regression models. The statistics of the Hausman test are beneficial in determining whether to use a random- or fixed-effects regression model. As a result of the Hausman test, the current study employs a random-effects model to assess the influence of total and individual ESG practices on FP.

Table 5 presents the results of the GLS regression models. The coefficients of the models, standard errors, and coefficients of determination (*R*-sq) were summarized. The model coefficients are denoted by ** and *, which indicate a significant influence at 0.01 and 0.05 levels, respectively. Standard errors in the models are reported in parentheses. The results of the first model show a positive and significant

Table 5 GLS regression models

Variables		Model 1			Model 2		
		MV	TEV	Tobin's *Q*	MV	TEV	Tobin's *Q*
ESG		0.476**	0.356**	0.468**	-	-	-
		(0.030)	(0.24)	(0.029)	-	-	-
ENV		-	-	-	0.044**	0.006	0.042**
		-	-	-	(0.012)	(0.009)	(0.012)
SOC		-	-	-	0.079**	0.102**	0.085**
		-	-	-	(0.017)	(0.014)	(0.016)
GOV		-	-	-	0.370**	0.240**	0.349**
		-	-	-	(0.051)	(0.041)	(0.049)
COV		−0.043**	−0.034**	−0.043**	−0.026*	−0.022*	−0.027*
		(0.013)	(0.009)	(0.012)	(0.013)	(0.009)	(0.012)
SIZE		−0.679**	−0.399**	−0.668**	−0.640**	−0.382**	−0.629**
		(0.034)	(0.026)	(0.032)	(0.035)	(0.027)	(0.032)
AGE		−0.171**	−0.082**	−0.176**	−0.160**	−0.081**	−0.165**
		(0.034)	(0.021)	(0.033)	(0.033)	(0.021)	(0.032)
LEV		0.483**	−0.033	−0.160**	0.473**	−0.034	−0.169**
		(0.048)	(0.028)	(0.034)	(0.048)	(0.028)	(0.034)
_cons		9.172**	8.606**	11.302**	8.694**	8.455**	10.865**
		(0.320)	(0.245)	(0.301)	(0.343)	(0.266)	(0.330)
Number of obs.		2015	2015	2015	2015	2015	2015
R-sq	Within	0.553	0.424	0.501	0.569	0.444	0.518
	Between	0.123	0.262	0.413	0.112	0.244	0.412
	Overall	0.152	0.271	0.416	0.145	0.258	0.417

** and * mean that coefficients are significant at 0.01 and 0.05 levels, respectively. Standard errors in the models are reported in parentheses

influence of ESG performance on MV, TEV, and Tobin's *Q* at a significance level of 0.01. This finding suggests that firms with higher ESG performance have better market value, total enterprise value, and Tobin's *Q* ratio. These results support H1a. These results are consistent with the findings of the following previous studies (Ademi & Klungseth, 2022; Ahmad et al., 2021; Al Amosh et al., 2022; Alareeni & Hamdan, 2020; Carnini Pulino et al., 2022; Habib, 2022; Kalia & Aggarwal, 2022; Nguyen et al., 2022; Nurim et al., 2022). Accordingly, this is considered an opportunity for firm decision-makers to concentrate on adopting and enhancing ESG practices to improve FP. In addition, the results for COV show a negative and significant influence on MV, TEV, and Tobin's *Q* at a significance level of 0.01. This finding suggests that the coronavirus crisis negatively affected FP. Therefore, the results support H2. These results demonstrate the important role of firm leaders in adapting to the pandemic crisis and developing strategies and policies to enhance FP and achieve continuous improvement.

The results of the second model show a positive and significant influence of most ESG sub-dimensions on MV, TEV, and Tobin's *Q* at a significance level of 0.01. ENV positively and significantly influences MV and Tobin's *Q* at a significance level of 0.01, whereas ENV's influence on TEV is positive but insignificant. This finding suggests that firms with higher environmental performance have better market values and Tobin's *Q* ratios. These results mostly support H1b. SOC and GOV positively and significantly influenced MV, TEV, and Tobin's Q, at a significance level of 0.01. This finding suggests that firms with higher social and governance performance have better market value, total enterprise value, and Tobin's *Q* ratio. These results support H1c and H1d. Accordingly, this is considered an opportunity for firm decision-makers to concentrate on adopting and enhancing environmental, social, and governance practices to improve FP. These results are consistent with the findings of previous studies (Han et al., 2016; Hu et al., 2018; Qiu et al., 2016). In addition, the results for COV show a negative and significant influence on MV, TEV, and Tobin's *Q*, at a significance level of 0.05. This finding suggests that the coronavirus crisis negatively affected FP. Therefore, these results supported H2. These results demonstrate the important role of firm leaders in adapting to the pandemic crisis and developing strategies and policies to enhance FP and achieve continuous improvement, as the coronavirus pandemic has had significant repercussions on all aspects of the economy, whether on a macro- or micro-scale (Fauci et al., 2020; Habib & Kayani, 2022; Habib & Mourad, 2022).

