



Exploring the relationship of ESG score and firm value using cross-lagged panel analyses: case of the Indian energy sector

Abhishek Behl¹ · P. S. Raghu Kumari² · Harnesh Makhija² · Dipasha Sharma³

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Abstract

Business integration with the internal and external world is gaining momentum in the light of Environment, Social, and Governance factors (ESG score) linkage to corporate financial performance (CFP). However, the impact of the ESG–CFP relationship varies across economies, industries, and institutional frameworks due to varying legal, social structures and expectations from stakeholders. The present study aims to test the bidirectional causality and autoregression effects between ESG disclosures and the firm value of Indian energy sector companies' data using a four-wave cross-lagged panel structural equation modeling. Results indicate that the relationship is not bidirectional in the overall and individual elements of ESG to firm value. We find AR effects to be stable, and there is a negative association found in the first two lags and a positive association found in the last lag. Research findings are beneficial for investors, fund managers, policymakers, and energy company managers. We further provide direction to executives on ESG investment and practices and lag period to reap the benefit of such investments through firm value.

Keywords ESG · Firm value · Bidirectional causality · Energy industry · India

✉ Abhishek Behl
abhishekbhl27@gmail.com

P. S. Raghu Kumari
raghukumari@somaiya.edu

Harnesh Makhija
harnesh@somaiya.edu

Dipasha Sharma
dipashasharma20@gmail.com

¹ O. P. Jindal Global University, Sonipat, India

² K. J. Somaiya Institute of Management, Mumbai, India

³ Symbiosis Centre for Management and Human Resource Development, Symbiosis International (Deemed University), Pune, India

1 Introduction

The changing norms on legal, social, moral, and financial aspects, along with a greater resilience on disclosures and sustainability practices in the mutable world of business are creating demands for companies to meet the expectations of society and stakeholders on par with shareholders (Broadstock, 2020; Odell & Ali, 2016; Odera et al., 2016; Waddock, 2004; Goosling & Vocht, 2007). This shift from the narrow view of shareholder wealth maximization to stakeholder value creation is due to customers' preference towards sustainable products (Gauthier, 2005) and the firm's quest to know whether it pays to be green (Goncalves et al., 2016). To justify a firm's stance concerning shareholder wealth versus stakeholder value, the literature provides various theories that conceptualize the myopic profit phenomenon under the trade-off theory (Friedman, 1970) to a broad perspective of stakeholder's considerations through the stakeholder theory (Freeman, 1999; Harrison & Freeman, 1999). The gradual movement of firms from trading off for shareholders to stakeholders is sometimes due to the legal requirements and compliances described in the legitimacy theory (Patten, 1991, 1992). These theoretical arguments suggest implications that firms should focus only on shareholders rather than on stakeholders.

According to the trade-off theory, firms expect to generate profits and focus on wealth maximization (Friedman, 1970; Pava & Krausz, 1996). However, if a firm follows the trade-off theory, it is only responsible for its shareholders and not the stakeholders. Henceforth, firms may not need to indulge in sustainable products, social responsibility, or environmental care, and can engage in profit maximization in any manner.

At the same time, the stakeholder theory emphasizes that firms should generate returns to stakeholders from environmental, social, and governance (ESG) investments (McWilliams & Siegel, 2000; Ruf et al., 2001; Saeidi et al., 2015). Therefore, according to the stakeholder theory, a firm's engagement towards a larger society through ESG concerns will reap sustainable benefits and profits. The legitimacy theory states that companies disclose sustainability information to stakeholders to reiterate an organization's commitment towards society in support of the stakeholder theory. According to the legitimacy theory, firms' disclosures towards ESG enable the firm's commitment towards society and generate a sustainable pool of profit. Firms and stakeholders believe that these investments generate long-term benefits. However, some scholars argued that these investments might not produce immediate financial benefits for firms (Groening & Kanuri, 2013; López et al., 2007). Some researchers (e.g. Callan & Thomas, 2009; Xiong et al., 2016) questioned the existing longitudinal data approaches, which have tested the relationship for a total period and generalized the results. They argue that this relationship is time dynamic in nature, and results vary according to country and industry level focus, which many studies have ignored.

Developed economies such as the US and UK have rewarded ESG in the sectors where the perception of such ESG risks was higher. The literature shows that the growth of research in these countries is comparatively less than in Asian countries, (Refer to Appendix, Table 7) (Pasquini-Descomps & Sahut, 2013). The need for the environmental, social, and governance-firm value (ESG-FV) relationship is gaining momentum in Asia, as investors believe that firms following sustainable practices are good for value creation in the long run (Alsayegh et al., 2020). Notably, India is facing challenges in integrating ESG aspects into its strategic practices due to limited resources, a large population, a higher population density, a limited physical and social infrastructure, and political instability. Hence, research in this area in India is of utmost importance. Through better integration of ESG standards, firms may be

able to harness growth and value creation, as there is a significant difference between ESG score and firm performance across the economies (Odell & Ali, 2016; Odera et al., 2016).

India's energy industry provides an appropriate context for investigating the ESG-FV longitudinal relationship for several reasons. According to the latest sustainability report on Nifty-50 companies (the top 50 companies on NSE, India as per the market capitalization), energy industries are among the top performers in policy disclosures related to environment and social issues (NSE, 2020). Higher ESG disclosures give positive signals about a firm's reputation in the market related to business risk, which improves the firm's creditworthiness and lowers the cost of capital in India (Bhattacharya & Sharma, 2019).

Second, a paradox exists in the energy sector in that the energy sector is perceived as being socially responsible, focused on human health, social behaviour, and the nation's cultural identity (NSE, 2020). On the other hand, energy sector products and operations are highly detrimental to environmental health. This sector is considered an environmentally sensitive industry by the Central Pollution Control Board in India and other sectors, such as the tobacco, steel, and chemicals sectors (Jha & Rangarajan, 2020).

Third, India's energy sector is one of the most diversified globally, with demand expected to double by 2040; excelling at innovations in reducing pollution and gaining momentum in reforms, it is the most interesting case to study (Energy Policy Report, 2020). Fourth, the Indian energy sector, including the pharma and chemical sectors, has relatively consistent reporting on ESG disclosure data with medium to high reporting quality (Sharma, 2019), making these sectors eligible for conducting longitudinal studies. Since the research on the ESG-FV relationship has remained inconclusive, and methodologies and jurisdictions are yielding varying results, India presents an interesting case in which to study this specific industry relationship.

The energy sector utilizes the natural resources of the biophysical environment and is prone to exploiting the environment and pollution, leading to both ecological and social imbalance. Hence, the energy sector follows a natural resource-based view of the firm and may not follow the basic assumptions of the stakeholder theory or resource-based view (RBV) theory. Such a sector needs to develop an interconnected strategy for pollution prevention, product stewardship, and sustainable development (Hart, 1995), specifically in an economy like India, where pollution and emissions are on a higher scale. Firms aligning strategy towards environmental management and social and governance aspects may reap long-term benefits with regard to the competitive advantage. Does this mean that higher disclosures towards ESG concerns may reward it with better firm value?

The above thought-provoking statements of problematization generate our guiding research question as:

RQ1: How do ESG disclosures affect firm value in the Indian energy sector?

In the ESG-FV relationship, researchers mainly focus on uni-directional, cross-sectional, and direct relationship studies, with a limited focus on cross-lagged and bi-directional relationships (Alshehhi et al., 2018; Gillan et al., 2021). Supporting the theory of stakeholders, most researchers found a positive association between cross-lagged and bi-directional relationships (Chelawat & Trivedi, 2016; Dalal & Thaker, 2019). Some researchers support the trade-off theory by confirming a negative association between cross-lagged and bi-directional relationships (Duque-Grisales & Aguilera-Caracul, 2019; Lorraine et al., 2004). On the other hand, Eveline Van de Velde et al. (2005) and Ionescu et al. (2018) found no association between cross-lagged and bi-directional relationships (Appendix, Table 6). Further, Alshehhi et al. (2018) highlighted that out of 136

studies published until 2018, 25 studies belonged to emerging countries, which indicates that studies from emerging economies (6%) are significantly lower than developed economies (23%). In addition, the research indicated that out of 37 industry-based studies, 34 were done from a multi-industry focus, indicating the need for specific industry studies.

Another strand of the literature shows that researchers have largely focused on the direct relationship between ESG disclosures and FV, and very few have focused on causal, reverse causal effects (Aguilera-Caracuel, 2019; Dhaliwal et al., 2011; Yadav et al., 2016) and lagged effects (Huang et al., 2020; Lev et al., 2010) (see Appendix, Table 6). Understanding the role of the time aspect is of vital importance, as ESG-FV is a time-variant relationship. It has managerial implications, such as managers face annual budget constraints while focusing on creating value for shareholders. Moreover, the bidirectional causality could be different in different periods and, also, the association can be positive or negative (Gillan et al., 2021; Huang et al., 2020; Lev et al., 2010).

Jha and Rangarajan (2020) highlighted the need for further probing into bi-directionality testing, as they found insignificant results based on all sectors data. They pointed out that future researchers should test bi-directionality in specific industries to test the applicability of the slack resource theory (firm value impacts ESG) and the good management theory (ESG impacts firm value) in the context of India. Accordingly, we frame our complementary research question as:

RQ2: What is the direction of the relationship between ESG and firm value, and how do these two variables impact one another?

