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Do sustainable practices influence value creation through acquisition? An analysis of Indian industries

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ABSTRACT

This study examines the impact of pre-acquisition sustainability performance on announcement returns and post-acquisition market value in the metals and mining industry of India, based on acquisition dates. This study uses Bloomberg database data to derive proxy measures of sustainability using environmental, social, and governance (ESG) scores. It examines acquisitions from Nifty 500 companies from 2010 to 2020, focusing on the top 8 industries. The event study approach determines abnormal returns and cumulative abnormal returns over various periods. Two regression analyses evaluate the influence of pre-acquisition ESG scores on acquisition returns and market valuation. The announcement returns of the mining sector are adversely influenced by environmental scores, while the chemical sector benefits from positive social scores. Moreover, the environmental and social scores exert a detrimental impact on the valuation of the oil and gas industry. In a pre-acquisition scenario, investors can make informed decisions about a company's environmental, social, and governance issues, leading to above-average short-run profits in various industries, including chemical, metals, mining, and oil and gas. In the short term, investors can leverage free cash flow, earnings multiple analysis, and environmental, social, and governance considerations to invest in companies capable of generating above-average profits.

Contribution/ Originality: The impact of sustainability on corporate value creation through acquisitions in the Indian context represents a novel concept when compared to developed markets. The study examines the NSE 500 from 2010 to 2020, a timeframe characterized by relative market stability between the global recession and the COVID-19 pandemic.

1. INTRODUCTION

The corporate ecosystem is essentially governed by shareholder theory Friedman (2007) and stakeholder theory (Freeman, 1984). The corporate prioritization of profit maximization is propagated by shareholder theory, while profit along with societal betterment is propagated by stakeholder theory. The literature review indicates that following the 2008 financial crisis in the USA, characterized by corporate greed and immorality, there has been an increased emphasis on stakeholder theory (Nollet, Filis, & Mitrokostas, 2016). These perspectives were strengthened following the coronavirus crisis in 2019. This necessitates that stakeholders hold firms accountable for their

environmental, social, and governance (ESG) concerns, prompting a detailed analysis of how changes in sustainable practices influence corporate value generation.

A stakeholder is primarily driven by instrumental, relational, and moral motives (Aguilera, Rupp, Williams, & Ganapathi, 2007). Instrumental motives (Tyler, 1987) posit that individuals are driven by self-interest and company actions, including employee benefits, medical leaves, and cost control. Relational motives, as discussed by Tyler and Lind (1992), deal with the psychological need for belongingness. It boils down to the quality of the employee relationship with management. Morality-based motives, according to Folger (2007), address the need of a human being for a meaningful existence. Sustainable practices by corporations address these motives of investors.

Corporate acquisitions have been chosen as the event to measure the effect of sustainable practices on firm value. Acquisitions are critical in analyzing the financial benefits for stakeholders, as they significantly influence a firm's value (Ahern & Weston, 2007). The gradual integration of a firm through acquisition is a challenging process and tests the mettle of the stakeholders (Arouri, Gomes, & Pukthuanthong, 2019; Dessaint, Golubov, & Volpin, 2017). A successful acquisition, therefore, is not only financially healthy for a firm's shareholders, but it also affects all the stakeholders positively (Meglio, 2016). Improved market value post-M&A serves as a reward for the stakeholders (Zheng, Li, Ren, & Guo, 2023).

Research shows a positive correlation between market value and corporate social responsibility (CSR) in the short term (Kaspereit & Lopatta, 2016). In this line, the study seeks to determine the short-term impact of sustainable practices on a company's market value, where ESG scores are used as a representative of sustainable practices. The stock price and the cumulative abnormal return (CAR) generated in the event of acquisition a key indicators of a company's synergetic value (Asquith, 1983; Bradley, Desai, & Kim, 1983; Dodd, 1980) whereas Tobin's Q is a conventional proxy for the acquirer's market value (Busch & Hoffmann, 2011; Kwon & Lee, 2019; Xie, Nozawa, Yagi, Fujii, & Managi, 2019) reflecting reputational effects, financial concerns, and market expectations (Busch & Hoffmann, 2011). Therefore, sustainable practices and ESG performance play a crucial role in a company's short-term success. So, it is essential to determine the extent to which corporate sustainable practices contribute to a company's short-term success. Our study will contribute in terms of gaining a competitive edge, increasing operational effectiveness, and strengthening stakeholder connections, which will surely boost the short-term performance of the firms. One of the important contributions of our study is that it suggests firms achieve instant commercial gains and position themselves for long-term sustainability by incorporating ESG principles into their daily operations. This means that short-term value creation with ESG is essential. The short-term value creation is indicated by cumulative abnormal returns in the event window of acquisition announcement and firm value following the acquisition. So, the following subsequent research questions are formulated.

(I) Does the ESG performance of the acquirers in a domestic acquisition influence the announcement returns, thereby creating value for the shareholders?

(II) Does improved post-acquisition ESG performance in domestic acquisitions boost the acquirers' post-acquisition market valuations compared to their pre-acquisition ESG performance?

