ENVIRONMENTAL, SOCIAL, GOVERNANCE FACTORS AND FINANCIAL PERFORMANCE: EVIDENCE FROM SENSITIVE SECTOR

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Abstract

The main aim of this paper is to analyze the impact of environmental, social, and governance (ESG) factors on financial performance (market value), within the context of US markets, utilizing financial data from firms listed on the US S&P 500 index, focusing on energy stocks over the decade spanning 2015 to 2023. Following an approach based on the structural equation modelling (SEM) using SmartPLS indicate that, it is implemented to assess the indicated linkages. The results demonstrate significant positive correlations between capital expenditure (CapEx), ESG factors, and market value. Although no direct link between environmental factors and revenue was identified, CapEx and enterprise disclosure scores showed a positive significance. Additionally, the capital spending, with mediated sales revenue, has a significant positive impact on ESG. This investigation enriches the available knowledge on ESG influences and the effectiveness of energy enterprises by underlining the importance of financial outlay. It posits that policymakers have the capacity to foster sustainable practices by monitoring the allocation of corporate expenditures and assessing their implications for market valuation. Investors may leverage this data to identify organizations that prioritize sustainability in their investment strategies. Specifically, energy firms have the potential to augment their market value by intensifying their focus on environmental initiatives (Wanday et al., 2022).

Keywords: ESG, Capital Expenditure, Financial Performance, Energy Stocks, Revenue, Structural Equation Modelling

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1. INTRODUCTION

Environmental, social, and governance (ESG) factors have become an important topic in the world, and firms are adopting which sustainability goals to fulfil. In contemporary years, the energy sector, akin to other industrial sectors, is confronted with the imperative to comply with ESG stipulations

within its operational frameworks, particularly as investors endeavor to elucidate the correlation between capital expenditures (CapEx) and market valuations. The implementation of a robust ESG strategy represents one of the most formidable challenges encountered by energy corporations. Numerous enterprises that have predominantly focused on the maximization of profits have historically neglected their ESG obligations over several decades. ESG responsibilities were not only perceived to exert minimal influence on financial performance, but they were also regarded as a potential liability to such performance, as they were associated with increases in operational costs (Billio et al., 2021). This study will enhance societal understanding by elucidating the unresolved debates regarding the positive or negative relationship between ESG factors and financial performance. It will also focus on showing the importance of investing in the social and governance aspect of ESG, as most companies have previously focused mainly on the environmental aspect due to an understanding of long-term environmental impacts. This research paper will discuss the various reasons why ESG and financial performance can lead to different conclusions, considering that financial performance can be measured using different methods, and different indicators can be used to determine companies' financial performance.

The escalating focus on ESG criteria within the realm of investment has compelled energy enterprises to reevaluate their capital allocation frameworks. As sustainability and ethical governance ascend the hierarchy of investor priorities, organizations are required to reconcile their financial imperatives with the requirement for transparent ESG disclosures. Firms operating within the ESG sector encounter intensified demands from stakeholders and are subjected to more stringent requirements regarding transparency and disclosure (Welbeck et al., 2017; Manes-Rossi et al., 2018). Research shows that such companies generally present more thorough disclosures about social and environmental concerns to verify their practices and improve their public reputation (Manes-Rossi et al., 2018).

The strategic allocation of capital towards cleaner energy initiatives not only serves to enhance ESG ratings but also corresponds with consumer expectations for responsible energy production. This transformation underscores the notion that investment decisions transcend mere short-term financial considerations, thereby impacting long-term sustainability and corporate reputation. Comprehending this interplay is essential for evaluating forthcoming performance and investment viability within the energy sector. Responsible investing has gained significant traction in recent years, with investors increasingly considering ESG factors when making investment decisions (Kaiser, 2020). This trend has been particularly pronounced in the US, where the financial performance of sensitive sectors and energy industries has been closely linked to their ESG performance. The term "sensitive industry" refers to those sectors that are highly susceptible to regulatory, environmental, and societal scrutiny. This sensitivity focuses on investors, policymakers, and researchers. The energy sector often faces stricter oversight due to its potential impact on the environment, public health, oil price fluctuations, regulatory scrutiny, and ESG relevance. Various sectors highlighted by social, environmental, or ethical considerations, particularly including the energy sector, cement sector, and oil and gas (Seguí-Mas et al., 2018; Garcia et al., 2017).