We contribute to the existing literature by pioneering a study on ESG linkage to market value creation in the energy sector. Second, we have extended time-varying relationship studies by applying the cross-lagged panel model, as this relationship has not been explored to date in the Indian context. Third, our results are generated on a robust model and make the direct implication that firms operating in the Indian energy and allied sectors should develop their competitive advantage through a strategic alignment of ESG requirements. The lead-lag relationship and the direction of the relationship between ESG and firm value could guide firms to understand the time-variant aspects of ESG investments.

This study is organized as follows. Section 2 presents the theoretical background and hypotheses development. We discuss stakeholder theory, trade-off theory, the resource-based view (RBV), and the slack resources theory on the ESG and firm value relationship. Section 3 presents the methodology and research design, with sample and data description. This section highlights the merit and appropriateness of the cross-lagged path model and justification on variables to address our research question. Section 4 contains the results of the cross-lagged path model on ESG and firm value. Section 5 presents discussion, theoretical and managerial implications, with concluding remarks. Here, we highlight that ESG investments can be perceived as additional costs by executives and investors in the short-term, but reap benefits in terms of firm value in the long run. Concluding remarks pave the way to managerial insights specific to the Indian energy sector. Finally, we outline the limitations of our study due to secondary data sources and issues/concerns related to the generalizability of findings, as the findings are specific to the emerging economy's energy sector. We propose future research to address the indirect relationship between ESG and firm value by exploring new mediating and moderating variables that can extend the existing literature in time-variant relationships.

2 Literature review and hypothesis development

2.1 Theoretical overview

The literature on ESG and firm value follows support from the stakeholder theory and the resource-based view theory (RBV). Both of these theories support the impact of ESG practices on firm value. Russo and Fouts (1996) concluded the pivotal role of the RBV in terms of the relationship between sustainable performance and economic performance of the firm, which was further supported by the work of McWilliams and Siegel (2000), McWilliams et al. (2006), and Branco & Rodrigues (2006). The previous literature argued that the integrated corporate social responsibility (CSR) and ESG practices lead to the development of unique intangible resources, including know-how in terms of better technology to be less environmentally polluting (Teece, 1980). Such practices assist in developing the corporate culture through a conscious effort on social disclosures (Barney, 1991), and reputation developed due to better integration of environment and social practices, along with governance requirements (Hall, 1992). All these intangible resources may appear as costly and may negatively affect economic value (Friedman, 1970), but should lead to a long-term economic advantage for all stakeholders (Freeman, 1999).

Freeman (1999) advocated the stakeholder theory, which proposes that a firm's prime objectives be engaged to all stakeholders (customers, employees, society, government, investor, regulators) and not limited to shareholder wealth maximization, which was the prime goal of the finance literature (Battisti et al., 2019; Jensen, 2001). This broader perspective of stakeholder engagement boosts integrated CSR practices in the early days (Belyaeva et al., 2020; Rey-Martí et al., 2016) and ESG practices in the modern world and their impact on firm value (Broadstock, 2020; Buallay, 2019). However, at the same time, the trade-off theory views ESG as an additional cost and inefficient usage of resources, and such inefficiency may lead to the destruction of shareholder wealth (Brammer et al., 2006; Branco & Rodrigues, 2008; Friedman, 1970; Jha & Rangarajan, 2020). Therefore, it may be inconclusive whether ESG disclosures will be perceived as a cost and may lead to destruction in firm value, or it is going to be regarded as a long-term investment that may reap the benefit in the long run. Chen and Yang (2020) concluded substantial value creation is a positive signal in the short run and reversals in the long run due to exaggeration by the investors. Contrary to these findings, Patel et al. (2020) argued that investors expect lower short-term growth potential of industry firms with experimentation in leveraging ESG, and they are not so myopic. There is a possibility of a U-shaped relationship in emerging economies, and low levels of ESG activity, which positively impact firm value, but diminish returns to scale (Azmi et al., 2020).

2.2 ESG and firm value relationship

The previous literature on CSR and firm value, and later ESG dimensions or corporate sustainable performance (CSP) and firm performance, have reflected mixed results across economies based on accounting measures (Lee et al., 2013; Tang et al., 2012) and market-based measures (Aboud & Diab, 2018; Lo & Sheu, 2007; Wahba, 2015). However, the relationship has been justified from various contexts of institutional factors and firm-level factors. Fatemi et al. (2018) argue that ESG investments increase firm value and that weaknesses decrease it with a moderating role of disclosures, as

more disclosures mitigate the effect of weaknesses and enhance the positive effects. Wong et al. (2020) found a consistent positive association for developing economies. They found that ESG investments lowers a firm's cost of capital and, therefore, lead to a significant increase in firm value in Tobin's Q. However, investors expect lower short-term growth and lower discounts in growth expectations for firms that leverage higher ESG scores (Patel et al., 2020). These findings highlight that investors may prefer to wait, watch, and lower their expectations for the short-run in forward-looking measures. Firms prone to high financial or environmental risks may benefit from CSR practices. The firms with stable sources of earnings and slack resources to invest will benefit through CSR investment strategy. Firms operating in low environmental or financial risks may not reap the benefits of CSR investments, and such investments may be detrimental to firm value (Lu et al., 2021). Therefore, specific industries, such as energy and allied, chemical industries that operate on high environmental threat and have more responsibility towards the stakeholder, need strategic ESG management in their operations (Blacconiere & Northcutt, 1997; Blacconiere & Patten, 1994). The relationship between CSR and firm value also varies with ownership and depends on economic conditions. During the 2008 global financial crisis, over-investment in CSR does not positively impact firm value (Buchanan et al., 2018).

Thus far, the literature on ESG is saturated in the developed economies, and such economies have a strong foundation of institutional factors on CSR and ESG practices (Ioannou & Serafeim, 2010). However, evidence in developing economies may differ significantly (Odell & Ali, 2016; Odera et al., 2016) due to greater instability of the political and institutional systems, regulations, norms on Carbon emission and environmental hazard, pollution, and various other social issues related to wages and other aspects (Khanna & Palepu, 2000; Odell & Ali, 2016).

Along with the intangible resources of culture, know-how, and reputation in market (Grant, 1991), firms also create tangible resources through better ESG integration practices, namely technological advancement to avoid environmental hazards and high cash reserves (Groenewegen & Vergragat, 1991; Hart, 1995; Kemp, 1993). Such tangible and intangible capabilities are required for industries mainly responsible for higher GHG emissions, air pollution, and waste management, such as energy and allied industries. Specific to the global energy sector, Shahbaz et al. (2020) found that higher CSR performance in ESG scores does not guarantee higher financial performance—as proxied by both market and accounting performance.

The literature is inconclusive as far as the relationship direction. Although the literature shows a majority of studies indicating a positive influence, some scholars identified insignificantly (Ullmann, 1985) and with mixed results (Hsu et al., 2018; Humphrey et al., 2012). Kim and Oh (2019) argued that the ESG-FV relationship could be non-linear or U-shaped with a reverse linkage possibility (Jha & Rangrajan, 2020) (Table 5). Therefore, our proposition includes time dimensions in the relationship between ESG and firm value with a cross-lagged relationship. The time chosen for the study is T1 (year 2016–2017), T2 (year 2017–2018), T3 (year 2018–2019), and T4 (year 2019–20), respectively.

Based on these arguments, we propose the following hypotheses regarding ESG scores and firm value:

H_{1A}: ESG score of (T₁) has a positive influence on the firm value of (T₂).

H_{1B}: ESG score of (T₂) has a positive influence on the firm value of (T₃).

H_{1C}: ESG score of (T_3) has a positive influence on the firm value of (T_4).

Following the RBV of the firm, there is strong evidence of environmental management having an impact on a firm's competitive advantage (Aragon-Correa & Sharma, 2003; Christmann, 2000; Sharma & Vredenburg, 1998), and on a firm's performance (Russo & Fouts, 1997; Waddock & Graves, 1997). Integrated environmental practices not only create the opportunity for better intangible and tangible resources in the form of technology and know-how, but they also enable a firm to mitigate future regulatory costs and enhance the overall efficiency of operations, specifically in manufacturing firms (Ambec & Lanoie, 2008; Hart & Milstein, 2003). Lucas and Noordewier (2016) postulated the concept of “dirty industries” and suggested that integrating environmental practices enhances a firm's financial performance. Such “dirty industries” can be determined based on the pollution being created by the activities undertaken by such firms, and the energy and allied sectors can indeed be sectors to study. Companies engaging in voluntary social and environmental activities can avoid the adverse effect of future regulatory costs on their future cash flows (Richardson et al., 1999) through intangible asset value creation (Konar & Cohen, 2001), lowering the cost of equity and the cost of capital (Dhaliwal et al., 2011), meeting analysts' expectations on the dispersion of earnings forecasts (Harjoto & Jo, 2015), and gaining better stock performance with reduced volatility (Yadav et al., 2016).

Our second group of hypotheses breaks up the critical hypotheses, which was on composite ESG score to further individual ‘E’ score as follows:

H_{2A}: Environmental score of (T_1) has a positive influence on the firm value of (T_2).

H_{2B}: Environmental score of (T_2) has a positive influence on the firm value of (T_3).

H_{2C}: Environmental score of (T_3) has a positive influence on the firm value of (T_4).