Differences Analysis

Table 6 shows the Mann–Whitney *U* test results. The test is employed to demonstrate the noteworthy differences between the distribution of variables for the two groups, that is, the period before the coronavirus crisis and the period during the crisis.

The test results for MV, TEV, and Tobin's *Q* indicate that the null hypotheses are not supported at a 0.01 significance level, which means that the distributions

Table 6 Difference analysis using the Mann–Whitney *U* test

Variables	Mann–Whitney *U* test		Null hypothesis	Decision
	Z statistic	*p* value		
MV	−3.581	<0.001	The distribution of MV is the same across categories of groups	Reject the null hypothesis
TEV	−3.914	<0.001	The distribution of TEV is the same across categories of groups	Reject the null hypothesis
Tobin's *Q*	−3.236	<0.001	The distribution of Tobin's *Q* is the same across categories of groups	Reject the null hypothesis
ESG	−1.178	0.239	The distribution of ESG is the same across categories of groups	Retain the null hypothesis
ENV	−0.148	0.882	The distribution of ENV is the same across categories of groups	Retain the null hypothesis
SOC	−1.015	0.310	The distribution of SOC is the same across categories of groups	Retain the null hypothesis
GOV	−4.118	<0.001	The distribution of GOV is the same across categories of groups	Reject the null hypothesis

of MV, TEV, and Tobin's *Q* are not the same across the categories of groups, and the major reason for these distinctions is the crisis. Therefore, these results supported H3 at a 0.01 significance level. In contrast, the test results for the ESG and its sub-dimensions, excluding the GOV dimension, indicate that the null hypotheses are supported at a 0.01 significance level, which means that the distribution of these variables is the same across categories of groups. The test results for the GOV dimension indicate that the null hypothesis is not supported at a 0.01 significance level, which means that the distribution of GOV is not the same across categories of groups, and the major reason for these distinctions is the crisis. Therefore, these results mostly not supported H4 at a 0.01 significance level.

Table 7 Dynamic model estimation

Variables	Model 1			Model 2		
	MV	TEV	Tobin's *Q*	MV	TEV	Tobin's *Q*
MV (L1)	−0.003	-	-	−0.034	-	-
	(0.037)	-	-	(0.040)	-	-
TEV (L1)	-	0.051	-	-	0.023	-
	-	(0.042)	-	-	(0.044)	-
Tobin's *Q* (L1)	-	-	0.001	-	-	−0.022
	-	-	(0.049)	-	-	(0.053)
ESG	0.593***	0.412***	0.516***	-	-	-
	(0.043)	(0.037)	(0.055)	-	-	-
ENV	-	-	-	0.046***	−0.008	0.022
	-	-	-	(0.016)	(0.011)	(0.015)
SOC	-	-	-	0.145***	0.119***	0.130***
	-	-	-	(0.022)	(0.017)	(0.022)
CGE	-	-	-	0.354***	0.310***	0.334***
	-	-	-	(0.063)	(0.053)	(0.074)
COV	0.055*	0.026	0.056	0.068**	0.038*	0.069*
	(0.029)	(0.022)	(0.041)	(0.031)	(0.023)	(0.042)
SIZE	−0.580***	−0.372***	−0.717***	−0.585***	−0.395***	−0.736***
	(0.083)	(0.067)	(0.095)	(0.090)	(0.070)	(0.097)
AGE	−0.987***	−0.847***	−1.421***	−1.063***	−0.870***	−1.472***
	(0.307)	(0.226)	(0.441)	(0.324)	(0.0235)	(0.456)
LEV	0.545***	0.072*	−0.077	0.553***	0.058	−0.085**
	(0.066)	(0.040)	(0.049)	(0.067)	(0.039)	(0.048)
_cons	10.505***	10.152***	15.804***	11.146***	10.630***	16.416***
	(1.337)	(0.909)	(1.949)	(1.404)	(0.948)	(2.007)
Number of obs.	1612	1612	1612	1612	1612	1612
Instruments	15	15	15	17	17	17

***, **, and * mean coefficients are significant at 0.01, 0.05, and 0.1 levels, respectively. Standard errors in the models are reported in parentheses