A study by Hughes et al. (2021) found that companies with strong ESG practices tend to have better financial outcomes. This is because ESG integration can help mitigate investment risk and create growth opportunities for businesses. For instance, firms with high ESG ratings are less likely to engage in financial fraud or other unethical practices, which can have significant financial implications (Zhan, 2023). Moreover, companies that are aligned with long-term sustainability issues can often outperform their competitors in terms of shareholder returns (Hughes et al., 2021; Kaiser, 2020). The existing literature on the relationship between ESG factors and financial performance provides a nuanced perspective on this topic. While some research suggests that the financial performance of ESG investing is on par with conventional investing, other studies have found that ESG integration as a strategy can lead to improved risk-adjusted returns compared to approaches such as screening or divestment (Kaiser, 2020; Atz et al., 2022). Prior research of Rubab et al. (2025) highlighted predominant themes such as investor awareness, sustainability, ESG models, ratings, and practices. Various factors are considered and influence sustainable investment decisions.

This paper involves contributions to the existing literature on how the ESG factors impact market value by addressing the capital spending and revenue mediating, focusing on energy firms indexed in the S&P 500.

Furthermore, the literature indicates that ESG investing can provide asymmetric benefits, particularly during times of economic or social crisis.

Therefore, the following research questions are formulated to explore the answers:

RQ1: What is the impact of capital expenditure on ESG factors in the energy sector?

RQ2: How do ESG factors impact on firm's financial performance value?

The main aim of this study is to examine the relationship between the variables.

The research includes a review of the existing literature to identify gaps and sets concrete goals to achieve this.

- Undertake an extensive examination of the synergistic effects of ESG on financial performance, specifically in relation to market valuation.
- This study conducts a dynamic analysis of the relationship between CapEx and sales in order to elucidate its ramifications for corporate valuation.

The structure of the paper is as follows. Section 2 provides the review literature and hypotheses development. Section 3 describes research methodology. Section 4 presents analyses and interpretations. Section 5 discusses the results, and Section 6 outlines the conclusions.

2. LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

Capital expenditure plays a pivotal role in the energy sector, serving as the financial backbone for infrastructure development, technological

advancements, and sustainability initiatives. By allocating substantial resources to CapEx, energy companies aim to expand their operational capacities while aligning their practices with environmental and governance standards. Studies, such as those highlighted in Nunes (2023), indicate a positive correlation between effective ESG strategies and financial performance, particularly in energy firms that are committed to sustainable practices. Furthermore, the analysis presented in Nunes (2023) underlines that a solid governance framework enhances overall performance metrics, promoting long-term sustainability. Energy companies allocating capital toward sustainable technologies, such as renewable energy sources or energy-efficient infrastructure, not only enhance their operational efficiency but also improve their ESG disclosures. Research indicates that firms that improve their ESG profiles through careful CapEx decisions experience a correlated increase in market valuation, suggesting that stakeholders increasingly value sustainability-focused investments (Khan et al., 2024). Furthermore, as SMEs increasingly embrace ESG practices, the positive impact of such investments on firm value becomes evident, demonstrating a broader trend towards sustainability across various sectors (Achsani et al., 2023). Furthermore, the study by Kumar (2024) found limited potential for using ESG performance metrics as signaling mechanisms for financial performance based on the empirical findings.

As investors gravitate towards firms that demonstrate strong ESG profiles, heightened transparency in ESG disclosures can mitigate information asymmetry and foster positive market sentiment. Specifically, research indicates that improvements in ESG performance correlate with increased market prices relative to a company's true value, enhancing investor confidence in overvalued stocks while restoring the true value of undervalued assets (Khan et al., 2024). As per Achsani et al. (2023), the attention to corporate ESG has not only attracted institutional investments but has also led small and medium-sized enterprises (SMEs) to amplify their ESG commitments, recognizing its positive effects on firm value. Wang and Sarkis (2017) assess the cumulative ESG scores of the foremost 500 environmentally sustainable corporations within the US and ascertain that enhanced corporate social responsibility (CSR) governance is positively associated with superior financial performance. However, Ching et al. (2017) the investigation revealed an absence of correlation between the sustainability disclosures of a corporation and the fiscal outcomes of publicly traded entities included in the corporate sustainability index.