Instead of looking at ESG as an aggregate measure, studies have also looked at the relationship between individual components of ESG and firm value. The results were inconclusive and researchers observed mixed relationships. Dumitrescu et al. (2020) suggested that only the social dimension of ESG affects the related future financial distress of a firm, and the governance dimension remains a hygiene factor, which increases the distance-to-default. Therefore, the view towards CSR and firm value cannot be limited to the aggregate values of ESG. Along a similar line, Lu et al. (2021) concluded that in developed economies, CSR will have a positive impact on firm value under specific scenarios only, and not always pro-bono concerns will be reward-bearing to the firm. On the social disclosures and strategies towards higher social engagements of the firm, the RBV theory suggests that it leads to the development of a corporate culture and reputation in the market (Branco & Rodrigues, 2006). Better market reputation through socially responsible activities or “green/sustainable products” adds a competitive advantage to the firm that charges slightly higher prices than its competitors (Fomburn & Shanley, 1990; Klein & Leffer, 1981).

Along with competitive pricing, firms also gain access to cheaper funds from the capital and debt market, as socially responsible firms receive better credit ratings (Attig et al., 2013; Beatty & Ritter, 1986; Milgrom & Roberts, 1986; Roberts, 2010; Sharma et al., 2019). When firms take initiatives towards internal social responsibility, such as employees' diversity, employees' engagement, and product quality, they create intangible resources in terms of loyal employees and reputation (Jo & Harjoto, 2011). An initiative

towards external stakeholders leads to lower possibilities of friction with the firm /plant's neighbourhood/plant and reduces legal costs through more efficient contracting (Jones, 1995) and risk reduction (Fatemi & Fooladi, 2013).

We propose our sub-hypotheses as follows:

H_{3A}: Social score of (T_1) has a positive influence on the firm value of (T_2).

H_{3B}: Social score of (T_2) has a positive influence on the firm value of (T_3).

H_{3C}: Social score of (T_3) has a positive influence on the firm value of (T_4).

On the governance disclosures aspect of ESG, it is concluded in the literature that it may not bring any additional advantage or value to a firm on its own. Still, failure to abide by it will result in additional costs and affect resource capabilities (Barney et al., 1991). However, governance disclosures and initiatives assist in reducing agency costs and ultimately encourages sustainable corporate transparency in the firm, which is essential for stakeholders and firm value creation (Giannarakis et al., 2020).

We propose our sub-hypotheses as follows:

H_{4A}: Governance score of (T_1) has a positive influence on the firm value (T_2).

H_{4B}: Governance score of (T_2) has a positive influence on the firm value (T_3).

H_{4C}: Governance score of (T_3) has a positive influence on the firm value (T_4).

Thus far, we have discussed only one aspect of the ESG-FV relationship, and we have proposed hypotheses to explore the relationship. However, from the firm's RBV, the availability of such tangible and intangible resources may be available to the firm only due to excess cash reserves and high profits (Barney et al., 2011). The slack resources theory also advocates this perspective, as in case of abundance of reserves; only firms will go for CSR activities and may reap benefits through better financial performance (Waddock & Graves, 1997). There is a high possibility of a "virtuous cycle" or two-way relationship with a time lag (Xiong et al., 2016).

Xiong et al. (2016) followed a two-step longitudinal design, including cross-lagged longitudinal path analysis, to examine CSR-CFP overall and decomposed relationships. They observed a one-year time lead-lag relationship between CSR-CFP. The previous literature on the lead-lag relationship found bi-directional causality between CSR- CFP without lag (Lev et al., 2010; Orlitzky et al., 2003), or a one-year lag (Bo et al., 2016; Nelling & Webb, 2009). However, Orlitzky et al. (2003) concluded limited empirical evidence in their CSR-CFP relationship meta-analysis.

Therefore, we propose one more set of hypotheses as follows:

H₅: A bi-directional relationship exists between ESG overall and individual elements score and firm value in the Indian energy sector.

Figure 1 details our conceptual model based on the formulated hypothesis.

The S coefficient represents the auto-regressive effects that capture the stability of the constructs over time in terms of the rank order of the scores; the a and b coefficients

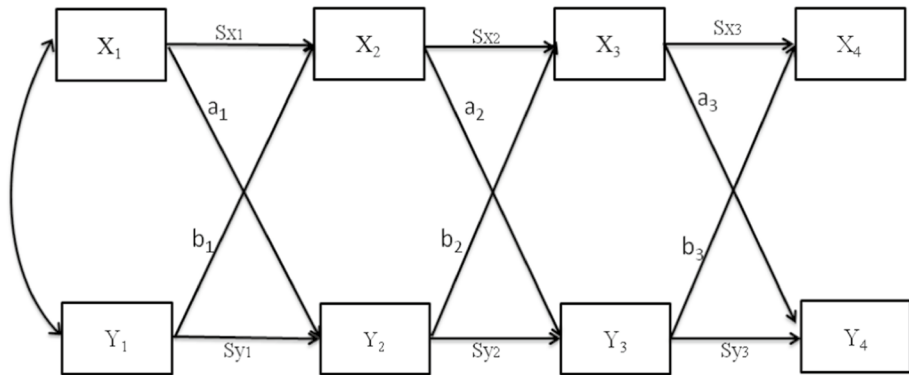


Fig. 1 Conceptual model

represent the cross-lagged effects. Y_1, Y_2, Y_3 , and Y_4 are firm values for the years 2016, 2017, 2018, and 2019, respectively. The composite ESG scores X_1, X_2, X_3 , and X_4 and individual ‘E,’ ‘S’ and ‘G’ scores are for the years 2016, 2017, 2018, and 2019, respectively.

2.3 Research methodology

We collected longitudinal sample data from 62 Indian energy sector companies, based on the Nifty 500 index, to test the hypotheses. According to NSE, “It is a free-float market capitalization index representing approximately 96% of total market capitalization and 93% of the aggregate turnover on the NSE, with a total composition of 72 industry indices.” ESG disclosure scores and financial data were collected from the Bloomberg and Prowess database. The Bloomberg database provides annual ESG disclosure scores ranging from 0.1 to 100 on ESG overall and individual levels (E-S-G) for firms evaluated on around 800 parameters (Bloomberg Disclosure Score, 2019), covering nearly 11,500 listed companies from 83 countries (ESG Data, 2019). The scores are computed using a robust and holistic purview based on the public information retrieved from business responsibility reports, sustainability reports, annual reports, CSR disclosures, community spending data, and company websites (Huber et al., 2017). The Centre for Monitoring Indian Economic (CMIE) provides firm-related financial and non-financial databases through Prowess from the sources of company annual reports, disclosures, and filings submitted to various government bodies such as the Ministry of Corporate Affairs.

This study aims to follow a cross-lagged panel path analysis (Xiong et al., 2016) to examine the overall and individual elements of ESG, following a four-year wave (time frame represented as T1 to T4) from the years 2016 to 2019 on the samples from energy and allied firms. The chosen period is highly suitable for exploring the ESG-FV relationship as CSR policy was implemented in India in 2015, and prior to that, companies began declaring these results publicly. Hence, a four-wave study is very suitable to conduct a longitudinal study with emphasis on lagged impact. Data were collected by the end of 2019 from a sample of 62 Indian energy and allied sector companies to form panel data for four years from 2016 to 2019. This study follows the Pan et al. (2018) study sample size guidance for conducting longitudinal structural equation modelling on sectoral data, emphasizing that a sample size of around 100 data points onwards is sufficient to provide robust results. In the Bloomberg annual database of energy company’s ESG scores, data from 65

companies was initially selected. In the second stage of data screening, the missing values were identified for S-score (5 cases), E-Score (3 cases), ESG score (4 cases), and other variables (3 cases), and finally omitted from the sample, forming a final data of 62 firms for the four years' unbalanced short panel data of 248 corporate data points. Panel data is preferred as it can absorb variations resulting from time and cross-section effects. The two-digit code given by the National Industries Classification (NIC) and following the Central Pollution Control Board classification of industries, such as energy and chemicals as environmental sensitive industries (NIC 2008 Codes, 2019), was based on sector selection.

The study follows Tobin's Q as a measure of firm value as it has macroeconomic significance by linking the firm's asset utilization to market value creation. It is a futuristic approach highly preferred by investors in assessing a company's total value creation in the stock market (Cavaco & Crifo, 2010). Scholars extensively started using market-based performance measures like Tobin's Q, as they can predict long-term firm value better than accounting measures (Alshehhi et al., 2018). In contrast, ROA is an accounting-based measure calculated on past data to assess profitability. Researchers used control variables such as firm size to make the results more relevant and reduce spuriousness in results (Callan & Thomas, 2009; Lu et al., 2014). Overall ESG score and individual ESG score elements have been considered in this study to examine the relationship with firm value as a dependent variable and firm size as a control variable in the study (Grewatsch & Kleindienst, 2017). Firm size has been linked to sustainability factors, as large firms spend more on community spending (Russo & Fouts, 1997). Our study used total assets as the measurement of size, as Wahba Elsayed (2015) suggested. The operationalization of the variables is explained in Table 1 in the "Appendix".

3 Results and analysis

3.1 Descriptive statistics and correlation

Table 2 displays the means and standard deviations of all measurements. For ESG variables, it is observed that in all of the years, mean disclosure scores are highest for G, followed by S and E, with a standard deviation of G; much less than E, S, and ESG, revealing that G scores are the least spread. Table 2 also depicts the correlation among all of the variables. There is a significant correlation between ESG and firm value variables, mostly at a significant level of 0.01. Correlation between different ESG and firm value variables does not show a consistent and significant direction.