The research is based on sustainability, corporate social responsibility (CSR) practices, ESG scores, mergers & acquisitions (M&A) and corporate financial and operational performance (Alareeni & Hamdan, 2020; Eccles, Ioannou, & Serafeim, 2014; Gillan, Koch, & Starks, 2021; Smith, Yahya, & Marzuki Amiruddin, 2007; Tampakoudis & Anagnostopoulou, 2020). The literature regarding the impact of sustainability on acquisitions is relevant (Deng, Kang, & Low, 2013; Krishnamurti, Shams, Pensiero, & Velayutham, 2019). The objective of this article is to contribute to the existing literature by establishing a relation between business performance and ESG performance in the Indian context, as measured by announced returns and market values.

This study utilizes event study and multiple regression methodologies to investigate the relationship between ESG factors and market performance. The financial and ESG data were obtained from Bloomberg and the National Stock Exchange (NSE). The subsequent sections of the study have been organized as follows. Section 2 discusses the

literature review that led to the formulation of the hypothesis. Section 3 explains the research design. Section 4 details the data and methodologies employed in our investigation. Section 5 presents the empirical findings, analysis, and interpretations. The final section includes the conclusion, limitations, and recommendations.

2. LITERATURE REVIEW AND DEVELOPMENT OF OBJECTIVES

2.1. Theoretical Framework

The theoretical framework of sustainability encompasses three primary theories: stakeholder theory (Freeman, 1984), Carroll's theory (Carroll, 1979), and the triple bottom line theory (Elkington, 1998). Stakeholder theory (Freeman, 1984) delineates the interactions within the boardroom concerning the interests of business constituencies. Stakeholders influence the firm and are influenced by it in various ways, and this interaction can have enduring effects on institutional regulations, customers, and suppliers. Freeman also emphasizes the necessity of good CSR policies in portfolios, as they improve financial performance and shareholder value. CSR initiatives can also help to improve a company's brand and image (Graves & Waddock, 1994). Carroll's theory, on the other hand, consists of four distinct components of corporate social responsibility: economic, legal, ethical, and discretionary. Lastly, the triple bottom line theory establishes sustainability as the primary goal of corporations, incorporating three dimensions: economic, social, and environmental.

Conflict resolution theory suggests corporate social responsibility (CSR) initiatives can mitigate disputes between management and stakeholders (Jensen, 2002). However, when acquisitions happen, driven by synergies, there might be layoffs and compensation reduction, hurting the company's CSR (Dessaint et al., 2017; Krishnamurti, Shams, & Chowdhury, 2021). This leads to a conflict of interest between management and stakeholders. Hence, CSR-focused companies are less likely to acquire. Agency theory Jensen and Meckling (1976) posits that CSR represents a trade-off between shareholders and stakeholders. In this framework, managers seek to augment their wealth and obscure it by increasing investments in CSR, which may appear beneficial to stakeholders but ultimately detracts from shareholder interests. It has also been argued that M&A activities may reduce the profit potential of companies engaged in CSR activities, as allocating resources to CSR diverts limited resources and consequently undermines the company's competitiveness (Barnea & Rubin, 2010; Cornell & Shapiro, 1987).

Empirical research on the impact of CSR on shareholders has yielded conflicting results, with few studies suggesting positive (Zhang, Zhang, & Yang, 2022) negative (Masulis & Reza, 2015) and a mixed impact (Krüger, 2015).

2.2. ESG Performance and Acquisition Announcement Returns

The research sphere related to ESG performance and acquisition announcement return is segregated into three stratums, as the literature shows. They are positive effect, negative effect and minimal or no effect on market value in the event of acquisition. Tampakoudis and Anagnostopoulou (2020) underscored the significance of ESG metrics in business sustainability reporting, classifying performance into announcement return, market value, and post-purchase financial performance. Although ESG research emphasizes economic performance, there is limited understanding of announcement returns and market value in the context of mergers and acquisitions, especially in the context of India. Following is a table pointing out the literature related to the impact of the ESG performance of corporates on M&A. Table 1 outlines the existing literature regarding the influence of ESG performance on M&A activities. Literatures categorize based on studies that indicate positive, negative, or no effect of ESG scores on announcement returns.

Table 1. Literature on the impact of ESG performance on M&A.