Bloomberg has developed and shared the ESG score, which serves as a numerical assessment comprising around 120 elements associated with ESG aspects. In the last three decades, academic research and practical studies exploring the link between sustainability disclosure and financial performance have surged at a remarkable speed (Shaikh, 2022). The rise of ESG ratings originated in the 1980s, serving as an important tool for investors to know firms with their performance in their respective domains. Investors and stakeholders in the energy sector, along with the general public, are increasingly aware of the crucial role that ESG ratings play as essential drivers. Energy companies that recognize the importance of ESG standards will excel in attracting and keeping exceptional talent while also meeting market expectations (Verma & Shroff, 2025; Tran & Do, 2025). This sector is widely recognized for presenting an ecological risk. A multitude of companies in this industry have taken steps to comply with ESG standards while striving to reduce their environmental footprint. Clearly, environmental factors are rising to the forefront for oil and gas firms as they seek to optimize their operations and increase value across their enterprises. While it is likely that most oil and gas firms will continue investing in traditional production techniques, leading players in the sector are progressively focusing on sustainable energy projects (Verma & Shroff, 2025; Tran & Do, 2025). According to Volkmer (2021), the environmental criterion is undoubtedly the most crucial for energy companies aiming to present a favorable image to prospective investors. The elements listed below all play a role in reducing their impact and ensuring they stay both competitive and appealing to investors in the market. Increased capital investment often leads to improved environmental performance, thereby appealing to environmental regulations and enhancing firm value, as suggested in recent findings. Specifically, those firms that effectively manage their CapEx to align with environmentally sustainable practices not only boost their market standing but also capitalize on the opportunities presented by changing regulatory landscapes (Manzardo et al., 2016; Cao et al., 2024). This underscores the intricate relationship between CapEx and market performance within the energy sector.

Investment in capital assets often signifies a company's commitment to growth, innovation, and enhanced operational efficiency, which, in turn, can elevate its market valuation. However, the efficacy of CapEx in boosting market value is frequently moderated by revenue, indicating that successful capital investments must translate into increased earnings to positively influence investor perceptions. This is particularly notable in the energy sector, where fluctuations in market conditions and resource availability can dramatically affect output and profitability. Furthermore, the implications of public spending and volatility brought forth in literature underscore that optimizing public expenditures can enhance overall productivity growth, thus driving market value higher (Herrera, 2007). Furthermore, understanding local economic influences, such as those discussed in mining activities in Arctic regions, can provide insights into the varying impacts of CapEx across different sectors, highlighting the necessity for precise evaluation methodologies (Crow et al., 2021). As companies invest in new projects or technologies, the expectation is that these capital outlays will lead to increased revenue streams, thus improving overall market value. This dynamic is especially significant in the energy sector, where investments often require substantial financial commitment, yet yield results that strongly correlate with revenue performance. An analysis of various case studies demonstrates how companies that effectively leverage revenue growth to justify their CapEx can enhance their market appeal, further emphasizing the necessity of revenue as a pivotal mediator in this relationship (Maguire, 2016).

By the above assumptions, we have developed the following hypotheses:

H1: There is a relationship between capital expenditure and the ESG factor of energy stocks of the S&P 500.

H2: There is a relation between capital expenditure and revenue.

H3: There is a relation between capital expenditure and market value.

H4: There is a relationship between ESG and revenue.

H5: There is a relationship between ESG and market value, with the sales revenue being the mediator between the two.

3. RESEARCH METHODOLOGY

3.1. Data collection

Our investigation is predicated on a comprehensive dataset encompassing 22 energy equities, namely Occidental Petroleum Corporation, ONEOK, Inc., Chevron Corporation, ConocoPhillips, Exxon Mobil Corporation, Valero Energy Corporation, Targa Resources, Inc., Schlumberger N.V., Baker Hughes Company, Devon Energy Corporation, Expand Energy Corporation, The Williams Companies, Inc., Coterra Energy Inc., Phillips 66, Texas Pacific Land Corporation, APA Corporation, EOG Resources, Inc., Kinder Morgan, Inc., EQT Corporation, Marathon Petroleum Corporation, Halliburton Company, and Diamondback Energy, Inc. equities[1], respectively, and are listed in the S&P 500 over a span of seven years, i.e., from 2017 to 2023, entirely derived from secondary data procured via the Bloomberg platform. They are selected on the basis of their market capitalization, environmental significance, and reliable access to financial and ESG information. Important discoveries arose from structural equation modelling (SEM) that utilized the bootstrapping method with 5000 resamples sourced from the original dataset. A salient benefit of bootstrapping is its capacity to facilitate inferences without necessitating stringent distributional assumptions, thereby augmenting the reliability and validity of our findings. This methodology enabled the computation of standard errors and confidence intervals (CIs) for the model coefficients. This focused approach zeroes in on the dynamic US market, permitting an in-depth exploration of its distinct drivers and challenges. Leveraging the extensive corpus of financial and operational data accessible on Bloomberg, we can scrutinize trends related to production capacity, pricing dynamics, market share, and regulatory frameworks. By concentrating solely on energy equities, the research sought to furnish a detailed and context-specific examination of the energy sector within the framework of the US economic landscape. This targeted data acquisition strategy guarantees both cost-effectiveness and access to a diverse array of credible information, thereby establishing a robust foundation for our inquiry into the complexities of S&P 500 energy stocks.