3.2 Inferential data analysis

3.2.1 Relationship between environment score (E) and firm value over time (Model 1)

Figure 2 displays the cross-lagged model between environment score (E) and firm value measure of Tobin's Q. The fit statistics for model, $\chi^2(11) = 12.811$, $p = 0.306$, RMSEA = 0.052, CFI = 0.997, and SMSR = 0.017, demonstrated a good fit to the data and indicated that it was appropriate to proceed further for testing of the structural model. In addition to the chi-square statistics, we reported a root mean square error of approximation (RMSEA), the standardized root mean squared residual (SRMR), and the comparative fit

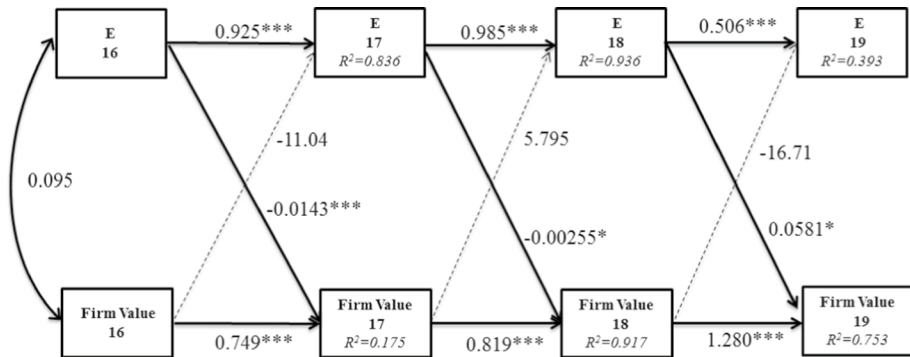


Fig. 2 Cross-lagged model of the environmental score (E) and firm value (adjusting for control variable firm size). *Note* The model provides standardized parameters, * $p < 0.05$, ** $p < 0.01$, and *** $p < 0.001$

index (CFI). A good fit is indicated by values equal or greater than 0.90 for CFI, and equal or less than 0.08 for RMSEA and SRMR (Hair & Anderson, 2015).

The model fit indices of Model 1 are shown in Table 3. The next step, the stability and cross-lagged effect between environment score (E) and firm value, was examined. A cross-lagged effect is the effect of one variable on another by controlling their stability over time. Results in Fig. 2 showed significant stability effects, suggesting that environment score and firm value (Tobin's Q) are temporally stable. Results indicated significant cross-lagged pathways from environment score to firm value across all four time points, which means environment score predicted firm value a year later. It is observed from Fig. 2 that reverse cross-lagged pathways from firm value to environment score are not significant, indicating that firm value did not predict environment score across all four time points. Environmental scores in 2016 and 2017 are negatively associated with the firm value in 2017 and 2018, respectively, indicating that a higher environment score predicted a decrease in firm value in the first two waves. In the third wave, the higher environment score in 2018 predicted an increase in firm value in 2019. As presented in Fig. 2, around 91% of the variation in firm value for the year 2018 was explained by the environment score of 2017 and the firm value of 2017.

3.2.2 Relationship between social score (S) and firm value over time (Model 2)

The cross-lagged panel model of the relationship between social score (S) and firm value is presented in Fig. 3. Fit statistics for Model 2 demonstrated an excellent fit (Table 3): $\chi^2(11) = 4.934$, $p = 0.934$, RMSEA = 0.000, CFI = 1.000, and SMSR = 0.011. The model fit indices of Model 2 are presented in Table 3. Coefficients of autoregressive paths are significant, suggesting that social score and firm value (Tobin's Q) are temporally stable. Cross-lagged pathways (Fig. 3) from social score to firm value across all four time points are found to be significant, which suggests social score predicted firm value a year later. Reverse cross-lagged pathways from firm value to social score are not significant, indicating that firm value did not predict social score across all four time points. A negative association is observed between social score of 2016 and 2017 with the firm value in 2017 and 2018, respectively, reflecting a higher social score, which predicted a decline in firm value in the first two waves. In the third wave, the higher social score in 2018 predicted an increase in firm value in 2019. About 91% of the firm value variability for the year 2018 was explained by the social score of 2017 and firm value of 2017.

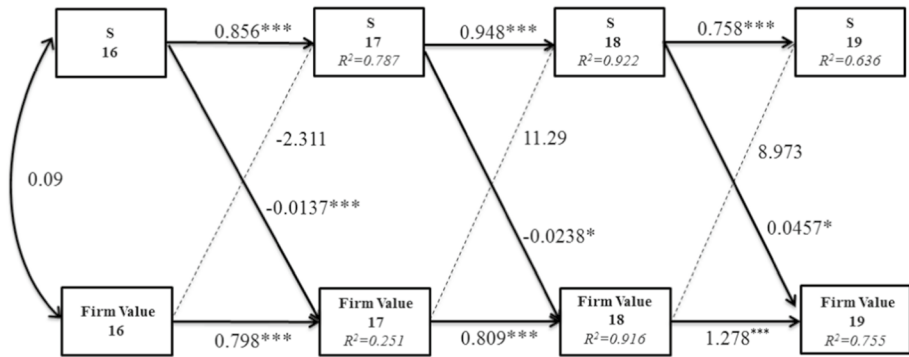


Fig. 3 Cross-lagged model of the social score (S) and firm value (adjusting for control variable firm size). Note The model provides standardized parameters, * $p < 0.05$, ** $p < 0.01$, and *** $p < 0.001$

3.2.3 Relationship between governance score (G) and firm value over time (Model 3)

The results of Model 3, which depicts the relationship between governance score and firm value, are presented in Fig. 4. The model fit criteria, such as root mean square error of approximation (RMSEA), the standardized root mean squared residual (SRMR), and the comparative fit index (CFI), demonstrated a good fit to the data with values of $\chi^2(10) = 10.519$, $p = 0.396$, RMSEA = 0.029, CFI = 0.999, and SMSR = 0.016. The model fit indices of Model 3 are presented in Table 3 in the [Appendix](#). The results showed significant stability effects for all of the measures, suggesting that all of the constructs are temporally stable. A substantial longitudinal effect was found from governance score to firm value over all time points, which suggests that governance score predicted firm value a year later. The governance score is negatively associated with the firm value in the first two waves, indicating higher governance scores in 2016 and 2017, which predicted a decline in firm value in 2017 and 2018. The governance score in 2018 was positively associated with the firm value in 2019. About 77% of the variation in the firm value of 2019 is explained by the governance score and firm value of 2018.

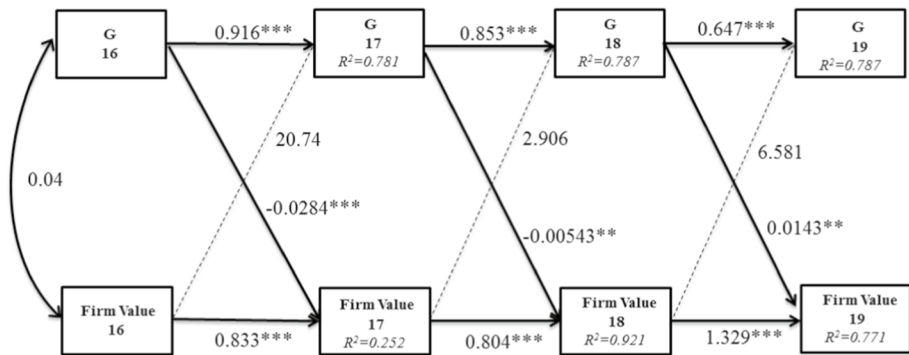


Fig. 4 Cross-lagged model of governance score (G) and firm value (adjusting for control variable firm size). Note The model provides standardized parameters, * $p < 0.05$, ** $p < 0.01$, and *** $p < 0.001$

3.2.4 Relationship between ESG score (ESG) and firm value over time (Model 4)

The temporal and cross-lagged effect of Model 4, which depicts the relationship between ESG score and firm value, is presented in Fig. 5. Fit statistics for Model 4 demonstrated an excellent fit (Table 3): $\chi^2(11)=8.096$, $p=0.705$, RMSEA=0.000, CFI=1.000, and SMSR=0.013. The model fit indices of Model 4 are presented in Table 3 in the “Appendix”. Coefficients of autoregressive paths are statistically significant, indicating stability in ESG score and firm value over time. All cross-lagged paths from ESG score to firm value are statistically significant, indicating ESG score can predict firm value. Cross-lagged paths from firm value to ESG score are not statistically significant. This indicates that the ESG score did not predict firm value over time. Coefficients for the first two years are negative, indicating the higher ESG score predicted a decline in firm value. About 92% of the variation in the firm value for year 2018 is explained by the ESG score and firm value for year 2017.

4 Discussion

Overall, analysis indicates ESG and the individual components of ESG, i.e., ‘E,’ ‘S’ and ‘G’ affect the Indian energy sector’s firm value negatively and significantly in the short-run, whereas in the long-run, they have a positive and significant impact on firm value. These results support the trade-off theory in the short-run, whereas the stakeholder theory and the RBV theory support the long run in our analysis. These findings are in line with the previous research work of Brammer et al. (2006), Branco and Rodrigues (2008), Duque-Grisales and Aguilera-Caracuel (2019), Friedman (1970), Lorraine et al. (2004), and Jha and Rangrajan (2020), supporting the trade-off theory in the short-run. This could be majorly attributed to the investors’ perception that sustainable investments lead to inefficient allocation of resources, which may not be rewarding in the stock market. However, these findings are inconsistent with the findings of Chen and Yang (2020). They found the support of positive signals and value creation in the short-run, whereas they lowered firm value in the long run due to exaggeration by the investors.