Additional Analyses

Table 7 presents the results of additional analyses using GMM system estimator. The results of the first model show a positive and significant influence of ESG performance on MV, TEV, and Tobin's *Q* at a significance level of 0.01. In addition, the results of the second model show a positive and significant influence of most ESG sub-dimensions on MV, TEV, and Tobin's *Q* at a significance level of 0.01. These findings suggest that firms with better total and individual ESG implementations have better performance measures. Additionally, the results show a positive and insignificant influence of the coronavirus crisis on FP in most cases at a significance level of 0.05. These results are comparable to those of previous studies. Ahmad et al. (2021) confirm that ESG performance has a favorable and significant influence on FP, but the consequences of ESG sub-dimensions are mixed. Alareeni and Hamdan (2020) confirm a positive effect between ESG performance and FP, but the findings on these sub-dimensions are mixed. Chen et al. (2021) demonstrate that ESG fulfillment has a dynamic and long-term influence on FP, as FP is significantly and negatively influenced by ESG fulfillment in the short term because of the opportunity and incurred costs, but significantly and positively influenced by ESG fulfillment in the long term. These results demonstrate the important role of firm leaders in developing strategies and policies to adopt and enhance ESG practices in order to achieve the best performance.

Robustness Tests

Robustness tests were conducted to assess the validity of the findings. Tests were employed to compare the primary models' outcomes with those obtained from the robustness models (Fixler et al., 2014; Habib & Shahwan, 2020; Mourad et al., 2021; Mourad et al., 2022; Parkin & Hollingsworth, 1997; Shahwan & Habib, 2020, 2023).

Table 8 shows the GLS estimator with the first-order autoregressive disturbance AR(1) to confirm that the outcomes did not change with further techniques employed. The outcomes confirm that the coefficients of all study variables are on the same path and importance as those of the basic analysis. Consequently, the outcomes showed greater confidence and robustness in the study outcomes.

Table 9 shows the GLS estimator with 5000 bootstrap replications to confirm that the outcomes did not change with further techniques employed. Similarly, the outcomes confirm that the coefficients of all study variables are on the same path and importance as those of the basic analysis. Hence, the outcomes show greater confidence and robustness in the study outcomes.

Conclusion and Policy Implications

ESG practices are necessary for decision-makers to enhance FP and achieve continuous improvement. This study explores the influence of total and individual ESG practices and the coronavirus crisis on US FP. The GLS regression results suggest

Table 8 GLS regression with AR(1) disturbances

Variables		Model 1			Model 2		
		MV	TEV	Tobin's *Q*	MV	TEV	Tobin's *Q*
ESG		0.500***	0.370***	0.494***	-	-	-
		(0.024)	(0.018)	(0.023)	-	-	-
ENV		-	-	-	0.066***	0.017*	0.063***
		-	-	-	(0.013)	(0.010)	(0.012)
SOC		-	-	-	0.079***	0.096***	0.086***
		-	-	-	(0.018)	(0.014)	(0.018)
GOV		-	-	-	0.344***	0.248***	0.326***
		-	-	-	(0.045)	(0.034)	(0.044)
COV		−0.054***	−0.035***	−0.053***	−0.041**	−0.027**	−0.042**
		(0.017)	(0.013)	(0.016)	(0.017)	(0.013)	(0.016)
SIZE		−0.604***	−0.353***	−0.598***	−0.556***	−0.332***	−0.549***
		(0.024)	(0.017)	(0.023)	(0.023)	(0.016)	(0.022)
AGE		−0.148***	−0.075***	−0.154***	−0.137***	−0.073***	−0.142***
		(0.029)	(0.020)	(0.029)	(0.027)	(0.019)	(0.027)
LEV		0.443***	−0.043**	−0.196***	0.418***	−0.048***	−0.222***
		(0.024)	(0.018)	(0.024)	(0.024)	(0.018)	(0.023)
_cons		8.494***	8.145***	10.652***	8.125***	8.455***	10.304***
		(0.262)	(0.184)	(0.261)	(0.274)	(0.266)	(0.271)
Number of obs.		2015	2015	2015	2015	2015	2015
R-sq	Within	0.541	0.410	0.486	0.552	0.427	0.496
	Between	0.122	0.269	0.435	0.118	0.254	0.448
	Overall	0.154	0.278	0.437	0.154	0.268	0.451