3.2. Measures

We have applied a SEM methodology path analysis noted for quantitative continuous data and engaged in partial least squares SEM (PLS-SEM) analysis to critically explore the multifaceted relationships between CapEx, ESG factor, and shareholder value in the energy field. Alternative methods that could have been applied, such as panel data regression models, fuzzy set qualitative comparative study (fsQCA), but this paper forms an econometric model, commonly designated as SEM models, were originally conceived to elucidate economic indicators. ESG factor values can be examined through principal component analysis (PCA) to consolidate multiple indicators into composite indices that preserve maximum explanatory variance for further analysis. Exogenous variables derive their variability from external influences, whereas endogenous variables acquire their variability from internal factors or other variables. We selected this methodology owing to its benefits in accommodating non-normally distributed data, formative constructs, and mediation effects.

Revenue is operationalized as "sales", the value of the ESG factor is denoted by ESG score forms environmental (E), social (S), and governance (G) criteria, representing a framework for assessing the sustainability and ethical impact of an organization. Environmental (E) refers to how an organization interacts with the natural environment. This includes its carbon footprint, energy consumption, waste management, greenhouse gas (GHG) emissions, recycling initiatives, and efforts to preserve natural resources. Companies that manage their environmental impact effectively are often considered more forward-looking, resilient to climate change, and better equipped to adapt to future environmental regulations.

Social (S) encompasses the company's relationships with stakeholders such as employees, customers, suppliers, and the wider community. Key considerations include fair labor practices, diversity and inclusion, employee health and safety, and community involvement. Firms that perform well on social criteria tend to enjoy stronger stakeholder relationships and enhanced public trust. Governance (G) focuses on the structures and processes by which a company is directed and controlled. It includes board composition, executive compensation, leadership quality, shareholder rights, transparency, ethical standards, and anti-corruption policies. Sound governance practices are critical to ensuring accountability and long-term value creation. Bloomberg aggregates data across these three dimensions to assign an ESG score, which reflects a company's overall sustainability performance and ethical standards. Company value is articulated as the company's market value, and CapEx shows the total spending of the firm in purchasing or procuring, upgrading assets in the long term. CapEx functions as an external factor that influences the endogenous variable, firm value. We hypothesize that sales revenue and ESG ratings operate as mediators, thereby facilitating the impact of CapEx on firm value. Our PLS-SEM methodology significantly outperforms those utilized in previous investigations, which primarily relied on linear regression, multiple regression, or multivariate regression analyses (Fang et al., 2019).

[1] https://www.tradingview.com/symbols/SP-SPN/components/

Table 1. Variables description

Measurement	*Factor*	*Symbol*	*Variable*	*Data source*	*References*
ESG factor	ESG disclosure score	*ESG*	Mediator	Bloomberg Lab	Kumar and Firoz (2022), Nguyen et al. (2022)
Sales revenue	Sales revenue	*REV*	Mediator	Bloomberg Lab	Rezina et al. (2020)
Financial performance	Market value	*MV*	Endogenous	Bloomberg Lab	Ersoy et al. (2022)
Resource	CapEx	*CE*	Independent (exogenous)	Bloomberg Lab	Ahmad (2014), Farooq and Masood (2016)

Source: Authors' elaboration.