Our findings support Patel et al., (2020) conclusions. They suggest that investors may lower the firm’s growth potential for the short-run and prefer to channelize long-term

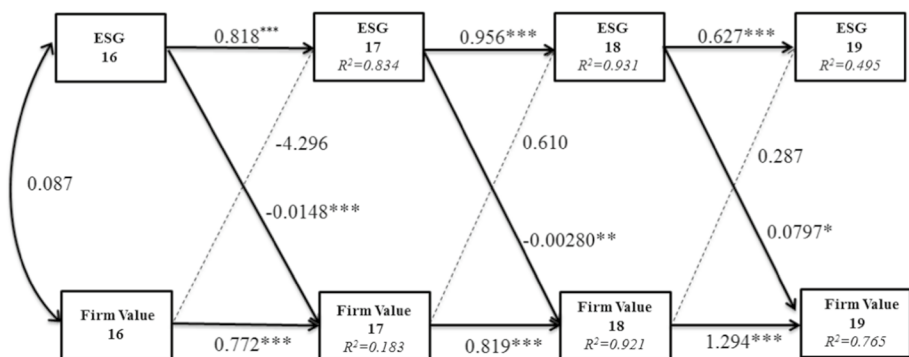


Fig. 5 Cross-lagged model of the ESG score (ESG) and firm value (adjusting for control variable firm size)
 Note The model provides standardized parameters, * $p < 0.05$, ** $p < 0.01$, and *** $p < 0.001$

value creation due to ESG in the long run by leveraging on ESG. Investors concerned about environment and social aspects may be required to forego some value specified in the short run as they opt for a limited investment set, which may be the cause of lower firm value in the initial years of ESG investments (Liagkouras et al., 2020).

Our findings support the conclusion of Shahbaz et al. (2020) for the global energy sector. Better ESG scores do not guarantee higher financial performance, specifically in the short run, and all CSR activities may not add to firm value (Kalaitzoglou et al., 2020).

The positive impact of ESG scores on firm value, in the long run, supports the stakeholder theory and the RBV of the firm. However, in developing economies like India, it takes a longer time to create intangible resources such as corporate culture and reputation in the market due to greater instability of the political and institutional system, regulations, norms on Carbon emission and environmental hazards, pollution, and various other social issues related to wages and other aspects (Odell & Ali, 2016; Odera et al., 2016; Khanna & Palepu, 2000). Customers in the beginning years may not be ready to pay more for sustainable or green products, and therefore we observed a lag time to reap benefits of ESG investments in the firm value. This lagged period in terms of benefits in developing economies like India is due to environmental and socially responsible investments as costs in the initial years. Executives may not prefer to invest in such initial payoffs until and unless they legally abide to do so (Cai et al., 2016).

Specifically, relating to the energy and allied sector firms, markets penalize firms for irresponsible behaviour towards environmental management, and firms that do not disclose such activities on Carbon emission, attract penalization and legal fees. In GHG emissions or environmental pollution by the energy and allied sector, ESG and “Environmental” disclosures lead to higher firm value in the long run (Matsumura et al., 2014). In the long run, ESG investments reduce firm risk, as it improves reputation in the long run, which may appear as a cost in the short run, but it reap benefits in the long run by reducing operational risk through the creation of intangible resources and lesser volatility in stock prices and firm value (Godfrey et al., 2009; Jo & Na, 2012).

Our results do not support any bi-directional causality or reversal linkage in the cross-lagged path model of ESG and the Indian energy and allied sector's firm value. These findings are consistent with Jha and Rangrajan's (2020) findings in the Indian context and do not support the slack resources hypothesis (Waddock & Graves, 1997). In the Indian energy sector, it does not matter that one is a high-value firm, so it is going to spend more on ESG investment as an aggregate or individual component 'E,' 'S,' and 'G,' however strategic investments on ESG lead to better firm value in the long run only, and not in the concurrent financial years. This delay or lagged effect may be the reason behind executives' lesser enthusiasm towards directing higher firm value and excess profits towards ESG practices supporting the trade-off theory and managerial responsibility towards profit maximization to shareholders in the short run. These findings support the claims of Luo et al. (2015), as ESG investments are often indefinite and vague to general investors. Later, when investors receive positive signals from analysts, they only regard such investments in value, and justify the time lag relationship between ESG and firm value.

4.1 Theoretical implications

This study offers several noteworthy theoretical contributions as well. Firstly, this is a pioneering study on the cross-lagged relationship between ESG and firm value in India's energy segment. The extant literature has stressed the need for time-based and

industry-focused studies, as this relationship is time and industry variant in nature. Our results indicate that the ESG-FV relationship is uni-directional at the overall and individual levels. The effect is from ESG to FV, supporting the good management theory in the short and long run. Secondly, the study has extended the good management theory and the trade-off theory in the short-run by showing results in an emerging market with a sectoral focus. Thirdly, the study has also extended the RBV, indicating that energy sector companies can leverage RBV to create a competitive advantage and develop dynamic capability in the long run. Developing dynamic capability can enhance the firm's stakeholder relations in the long run, which will ultimately help in creating a sustainable competitive advantage.

This paper contributes to bridging the literature gap and provides robust results on the cross-lagged, bi-directional, and auto-regressive effects of ESG and firm value. Our results indicate that the study has extended the existing literature by showing a longitudinal path analysis of ESG-firm value in a four-wave model depicting the overall and individual ESG disclosure elements' effect on firm value in a sectoral study.

4.2 Practical and managerial implications

This research has several practical implications that are particularly relevant to corporate managers, investors, policymakers, and fund managers. Energy company managers can use these findings to investigate further why a high score in ESG disclosures does not increase firm value, further helping them understand whether to focus more on overall ESG score or individual element-wise score. The results indicate that in the Indian energy sector disclosures, the scores were highest for the G score followed by S and E. Managers should focus more on corporate governance practices to create more value and wealth in the stock market. The results can guide investors while considering sustainable investments; as in the short run, investments in energy companies may not result in value creation. Our results can guide policymakers in giving incentives to companies' segment-wise. It is proven that these investments are not financially beneficial in the short-run and should be provided support to face the volatility in the stock market. Fund managers can use these findings while investing in ESG-focused funds as a part of the portfolio building process. These findings can guide them further in terms of energy stock investments as a part of long-term portfolio strategy, as in the short run, it can be too risky and may not be rewarding in the stock market. Further, results indicate that corporate managers should focus on the present economic and stock market sentiment while deciding sustainability practices' budgets.

5 Conclusion

The extant literature on the ESG-FV relationship has provided mixed results for the last four decades and left the gap in time-varying and industry-based studies, especially in emerging economies where industries and social-cultural issues are highly diversified. This study bridged this gap by exploring the cross-lagged and bi-directional relationship of ESG and firm value in the Indian energy sector over the 2016–2019 period. This study has extensively contributed theoretically and practically in the light of the ESG-FV relationship. As there are very few studies on the time-variant relationship, this pioneering study augments the existing literature from an emerging country perspective. India is the first-ever country to mandate compulsory CSR spending by corporates in 2014, and after that, sustainability

investment began gaining momentum. Therefore, the current study covering five years of policy implantation provided robust results to make it relevant for industry and academia.

India's energy needs are expected to double in the next decade. The country needs to focus on the in-house supply of energy resources to cope with the balance of payment deficits. However, the most critical question is whether domestic energy companies can produce to the considerable demand level without harming the environment in the process? Domestic energy companies have to focus on renewable and low carbon emission technologies and become super strong in sustainable practices to solve this issue. Hence, integration of the energy revolution with the industry revolution 4.0 is mandatory for countries like India. It can have a synergy effect in environmental protection, creating job opportunities and economic strengthening. Studying sustainable practices through ESG in terms of overall and individual elements linkage to firm value can be highly beneficial for corporates as, ultimately they are focused on wealth maximization. Investing in ESG practices is highly rewarding to corporations, especially in value creation through sales increases, cost reductions, fewer regulatory and legal interventions, productivity enhancement, and increased market capitalization (KPMG report, 2018). However, there is no consistency in ESG-FV creation results as the literature shows that the impact is highly dynamic across countries, industries, and business models. In the light of ESG investing gaining momentum globally, our study bridged this gap. The results reiterate that sustainable practices will yield long-term prospects in multiple ways, and energy companies should continue to invest in this and should not expect immediate returns.

6 Limitations and future scope

Like other empirical research studies, even this study has some limitations. As our results are based on Bloomberg data, which uses all publicly available data for scoring, it may not have covered undisclosed parameters. Second, we used the quantitative method for analysing the impact, whereas sustainable investment returns can also be in terms of qualitative parameters. Therefore, in future studies, researchers should consider undertaking mixed methods research by including data from direct interviews and thematic analysis of publicly available reports. Since we focused on the post-2015 effect, we covered four-time waves, which are exhaustive in cross-lagged panel models and could not consider an indirect relationship. Future researchers could focus on indirect relationship studies by concentrating on new mediating and moderating variables, which would extend the existing literature on time-variant relationships.

Appendix

See Tables 1, 2, 3, 4, 5, 6, and 7.