***, **, and * mean that coefficients are significant at 0.01, 0.05, and 0.1 levels, respectively. Standard errors in the models are reported in parentheses

that firms with higher ESG performance have better market value measures. In most cases, the results suggest that firms with higher environmental, social, and governance performance have better market value measures. These results are consistent with previous research showing that better total and individual ESG practices can improve FP (Ademi & Klungseth, 2022; Ahmad et al., 2021; Al Amosh et al., 2022; Alareeni & Hamdan, 2020; Carnini Pulino et al., 2022; Habib, 2022; Han et al., 2016; Hu et al., 2018; Kalia & Aggarwal, 2022; Nguyen et al., 2022; Nurim et al., 2022; Qiu et al., 2016). Accordingly, this is an opportunity for firm leaders to concentrate on adopting and enhancing ESG practices to improve FP and achieve continuous improvement. Additionally, the results suggest that the coronavirus crisis negatively affected firms' market value measures. These results demonstrate the important role of firm leaders in adapting to the pandemic crisis and developing strategies and policies to enhance FP and achieve continuous improvement, as the coronavirus pandemic has had significant repercussions on all aspects of the economy, whether on a macro- or micro-scale (Fauci et al., 2020; Habib & Kayani, 2022; Habib & Mourad, 2022).

Table 9 GLS regression with the bootstrap

Variables		Model 1			Model 2		
		MV	TEV	Tobin's Q	MV	TEV	Tobin's *Q*
ESG		0.476**	0.356**	0.468**	-	-	-
		(0.030)	(0.25)	(0.029)	-	-	-
ENV		-	-	-	0.044**	0.006	0.042**
		-	-	-	(0.012)	(0.010)	(0.012)
SOC		-	-	-	0.079**	0.102**	0.085**
		-	-	-	(0.017)	(0.014)	(0.016)
GOV		-	-	-	0.370**	0.240**	0.349**
		-	-	-	(0.051)	(0.041)	(0.049)
COV		−0.043**	−0.034**	−0.043**	−0.026*	−0.022*	−0.027*
		(0.014)	(0.009)	(0.012)	(0.013)	(0.009)	(0.012)
SIZE		−0.679**	−0.399**	−0.668**	−0.640**	−0.382**	−0.629**
		(0.036)	(0.027)	(0.033)	(0.037)	(0.029)	(0.034)
AGE		−0.171**	−0.082**	−0.176**	−0.160**	−0.081**	−0.165**
		(0.034)	(0.022)	(0.034)	(0.034)	(0.022)	(0.033)
LEV		0.483**	−0.033	−0.160**	0.473**	−0.034	−0.169**
		(0.050)	(0.028)	(0.037)	(0.052)	(0.029)	(0.036)
_cons		9.172**	8.606**	11.302**	8.694**	8.455**	10.865**
		(0.315)	(0.252)	(0.312)	(0.346)	(0.281)	(0.336)
Number of obs.		2015	2015	2015	2015	2015	2015
R-sq	Within	0.553	0.424	0.501	0.569	0.444	0.518
	Between	0.123	0.262	0.413	0.112	0.244	0.412
	Overall	0.152	0.271	0.416	0.145	0.258	0.417

** and * mean that coefficients are significant at 0.01 and 0.05 levels, respectively. Standard errors in the models are reported in parentheses

The results of this study support the following theoretical assumptions: for example, ESG practices influence FP, which aligns with institutional and legitimacy theories, suggesting that enhancing firm responsibility practices improves FP (Beddewela & Fairbrass, 2016; Velte, 2017). In addition, stakeholder theory confirms that firm responsibility practices may help firms enhance their relationships with stakeholders (Bitektine & Haack, 2015; Russo & Perrini, 2010; Tu & Huang, 2015).

The findings of this examination have noteworthy implications. Managers could benefit from the results of this examination by recognizing the status of ESG practices and FP before and during the coronavirus crisis and identifying the linkage between the fulfillment of ESG responsibilities and FP. This study provides noteworthy practical implications that could enable managers to develop strategies and policies to adopt and enhance ESG practices to achieve the best performance. Furthermore, the results could influence trading processes as investors and financiers pursue attractive financial returns from investments in businesses concerned with ESG issues.

This study has specific limitations, which give rise to future research areas. The impact of working capital management is not considered in this examination and is a probable factor to be explored (Akgün & Memiş Karataş, 2021; Habib, 2022; Habib & Kayani, 2022; Habib & Mourad, 2022). In addition, future research can include other countries and concentrate on other factors, such as managerial ability, intellectual capital, and real earnings management (Alex & Andrew, 2018; Baik et al., 2020; Dalwai et al., 2018, 2023; D'Amato, 2021; Kumar et al., 2021; Potharla et al., 2021; Tabassum et al., 2015; Tulcanaza-Prieto & Lee, 2022), which are noteworthy factors that can influence FP.

Author Contribution The first author conceived the project and planning, fundamental analysis, and the framework and statistical models; collected data and analyzed it; wrote the abstract, introduction, literature review and hypothesis formulation, data and methodology, empirical results, and conclusion and policy implications; reviewed and edited the manuscript; and responded to the editor and reviewers' comments. The second author conceived the project and planning, empirical results and reviewed the manuscript.

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