It enables the analysis of complex causal relationships incorporating mediation effects, thereby offering enhanced understanding of the underlying mechanisms involved. Also, PLS-SEM expertly handles complications related to multicollinearity and data that is not normally distributed, which often arise in financial and environmental datasets. While prior investigations frequently relied on F-tests, Hausman tests, or nonparametric methodologies, this research introduces a novel perspective by explicitly modeling mediation through PLS-SEM (Fang et al., 2019). This comprehensive viewpoint elucidates the complex interconnections between environmental initiatives, resource allocation, and economic results within the industry, providing valuable contributions to both academic discourse and practical implementations in the field. Our research was examined using PLS-SEM, which was the most appropriate approach for this investigation because of several key characteristics. Primarily, PLS-SEM is an especially effective method for analyzing intricate research models and conducting causal-predictive evaluations (Hair et al., 2017; Henseler et al., 2009). Our objective is to investigate the interplay between environmental and financial elements within the specific context of energy sector stocks indexed in the S&P 500 using our PLS-SEM analysis. PLS-SEM was the most appropriate approach for our study due to its effectiveness in theory development and exploratory research (Richter et al., 2016).

4. RESEARCH RESULTS

4.1. Descriptive statistics

Descriptive statistics of the four variables, *ESG* score, *CE, REV,* and *MV*, each showcase individual statistical properties, emphasizing variations in central tendency, variability, and distributional behaviors. *ESG* score is distinguished as the most significant dataset, exhibiting the highest means (4.773), followed by *MV* (4.67), while *REV* (4.24) and *CE* (3.31) demonstrate comparatively lower averages. The median values are closely aligned with their corresponding means, implying relatively symmetrical distributions. Nonetheless, *REV* and *MV* are devoid of a mode, signifying that no particular value manifests with greater frequency within these datasets. A further examination of variability indicates that the *ESG* score possesses the highest standard deviation (1.037) and variance (1.076), rendering it the most dispersed dataset. Conversely, *MV* emerges as the most consistent, exhibiting the lowest standard deviation (0.420) and variance (0.176), signifying minimal variability. This observation is corroborated by the range, wherein *ESG* score displays the widest spread (6.04), while *MV* reflects the narrowest (2.189), accentuating *MV*'s stability. *CE* and *REV* occupy an intermediate position, demonstrating moderate variability.

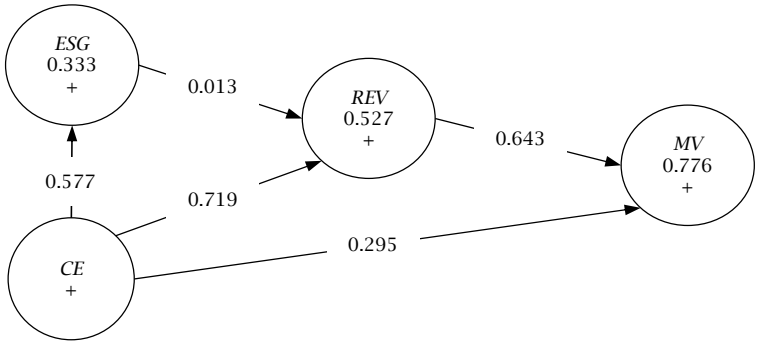
The characteristics of the distributions also yield significant insights. *CE* possesses the highest kurtosis (2.561), indicating that its values are more densely grouped around the mean, resulting in a pronounced peak, whereas *REV* (0.42) and *MV* (0.515) exhibit flatter distributions. Skewness elucidates the asymmetry present within the data. *ESG* score (-1.265) and *CE* (-1.67) are negatively skewed, suggesting a propensity towards higher values with a leftward tail, while *MV* (0.193) is marginally right-skewed, indicating a slight accumulation of lower values. Finally, an analysis of the cumulative sums reveals that the *ESG* score (735.07) possesses the highest aggregate value, closely trailed by *MV* (719.578). In contrast, *CE* (510.644) registers the lowest total, affirming its status as the dataset with the smallest values. These revelations illustrate that the *ESG* score is the most diverse and dominant dataset, *CE* is characterized by the most concentrated distribution, *REV* maintains a balanced configuration, and *MV* is the most stable with minimal variability. This analytical examination provides a thorough insight into the behavioral patterns of each dataset, enabling comparative assessments and well-informed decision-making.