Table 1 Summary of variables used in this study

Symbol	Definition	Measurement	Source
<i>Dependent variable</i>			
Tobin's q	Firm value	Market value (Market Cap + Total Liabilities + Preferential Equity + Minority Interest)/Replacement value of assets	Prowess
<i>Independent variables</i>			
ESG	ESG score	KPIs selected by Bloomberg	Bloomberg
E	E-Score	KPIs selected by Bloomberg	Bloomberg
S	S-Score	KPIs selected by Bloomberg	Bloomberg
G	G-Score	KPIs selected by Bloomberg	Bloomberg
<i>Control variables</i>			
Size	Firm size	Natural logarithm of the firm's total assets	Prowess

Table 2 Pairwise correlation among environment score (E), social score (S), governance score (G), and firm value, and means and standard deviations

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1. E T1	1.00																			
2. E T2	0.91	1.00																		
3. E T3	0.91	0.97	1.00																	
4. E T4	0.59	0.63	0.63	1.00																
5. S T1	0.78	0.75	0.73	0.51	1.00															
6. S T2	0.71	0.75	0.73	0.56	0.89	1.00														
7. S T3	0.73	0.78	0.78	0.63	0.86	0.96	1.00													
8. S T4	0.49	0.51	0.53	0.74	0.72	0.78	0.80	1.00												
9. G T1	0.71	0.65	0.65	0.54	0.62	0.58	0.56	0.47	1.00											
10. G T2	0.60	0.61	0.63	0.53	0.56	0.58	0.56	0.53	0.88	1.00										
11. G T3	0.62	0.63	0.66	0.53	0.59	0.60	0.59	0.50	0.87	0.92	1.00									
12. G T4	0.40	0.42	0.43	0.63	0.41	0.42	0.44	0.55	0.77	0.76	0.80	1.00								
13. ESG T1	0.94	0.86	0.86	0.50	0.81	0.75	0.77	0.50	0.69	0.59	0.58	0.35	1.00							
14. ESG T2	0.90	0.95	0.93	0.59	0.83	0.87	0.87	0.61	0.68	0.66	0.65	0.43	0.91	1.00						
15. ESG T3	0.90	0.94	0.96	0.65	0.82	0.85	0.89	0.65	0.68	0.68	0.71	0.48	0.89	0.97	1.00					
16. ESG T4	0.60	0.63	0.64	0.96	0.62	0.68	0.73	0.86	0.56	0.58	0.56	0.65	0.57	0.65	0.70	1.00				
17. FV T1	0.13	0.09	0.04	0.13	0.10	0.08	0.10	0.07	0.09	0.03	-0.06	-0.05	0.13	0.10	0.06	0.10	1.00			
18. FV T2	-0.41	-0.48	-0.45	-0.29	-0.50	-0.53	-0.48	-0.35	-0.50	-0.51	-0.50	-0.36	-0.42	-0.52	-0.50	-0.33	-0.13	1.00		
19. FV T3	-0.45	-0.52	-0.50	-0.36	-0.54	-0.57	-0.55	-0.42	-0.53	-0.56	-0.58	-0.44	-0.44	-0.55	-0.56	-0.40	-0.12	0.96	1.00	
20. FV T4	-0.33	-0.39	-0.36	-0.37	-0.41	-0.44	-0.42	-0.39	-0.39	-0.42	-0.40	-0.37	-0.33	-0.41	-0.41	-0.40	-0.14	0.90	0.88	1.00
Mean	17.26	18.14	18.76	15.44	33.70	35.30	36.66	33.28	46.91	47.56	48.12	47.12	26.29	28.64	29.71	26.88	0.07	0.06	0.06	0.07
SD	14.69	14.79	14.90	12.60	18.58	17.91	17.36	16.21	8.97	9.29	8.83	8.44	14.47	12.94	12.79	11.40	0.05	0.052	0.05	0.06

All correlations are significant at 0.01 level

Environmental score (E), Social score (S), Governance score (G), Environment-Social-Governance (ESG), Firm value (FV)

Table 3 Fit indices for models 1 to 4

Model	χ^2	Df	P	RMSEA	SRMR	CFI
Model 1	12.811	11	0.306	0.052	0.017	0.997
Model 2	4.934	11	0.934	0.000	0.011	1.000
Model 3	10.519	10		0.396	0.029	0.016
Model 4	8.096	11	0.705	0.000	0.013	1.000
Cut-off for good fit by Hair and Anderson (2015)			$p\text{-value} > 0.05$	$\text{RMSEA} < 0.08$	$\text{SMSR} < 0.08$	$\text{CFI} > 0.90$

RMSEA, root mean square error of approximation; SMSR, standardized root mean square residual; CFI, comparative fit index

Table 4 Hypothesis summary

No.	Hypothesis	Supported/ Not Supported
H _{1A}	ESG score of (T ₁) has a positive influence on firm value of (T ₂)	Not supported
H _{1B}	ESG score of (T ₂) has a positive influence on firm value of (T ₃)	Not supported
H _{1C}	ESG score of (T ₃) has a positive influence on firm value of (T ₄)	Supported
H _{2A}	Environmental score of (T ₁) has a positive influence on firm value of (T ₂)	Not supported
H _{2B}	Environmental score of (T ₂) has a positive influence on firm value of (T ₃)	Not supported
H _{2C}	Environmental score of (T ₃) has a positive influence on firm value of (T ₄)	Supported
H _{3A}	Social score of (T ₁) has a positive influence on firm value of (T ₂)	Not supported
H _{3B}	Social score of (T ₂) has a positive influence on firm value of (T ₃)	Not supported
H _{3C}	Governance score of (T ₃) has a positive influence on firm value of (T ₄)	Supported
H _{4A}	Governance score of (T ₁) has a positive influence on firm value of (T ₂)	Not supported
H _{4B}	Governance score of (T ₂) has a positive influence on firm value of (T ₃)	Not supported
H _{4C}	Governance score of (T ₃) has a positive influence on firm value of (T ₄)	Supported
H ₅	A bidirectional relationship exists between ESG overall and individual elements score and Firm value in the Indian energy sector	Not supported

Table 5 Literature summary on ESG-CFP results direction

Direction of Significant	Number	%
Mixed	16	9
Positive and no impact	4	2
Negative	12	7
Positive and negative	14	8
No impact	10	6
Positive	120	68
Total	175	100

Table 6 Literature summary on Methodology wise

Methodology Approach	Number	%
Regression analysis	65	37
Panel data analysis	18	10
Survey	11	6
Meta-analysis	8	5
Literature review	7	4
Structural equation modelling	7	4
Hierarchical regression analysis	4	2
Event study	5	3
Structural equation modelling (PLS)	2	1
Other	47	27
Total	174	100

Table 7 Country and year wise distribution of publication

Country	Pre 2002	2002–03	2004–05	2006–07	2008–09	2010–11	2012–13	2014–15	2016–17	2018–19	2020–Mar 21	Total
Japan			1									1
Belgium			1									1
Oman								1				1
Egypt				1								1
Romania							1					1
Iran							1					1
South Africa							1		1			2
UAE				1								1
Thailand							1					1
Turkey								1				1
Pakistan							2					2
Brazil					1	1						2
India					1			2		2		5
South Korea							2		1			3
Canada					1		1	2				4
Malaysia							1	2				4
Australia							4	2	1		2	9
China					1	1		4	4	1		10
Taiwan				1	2		1	6				10
US	4	1	2	1	1	2	8	5	8	12	7	50
European Countries	1	2	1	3	2	4	10	7	17	117	70	234
Time period distribution (%)	1	1	1	1	2	3	8	10	11	39	23	