Table 2. Descriptive statistics of variables 2017–2023

Parameter	*ESG*	*CE*	*REV*	*MV*
Mean	4.77318182	3.315873	4.240615	4.672587
Standard error	0.08362184	0.043971	0.053234	0.033876
Median	4.93	3.338948	4.229903	4.707763
Mode	4.7	3.139564	N/A	N/A
Standard deviation	1.03771979	0.545668	0.660613	0.420394
Sample variance	1.07686236	0.297754	0.436409	0.176732
Kurtosis	2.56172761	5.647536	0.429789	0.515321
Skewness	-1.2658583	-1.67044	-0.30574	0.193613
Range	6.04	3.429951	3.411314	2.189187
Minimum	0.79	0.956745	2.189305	3.533236
Maximum	6.83	4.386695	5.600619	5.722423
Sum	735.07	510.6444	653.0547	719.5784

Source: Authors' elaboration.

Figure 1. Structural equation modelling: Path analysis



Source: Authors' elaboration.

Figure 1 postulates a path analysis of the impact of ESG factors on the market value of firms with CapEx (*CE*) as the independent variable, with mediating revenue using SmartPLS.

4.2. Correlation matrix

The correlation matrix elucidates the interrelationships among the four variables: *ESG, CE, REV,* and *MV*. The most pronounced correlation is identified between *REV* and *MV* (0.8571), signifying a robust positive association, which implies that an increase in one variable is likely to correspond with an increase in the other. In a similar vein, the correlations between *CE* and *REV* (0.726082) and *CE* and *MV* (0.762032) also reflect strong positive associations, indicating a substantial interdependence among these variables. Moderate positive correlations are observed between *ESG* score and *CE* (0.57712), as well as *ESG* and *MV* (0.577120), suggesting a less pronounced yet still significant relationship. Conversely, the weakest correlation exists between *ESG* and *REV* (0.4274889), denoting a comparatively low association between these two variables. In summary, the majority of correlations within the matrix are positive, indicating a tendency for these variables to exhibit concordant movements, with varying degrees of relational strength.

Table 3. Relationship matrix of variables (2017–2023)

Variables	*ESG*	*CE*	*REV*	*MV*
ESG	1			
CE	0.57712076	1		
REV	0.4274889	0.726082	1	
MV	0.48390737	0.762032	0.8571	1

Source: Authors' elaboration.

4.3. Total effect matrix

The comprehensive effects table elucidates the interrelationships among *ESG* score, *CE, REV,* and *MV*. *CE* is identified as the predominant variable, exhibiting substantial effects on *MV* (0.762) and *REV* (0.726), along with a moderate influence on *ESG* score (0.577). This implies that *CE* is pivotal in affecting these variables. Conversely, the *ESG* score demonstrates minimal influence, with remarkably low effect values on *MV* (0.008) and *REV* (0.013), signifying that the *ESG* score does not play a significant role in the alterations of these variables. Furthermore, *REV* displays a pronounced effect on *MV* (0.643), indicating a robust association between these two variables. Nevertheless, the table omits data pertaining to *MV*, which may be due to the absence of measurement of its effects or their insignificance. Collectively, these findings underscore the critical importance of *CE* and *REV*, while the *ESG* score appears to exert negligible influence on the overall system.

Table 4. Total effects matrix (2017–2023)

Variables	*CE*	*ESG*	*MV*	*REV*
CE		0.577	0.762	0.726
ESG			0.008	0.013
MV				
REV			0.643	

Source: Authors' elaboration.

4.4. Coefficient of determination

Table 5 shows the delineates the correlation coefficient R-square (R^2) and the adjusted correlation coefficient adjusted R^2 for *ESG* score, *MV*, and *REV*, thereby elucidating the robustness and dependability of their interrelations within a statistical framework. *MV* demonstrates the most robust correlation, evidenced by an R^2 of 0.776 and a nearly identical adjusted R^2 of 0.773, implying that it serves as a stable and significant predictor. *REV* reveals a moderate positive correlation, as indicated by an R^2 of 0.527 and an adjusted R^2 of 0.521, signifying its continued relevance as a factor even post-adjustment. Conversely, the *ESG* score presents the weakest correlation, with an R^2 of 0.333 and a more pronounced decline in the adjusted R^2 to 0.329, suggesting a reduction in its explanatory capacity when additional variables are incorporated. Collectively, *MV* is distinguished as the most significant predictor, followed by *REV*, whereas the *ESG* score is positioned as the least impactful within the model.

Table 5. Coefficient of determination (R^2) 2017–2023

Variables	*R^2*	*Adjusted R^2*
ESG	0.333	0.329
MV	0.776	0.773
REV	0.527	0.521

Source: Authors' elaboration.

4.5. Variation inflation factor

From Table 6, the variance inflation factor (VIF) values pertinent to the variables *ESG, CE, REV*, and *MV* are employed to evaluate the extent of multicollinearity within a regression framework. The VIF values associated with *CE* fluctuate from 1 to 1.499, signifying an exceedingly low level of multicollinearity and implying that *CE* functions as a robust predictor with negligible correlation to other variables. The VIF for *ESG* is recorded at 1.499, remaining substantially beneath the threshold indicative of problematic multicollinearity, thereby suggesting that ESG does not manifest considerable correlation with alternative predictors. The VIF for *REV* oscillates between 2.115 and 1.499, once again illustrating a low degree of multicollinearity and affirming that REV serves as a stable contributor to the model. Collectively, all VIF values are low, i.e., below 3, insinuating that multicollinearity does not pose a concern within this dataset. Each variable appears to provide a distinctive contribution to the model, devoid of indications of redundancy, and the model appears to be appropriately specified without excessive correlation among the independent variables.

Table 6. Variation inflation factor (2017–2023)

Variables	*CE*	*ESG*	*MV*	*REV*
CE		1.000	2.115	1.499
ESG				1.499
MV				
REV			2.115	

Source: Authors' elaboration.

4.6. Model fit indices

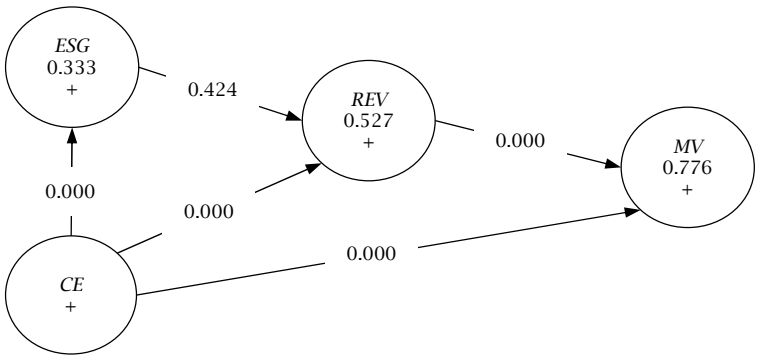
From Table 7, the findings presented elucidate a comparative analysis between a saturated model and an estimated model. The saturated model demonstrates an exemplary fit across all indices, characterized by a standardized root mean square residual (SRMR) value of 0, the absence of discrepancies in both unweighted least squares (d_uls) and G-statistic (d_G), and a chi-square value of 0. Furthermore, the normed fit index (NFI) attains a value of 1, implying an optimal fit. Conversely, the estimated model exhibits a marginally suboptimal fit, with minimal discrepancies in d_ULS (0.001) and d_G (0.002), signifying slight deviations from the saturated model. The chi-square value for the estimated model is 1.541, which remains relatively low and signifies a satisfactory fit, albeit not as impeccable as that of the saturated model. The NFI value of 0.996 for the estimated model is also marginally below 1, indicating a fit that is adjacent to, yet not quite as superior as, the saturated model.

Table 7. Model fit indices from data 2017–2023

Parameters	*Saturated model*	*Estimated model*
SRMR	0.000	0.012
d_ULS	0.000	0.001
d_G	0.000	0.002
Chi-square	0.000	1.541
NFI	1.000	0.996

Source: Authors' elaboration.

Figure 2. Hypotheses model: Bootstrapping



Source: Authors' elaboration.

Figure 2 shows the hypotheses model, and this investigation utilizes bootstrapping, an empirical method that facilitates the assessment of the statistical significance of various PLS-SEM outcomes, inclusive of path coefficients. This approach is necessitated by the fact that PLS-SEM does not presuppose the normal distribution of the data, thereby rendering parametric significance tests inappropriate for evaluating the significance of the path coefficients. In the process of bootstrapping, observations from the initial data set are randomly selected to create subsamples (with replacement). Subsequently, the PLS path model is estimated utilizing these subsamples. Moreover, 95% CIs for significance testing are established based on the parameter estimates for path coefficients obtained from the subsamples. In addition, bootstrapping provides the standard errors of the estimates, which allows for the calculation of t-values to evaluate the significance of each estimate (Becker et al., 2023).