References

- Aboud, A., & Diab, A. (2018). The impact of social, environmental and corporate governance disclosures on firm value: Evidence from Egypt. *Journal of Accounting in Emerging Economies*, 8(4), 442–458.
- Attig, N., El Ghoul, S., Guedhami, O., & Suh, J. (2013). Corporate social responsibility and credit ratings. *Journal of business ethics*, 117(4), 679–694.
- Aragón-Correa, J. A., & Sharma, S. (2003). A contingent resource-based view of proactive corporate environmental strategy. *Academy of management review*, 28(1), 71–88.
- Ambec, S., & Lanoie, P. (2008). Does it pay to be green? A systematic overview. *The Academy of Management Perspectives*, 45–62.
- Alsayegh, M. F., Abdul Rahman, R., & Homayoun, S. (2020). Corporate economic, environmental, and social sustainability performance transformation through ESG disclosure. *Sustainability*, 12(9), 3910.
- Alshehhi, A., Nobanee, H., & Khare, N. (2018). The impact of sustainability practices on corporate financial performance: Literature trends and future research potential. *Sustainability*, 10(2), 494.
- Azmi, W., Hassan, M. K., Houston, R., & Karim, M. S. (2021). ESG activities and banking performance: International evidence from emerging economies. *Journal of International Financial Markets, Institutions and Money*, 70, 101277.
- Barney, J. (1991). Special theory forum the resource-based model of the firm: Origins, implications, and prospects. *Journal of Management*, 17(1), 97–98.
- Beatty, R. P., & Ritter, J. R. (1986). Investment banking, reputation, and the underpricing of initial public offerings. *Journal of financial economics*, 15(1–2), 213–232.
- Blacconiere, W. G., & Northcut, W. D. (1997). Environmental information and market reactions to environmental legislation. *Journal of Accounting, Auditing & Finance*, 12(2), 149–178.
- Buallay, A. (2019). Is sustainability reporting (ESG) associated with performance? Evidence from the european banking sector. *Management of Environmental Quality: An International Journal*, 30(1), 98–115.
- Barney, J. B., Ketchen Jr, D. J., & Wright, M. (2011). The future of resource-based theory: revitalization or decline?. *Journal of management*, 37(5), 1299–1315.
- Bhattacharya, S., & Sharma, D. (2019). Do environment, social and governance performance impact credit ratings: A study from India. *International Journal of Ethics and Systems*, 35(3), 466–484.
- Belyaeva, Z., Shams, S. R., Santoro, G., & Grandhi, B. (2020). Unpacking stakeholder relationship management in the public and private sectors: the comparative insights. *EuroMed Journal of Business*, 15(3), 269–281.
- Blacconiere, W. G., & Patten, D. (1994). Environmental disclosures, regulatory costs and changes in share value. *Journal of Accounting and Economics*, 18(2), 357–377.
- Branco, M. C., & Rodrigues, L. L. (2006). Corporate social responsibility and resource-based perspectives. *Journal of business Ethics*, 69(2), 111–132.
- Battisti, E., Miglietta, N., Nirino, N., & Diaz, M. V. (2019). Value creation, innovation practice, and competitive advantage: Evidence from the FTSE MIB index. *European Journal of Innovation Management*, 23(2), 273–290.
- Branco, M. C., & Rodrigues, L. L. (2008). Factors influencing social responsibility disclosure by Portuguese companies. *Journal of business Ethics*, 83(4), 685–701.
- Buchanan, B., Cao, C. X., & Chen, C. (2018). Corporate social responsibility, firm value, and influential institutional ownership. *Journal of Corporate Finance*, 52, 73–95.
- Broadstock, D. C., Matousek, R., Meyer, M., & Tzeremes, N. G. (2020). Does corporate social responsibility impact firms' innovation capacity? The indirect link between environmental & social governance implementation and innovation performance. *Journal of Business Research*, 119, 99–110.
- Brammer, S., Brooks, C., & Pavelin, S. (2006). Corporate social performance and stock returns: UK evidence from disaggregate measures. *Financial Management*, 35(3), 97–116.
- Cai, L., Cui, J., & Jo, H. (2016). Corporate environmental responsibility and firm risk. *Journal of Business Ethics*, 139(3), 563–594.
- Callan, S. J., & Thomas, J. M. (2009). Corporate financial performance and corporate social performance: An update and reinvestigation. *Corporate Social Responsibility and Environmental Management*, 16(2), 61–78.
- Cavaco, S., & Crifo, P. (2010). Complementarity between CSR practices and corporate performance: an empirical study. *Crifo, P., J.-P. Ponssard, Corporate social responsibility: from compliance to opportunity*.
- Chen HY, Yang SS (2020) Do investors exaggerate corporate ESG information? Evidence of the ESG momentum effect in the taiwanese market. *Pacific Basin Finance Journal*, 63, 101407. <https://doi.org/10.1016/j.pacfin.2020.101407>

- Chelawat, H., & Trivedi, I. V. (2016). The business value of ESG performance: The Indian context. *Asian Journal of Business Ethics*, 5(1–2), 195–210.
- Christmann, P. (2000). Effects of “best practices” of environmental management on cost advantage: The role of complementary assets. *Academy of Management Journal*, 43(4), 663–680.
- Dalal, K. K., & Thaker, N. (2019). ESG and corporate financial performance: A panel study of Indian companies. *IUP Journal of Corporate Governance*, 18(1), 44–59.
- Dhaliwal, D. S., Li, O. Z., Tsang, A., & Yang, Y. G. (2011). Voluntary nonfinancial disclosure and the cost of equity capital: The initiation of corporate social responsibility reporting. *The Accounting Review*, 86(1), 59–100.
- Dumitrescu, A., El Hefnawy, M., & Zakriya, M. (2020). Golden geese or black sheep: Are stakeholders the saviors or saboteurs of financial distress? *Finance Research Letters*, 37, 101371.
- Duque-Grisales, E., & Aguilera-Caracuel, J. (2019). Environmental, social and governance (ESG) scores and financial performance of multilatinas: Moderating effects of geographic international diversification and financial slack. *Journal of Business Ethics*, 1–20.
- Fatemi, A., Glaum, M., & Kaiser, S. (2018). ESG performance and firm value: The moderating role of disclosure. *Global Finance Journal*, 38, 45–64.
- Fatemi, A. M., & Fooladi, I. J. (2013). Sustainable finance: A new paradigm. *Global Finance Journal*, 24(2), 101–113.
- Freeman, R. E. (1999). Divergent stakeholder theory. *Academy of Management Review*, 24(2), 233–236.
- Fombrun, C., & Shanley, M. (1990). What's in a name? Reputation building and corporate strategy. *Academy of management Journal*, 33(2), 233–258.
- Friedman, M. (1970). A Friedman doctrine: The social responsibility of business is to increase its profits. *The New York times Magazine*, 13(1970), 32–33.
- Gauthier, C. (2005). Measuring corporate social and environmental performance: The extended life-cycle assessment. *Journal of business ethics*, 59(1), 199–206.
- Groenewegen, P., & Vergragt, P. (1991). Environmental issues as threats and opportunities for technological innovation. *Technology Analysis & Strategic Management*, 3(1), 43–55.
- Gillan, S. L., Koch, A., & Starks, L. T. (2021). Firms and social responsibility: A review of ESG and CSR research in corporate finance. *Journal of Corporate Finance*, 101889.
- Godfrey, P. C., Merrill, C. B., & Hansen, J. M. (2009). The relationship between corporate social responsibility and shareholder value: An empirical test of the risk management hypothesis. *Strategic Management Journal*, 30(4), 425–445.
- Grant, R. M. (1991). The resource-based theory of competitive advantage: implications for strategy formulation. *California management review*, 33(3), 114–135.
- Grewatsch, S., & Kleindienst, I. (2017). When does it pay to be good? Moderators and mediators in the corporate sustainability–corporate financial performance relationship: A critical review. *Journal of Business Ethics*, 145(2), 383–416.
- Groening, C., & Kanuri, V. K. (2013). Investor reaction to positive and negative corporate social events. *Journal of Business Research*, 66(10), 1852–1860.
- Gosling, T., & Vocht, C. (2007). Social role conceptions and CSR policy success. *Journal of Business Ethics*, 74, 363–372.
- Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2015). *Multivariate Data Analysis*. edth India.
- Hall, R. (1992). The strategic analysis of intangible resources. *Strategic Management Journal*, 13(2), 135–144.
- Harjoto, M. A., & Jo, H. (2015). Legal vs normative CSR: Differential impact on analyst dispersion, stock return volatility, cost of capital, and firm value. *Journal of Business Ethics*, 128(1), 1–20.
- Harrison, J. S., & Freeman, R. E. (1999). Stakeholders, social responsibility, and performance: Empirical evidence and theoretical perspectives. *Academy of Management Journal*, 42(5), 479–485.
- Hart, S. L. (1995). A natural-resource-based view of the firm. *Academy of Management Review*, 20(4), 986–1014.
- Hart, S. L., & Milstein, M. B. (2003). Creating sustainable value. *Academy of Management Perspectives*, 17(2), 56–67.
- Hsu, P. H., Liang, H., & Matos, P. (2018). Leviathan Inc. and corporate environmental engagement.
- Huang, K., Sim, N., & Zhao, H. (2020). Corporate social responsibility, corporate financial performance and the confounding effects of economic fluctuations: A meta-analysis. *International Review of Financial Analysis*, 70, 101504.
- Huber, B. M., Comstock, M., Polk, D., & Wardwell, L. L. P. (2017). ESG reports and ratings: What they are, why they matter. In *Harvard Law School Forum on Corporate Governance and Financial Regulation*, 44.

- Humphrey, J. E., Lee, D. D., & Shen, Y. (2012). Does it cost to be sustainable? *Journal of Corporate Finance*, 18(3), 626–639.
- Ioannou, I., & Serafeim, G. (2010, August). THE IMPACT OF CORPORATE SOCIAL RESPONSIBILITY ON INVESTMENT RECOMMENDATIONS. In *Academy of Management Proceedings* (Vol. 2010, No. 1, pp. 1–6). Briarcliff Manor, NY 10510: Academy of Management.
- Ionescu, G. H., Firoiu, D., Pîrvu, R., Bădîrcea, R., & Drăgan, C. (2018). Implementation of integrated management systems and corporate social responsibility initiatives—a Romanian hospitality industry perspective. *Sustainability*, 10(10), 3684.
- Jensen, M. (2001). Value maximisation, stakeholder theory, and the corporate objective function. *European financial management*, 7(3), 297–317.
- Jha, M. K., & Rangarajan, K. (2020). Analysis of corporate sustainability performance and corporate financial performance causal linkage in the Indian context. *Asian Journal of Sustainability and Social Responsibility*, 5(1), 1–30.
- Jo, H., & Na, H. (2012). Does CSR reduce firm risk? Evidence from controversial industry sectors. *Journal of Business Ethics*, 110(4), 441–456.
- Jo, H., & Harjoto, M. A. (2011). Corporate governance and firm value: The impact of corporate social responsibility. *Journal of business ethics*, 103(3), 351–383.
- Jones, T. (1995). Instrumental stakeholder theory: A synthesis of ethics and economics. *Academy of Management Review*, 20(2), 404–437.
- Kalaitzoglou, I., Pan, H., & Niklewski, J. (2020). Corporate social responsibility: How much is enough? A higher dimension perspective of the relationship between financial and social performance. *Annals of Operations Research*, 1–37.
- Kemp, R. (1994) Technology and the transition to a sustainable economy: continuity and change in complex technological systems. *Paper presented at the Symposium International de Modeles de Developpment Soutenable, Paris, March*, 16–18.
- Khanna, T., & Palepu, K. (2000). The future of business groups in emerging markets: Long-run evidence from Chile. *Academy of Management journal*, 43(3), 268–285.
- Kim, W. S., & Oh, S. (2019). Corporate social responsibility, business groups and financial performance: A study of listed Indian firms. *Economic Research-Ekonomska Istraživanja*, 32(1), 1777–1793.
- Klein, B. and Leffler, K.B., (1981). The role of market forces in assuring contractual performance. *Journal of political Economy*, 89(4), 615–641.
- Konar, S., & Cohen, M. A. (2001). Does the market value environmental performance? *Review of Economics and Statistics*, 83(2), 281–289.
- Lee, S., Seo, K., & Sharma, A. (2013). Corporate social responsibility and firm performance in the airline industry: The moderating role of oil prices. *Tourism Management*, 38, 20–30.
- Lev, B., Petrovits, C., & Radhakrishnan, S. (2010). Is doing good good for you? How corporate charitable contributions enhance revenue growth. *Strategic Management Journal*, 31(2), 182–200.
- Liagkouras, K., Metaxiotis, K., & Tshirintzis, G. (2020). Incorporating environmental and social considerations into the portfolio optimization process. *Annals of Operations Research*, 1–26.
- López, M. V., Garcia, A., & Rodriguez, L. (2007). Sustainable development and corporate performance: A study based on the Dow Jones sustainability index. *Journal of Business Ethics*, 75(3), 285–300.
- Lorraine, N. H., Collison, D. J., & Power, D. M. (2004). An analysis of the stock market impact of environmental performance information. *Accounting Forum*, 28(1), 7–26.
- Lu, H., Oh, W. Y., Kleffner, A., & Chang, Y. K. (2021). How do investors value corporate social responsibility? Market valuation and the firm specific contexts. *Journal of Business Research*, 125, 14–25.
- Lu, Y., & Abeysekera, I. (2014). Stakeholders' power, corporate characteristics, and social and environmental disclosure: Evidence from China. *Journal of Cleaner Production*, 64, 426–436.
- Luo, X., Wang, H., Raithel, S., & Zheng, Q. (2015). Corporate social performance, analyst stock recommendations, and firm future returns. *Strategic Management Journal*, 36(1), 123–136.
- Lucas, M. T., & Noordewier, T. G. (2016). Environmental management practices and firm financial performance: The moderating effect of industry pollution-related factors. *International Journal of Production Economics*, 175, 24–34.
- Lo, S. F., & Sheu, H. J. (2007). Is corporate sustainability a value-increasing strategy for business?. *Corporate Governance: An International Review*, 15(2), 345–358.
- Matsumura, E. M., Prakash, R., & Vera-Muñoz, S. C. (2014). Firm-value effects of carbon emissions and carbon disclosures. *The Accounting Review*, 89(2), 695–724.
- McWilliams, A., & Siegel, D. (2000). Corporate social responsibility and financial performance: Correlation or misspecification? *Strategic Management Journal*, 21(5), 603–609.
- McWilliams, A., Siegel, D. S., & Wright, P. M. (2006). Corporate social responsibility: Strategic implications. *Journal of management studies*, 43(1), 1–18.

- Milgrom, P. and Roberts, J., (1986). Price and advertising signals of product quality. *Journal of political economy*, 94(4), 796–821.
- Nelling, E., & Webb, E. (2009). Corporate social responsibility and financial performance: The “virtuous circle” revisited. *Review of Quantitative Finance and Accounting*, 32(2), 197–209.
- NSE (2020). ESG analysis of 50 listed companies in India (2020). ESG – Reporting
- Odell, J., & Ali, U. (2016). ESG investing in emerging and frontier markets. *Journal of Applied Corporate Finance*, 28(2), 96–101.
- Odera, O., Scott, A. H., & Gow, J. (2016). Factors influencing corporate social and environmental disclosures: A systematic review. *International Journal of Business Governance and Ethics*, 11(2), 116–134.
- Goncalves, O., Robinot, E., & Michel, H. (2016). Does it pay to be green? The case of french ski resorts. *Journal of Travel Research*, 55(7), 889–903.
- Orlitzky, M., Schmidt, F. L., & Rynes, S. L. (2003). Corporate social and financial performance: A meta-analysis. *Organization Studies*, 24(3), 403–441.
- Pan, H., Liu, S., Miao, D., & Yuan, Y. (2018). Sample size determination for mediation analysis of longitudinal data. *BMC Medical Research Methodology*, 18(1), 32.
- Pasquini-Descomps, H. & Sahut, J.M. (2013) ESG impact on market performance of firms: international evidence. *Management International/International Management/Gestión Internacional*, 19(2), 40–63.
- Patel, P. C., Pearce, J. A., II., & Oghazi, P. (2021). Not so myopic: Investors lowering short-term growth expectations under high industry ESG-sales-related dynamism and predictability. *Journal of Business Research*, 128, 551–563.
- Patten, D. M. (1991). Exposure, legitimacy and social disclosure. *Journal of Accounting and Public Policy*, 10(4), 297–308.
- Patten, D. M. (1992). Intra-industry environmental disclosures in response to the Alaskan oil spill: A note on legitimacy theory. *Accounting, Organizations and Society*, 17(5), 471–475.
- Pava, M. L., & Krausz, J. (1996). The association between corporate social-responsibility and financial performance: The paradox of social cost. *Journal of Business Ethics*, 15(3), 321–357.
- Rey-Martí, A., Ribeiro-Soriano, D., & Palacios-Marqués, D. (2016). A bibliometric analysis of social entrepreneurship. *Journal of Business Research*, 69(5), 1651–1655.
- Richardson, A. J., Welker, M., & Hutchinson, I. R. (1999). Managing capital market reactions to corporate social responsibility. *International Journal of Management Reviews*, 1(1), 17–43.
- Roberts, J. (2010). Environmental policy. Routledge.
- Ruf, B. M., Muralidhar, K., Brown, R. M., Janney, J. J., & Paul, K. (2001). An empirical investigation of the relationship between change in corporate social performance and financial performance: A stakeholder theory perspective. *Journal of Business Ethics*, 32(2), 143–156.
- Russo, M. V., & Fouts, P. A. (1997). A resource-based perspective on corporate environmental performance and profitability. *Academy of Management Journal*, 40(3), 534–559.
- Saeidi, S. P., Sofian, S., Saeidi, P., Saeidi, S. P., & Saeidi, S. A. (2015). How does corporate social responsibility contribute to firm financial performance? The mediating role of competitive advantage, reputation, and customer satisfaction. *Journal of Business Research*, 68(2), 341–350.
- Shahbaz, M., Karaman, A. S., Kilic, M., & Uyar, A. (2020). Board attributes, CSR engagement, and corporate performance: What is the nexus in the energy sector? *Energy Policy*, 143, 111582.
- Sharma, D., Bhattacharya, S., & Thukral, S. (2019). Resource-based view on corporate sustainable financial reporting and firm performance: Evidences from emerging Indian economy. *International Journal of Business Governance and Ethics*, 13(4), 323–344.
- Sharma, E. (2019). A review of corporate social responsibility in developed and developing nations. *Corporate Social Responsibility and Environmental Management*, 26(4), 712–720.
- Sharma, S., & Vredenburg, H. (1998). Proactive corporate environmental strategy and the development of competitively valuable organizational capabilities. *Strategic management journal*, 19(8), 729–753.
- Tang, Z., Hull, C. E., & Rothenberg, S. (2012). How corporate social responsibility engagement strategy moderates the CSR–financial performance relationship. *Journal of management Studies*, 49(7), 1274–1303.
- Teece, D. J. (1980). Economies of scope and the scope of the enterprise. *Journal of Economic Behavior & Organization*, 1(3), 223–247.
- Gössling, T., & Vocht, C. (2007). Social role conceptions and CSR policy success. *Journal of Business Ethics*, 74, 363–372.
- Ullmann, A. A. (1985). Data in search of a theory: A critical examination of the relationships among social performance, social disclosure, and economic performance of US firms. *Academy of Management Review*, 10(3), 540–557.

- Van de Velde, E., Vermeir, W., & Corten, F. (2005). Corporate social responsibility and financial performance. *Corporate Governance*, 5(3), 129–138.
- Waddock, S. A., & Graves, S. B. (1997). The corporate social performance–financial performance link. *Strategic Management Journal*, 18(4), 303–319.
- Waddock, S. (2004). Creating corporate accountability: Foundational principles to make corporate citizenship real. *Journal of Business Ethics*, 50(4), 313–327.
- Wahba, H., & Elsayed, K. (2015). The mediating effect of financial performance on the relationship between social responsibility and ownership structure. *Future Business Journal*, 1(1–2), 1–12.
- Wong, W. C., Batten, J. A., Mohamed-Arshad, S. B., Nordin, S., & Adzis, A. A. (2020). Does ESG certification add firm value?. *Finance Research Letters*, 101593.
- Xiong, B., Lu, W., Skitmore, M., Chau, K. W., & Ye, M. (2016). Virtuous nexus between corporate social performance and financial performance: A study of construction enterprises in China. *Journal of Cleaner Production*, 129, 223–233.
- Yadav, P. L., Han, S. H., & Rho, J. J. (2016). Impact of environmental performance on firm value for sustainable investment: Evidence from large US firms. *Business Strategy and the Environment*, 25(6), 402–420.

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