5. DISCUSSIONS OF THE RESULTS

This study offers an integrated viewpoint on how sales income, CapEx, and environmental disclosure interact to affect enterprise value in the cement sector of India. The study validates the importance of both direct and mediated correlations between financial and sustainability-related dimensions using a strong PLS-SEM methodology. The results have significant theoretical, applied, and contextual ramifications. Tables 8 and 9 delineate the statistical findings that investigate the interrelations among various variables (*ESG* score, *CE, REV,* and *MV*) encompassing their initial sample values, means,

standard deviations, t-statistics, and levels of significance. The findings reveal that the relationships from *CE* to *REV* (0.719) and from *REV* to *MV* (0.643) exhibit the most robust positive associations, characterized by elevated t-statistics (12.147) and significance p-level, thereby affirming that these associations are statistically significant. Correspondingly, the relationships from *CE* to *ESG* score (0.577, t = 6.99, p = 0) and from *CE* to *MV* (0.295, t = 4.942, p = 0) also demonstrate moderate positive associations that attain statistical significance. Conversely, the correlation between *ESG* score and *REV* (0.013, t = 0.192, p = 0.424) is exceedingly weak and lacks statistical significance, indicating an absence of a meaningful correlation between these two variables. In line with the findings of Iatridis (2013) and Fatemi et al. (2017), this nuanced finding implies that authenticity and quality of disclosure are more important than volume.

Table 8. Hypotheses' test results

Variables	*Original sample (O)*	*Sample mean (M)*	*Standard deviation (STDEV)*	*T-statistics (|O/STDEV|)*	*P-values*
CE → ESG	0.577	0.566	0.083	6.990	0.000
CE → MV	0.295	0.301	0.060	4.942	0.000
CE → REV	0.719	0.712	0.059	12.147	0.000
ESG → REV	0.013	0.012	0.066	0.192	0.424
REV → MV	0.643	0.639	0.048	13.482	0.000

Source: Authors' elaboration.

Table 9. Synopsis of evidence supporting the hypotheses

Hypothesis	*Decision*
H1	Supported
H2	Supported
H3	Supported
H4	Not supported
H5	Supported

Source: Authors' elaboration.

6. CONCLUSION

The evaluation of CapEx and ESG scores in relation to firm market value presents several key insights. Capital spending aimed at fostering innovation and long-term growth tends to signal future value to investors, thereby enhancing a firm's market valuation. This positive impact becomes even more pronounced when such investments are aligned with strong ESG principles. Elevated ESG scores contribute not only to a firm's public image and stakeholder confidence but also indicate sound risk management and long-term viability. As a result, ESG considerations should be embedded within a firm's financial and strategic planning rather than treated as peripheral. With investors increasingly viewing ESG scores as indicators of a firm's overall quality, companies that prioritize sustainability are more likely to attract investment and benefit from lower financing costs. The combined influence of CapEx and ESG performance on market value also highlights the need for greater transparency in ESG reporting and the adoption of ethical investment practices. For regulators and policymakers, this emphasizes the importance of promoting ESG adoption through supportive frameworks, incentives, and sustainable finance tools to ensure resilient and forward-looking capital markets.

Further, the analysis of CapEx on energy stocks within the S&P 500 reveals significant insights for investors, particularly regarding how these expenditures influence market value through revenue generation. This indicates that increased capital investment correlates positively with revenue growth, which in turn enhances market valuation. This relationship underscores the importance of strategic investment decisions in fostering long-term profitability and stability in the energy sector. Companies are advised to align their capital spending with long-term growth objectives while factoring in ESG elements in their investment choices.

Strong ESG performance can boost a firm's reputation, strengthen stakeholder confidence, and enhance risk management, ultimately supporting higher market value. Clearly communicating ESG efforts, especially those tied to significant investments, can improve investor sentiment. Some limitations arise from the fact that the sample comprises companies exclusively from the US S&P energy stocks, which complicates the ability to generalize the findings to other regions. Additionally, the sample is limited to firms within the energy sector that share a similar asset base, which makes it challenging to extend the conclusions to other companies in the sensitive sectors or even to larger firms outside of the energy sector. This limitation also impacts the validity of the findings, as only a modest sample of twenty-two companies was included in this analysis.

This study opens new avenues for future research by establishing a nuanced relationship between the variables ESG and market value with CapEx, sales in the energy sector. Future research can expand this analysis by applying the model to other environmentally sensitive sectors such as chemicals, mining, or manufacturing. Finally, cross-country comparisons using alternative econometric or configurational methods (e.g., SEM, fsQCA) can further validate and extend the findings, contributing to the evolving literature at the intersection of sustainability and corporate finance.

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