Category	Acquisition synergy/deal premium	Authors'	Title	Sample (M&A deals)	Country	Findings
Positive effect	Acquisition synergy	Zhang, You, and Wu (2019)	Chinese financial market investors attitudes toward corporate social responsibility: Evidence from mergers and acquisitions	3000	China (2010-2017)	High CSR ratings lead to higher market returns.
		Deng et al. (2013)	Corporate social responsibility and stakeholder value maximization: evidence from mergers	1556	USA (1992-2007)	Acquirer with strong CSR receives high CAR upon announcement.
		Gomes (2019)	Does CSR influence M&A target choices?	608	Multinational (2003-2014)	CSR success enhances merger value for both acquirers and targets.
		Mihaiu, Popescu, and Ionescu (2021)	The impact of mergers and acquisitions and sustainability on company performance in the pharmaceutical sector	492	Multinational (2010-2020)	High ESG scores result in strong post-merger performance.
		Zhang et al. (2022)	When does corporate social responsibility backfire in acquisitions? signal incongruence and acquirer returns	493	Multinational (2002-2012)	Improvements in CSR performance result in enhanced acquisition performance, excluding hostile takeovers.
		Krishnamurti et al. (2019)	Socially responsible firms and mergers and acquisitions performance: Australian evidence	776	Australia (2000-2016)	Day of announcements CAR is significant and positive when a CSR-firm submits an acquisition offer. Additionally, CSR firms offer target firms a reduced bid premium.
		Kim, Park, and Lee (2022)	Can ESG mitigate the diversification discount in cross-border M&A?	129	Emerging markets (2012-2018)	ESG considerations can be implemented as a tactic to increase the efficacy of cross-border M&A.
		Gul, Xu, and Bani (2022)	Corporate social responsibility, overconfident CEOs and empire building: agency and stakeholder theoretic perspectives	16635	USA (1996-2015)	The effect of CSR on M&A is dependent on the degree of chief executive officer (CEO) arrogance. In the event that CEO is less overconfident, CSR increases the value of the acquisition, and vice versa.
		Guidi, Gallo, and Masino (2020)	Spreading the sin: an empirical assessment from corporate takeovers	23786	Multinational (1985-2015)	Shareholders of the acquirer devalue sin acquisition.
		Hussaini, Hassan, and Azman (2021)	Is corporate social responsibility an agency problem? an empirical note from takeovers	564	USA (1992-2014)	A greater acquirer CSR performance results in a greater takeover premium.
		Chen and Gavious (2015)	Does CSR have different value implications for different shareholders?	134	Israel (2007-2012)	Positive pricing in M&A occurs when the acquirer engages in CSR initiatives that

Category	Acquisition synergy/deal premium	Authors'	Title	Sample (M&A deals)	Country	Findings
						benefit humanity as a whole, rather than solely benefiting the firm.
		Petridis, Kotsios, and Papadopoulos (2022)	A support vector machine model for classification of efficiency: an application to M&A	441	EU (2003-2017)	The performance of M&A transactions is enhanced by gender diversity.
		Caiazza, Volpe, and Tontodonati (2021)	The role of sustainability performance after merger and acquisition deals in short and-term	757	USA (2000-2019)	Although the impact is minimal, companies with low or high ESG scores have a significant effect on the CAR value. Furthermore, there is no significant difference between high and low CSR values CAR. Instead, long-term performance is connected with present CSR performance at the time of the merger.
		Shi, Li, and Zhang (2022)	Beyond linear: The relationship between corporate social responsibility and market reactions to cross-border mergers and acquisitions	409	China (2010-2018)	Neither moderate nor high levels of CSR have an impact on market return.
		Fairhurst and Greene (2022)	Too much of a good thing? corporate social responsibility and the takeover market	1596	USA (1996-2016)	Companies that have high or low (CSR) scores are more susceptible to takeovers and realize lower wealth gains from such transactions compared to companies with moderate policies.
		Arouri et al. (2019)	Corporate social responsibility and M&A uncertainty	726	Multinational (2004-2016)	Increased (CSR) will reduce the likelihood of shareholder opposition, regulatory intervention, financing difficulties.
		Yen and André (2019)	Market reaction to the effect of corporate social responsibility on mergers and acquisitions: evidence on emerging markets	1986	emerging markets (2008-2014)	The impact of CSR on M&A is contingent on investors' cost-benefit considerations. Market reaction is influenced by agency cost (CSR-related factors), not CSR performance.
		Qiao (2018)	Corporate social responsibility and the long-term performance of mergers and acquisitions: do regions and related-party transactions matter?	1090	China (2012-2014)	The long-term M&A performance is significantly and positively impacted by the CSR performance of acquirers.
Negative effect	Acquisition synergy	Wang, Lu, and Liu (2021)	Corporate social responsibility overinvestment in mergers and acquisitions	614	USA (1996-2017)	If the acquirer makes excessive CSR investments, the value of the M&A transaction decreases. Additionally, financial performance declines after M&A.

Category	Acquisition synergy/deal premium	Authors'	Title	Sample (M&A deals)	Country	Findings
		Krishnamurti et al. (2021)	evidence on the trade-off between corporate social responsibility and mergers and acquisitions investment	8564	USA (1999-2016)	Adverse relationship between M&A deals and CSR scores.
		(Tampakoudis & Anagnostopoulou, 2020)	Does boardroom gender diversity affect shareholder wealth? evidence from bank mergers and acquisitions	1130	USA (2003-2018)	Board gender diversity has an inverse relationship with shareholder wealth.
	Deal premium	Jost (2022)	Does corporate social responsibility impact mergers & acquisition premia? new international evidence	1598	Multinational (2003-2018)	The CSR performance of targets or acquirers by itself has little effect on M&A premia.
No effect	Acquisition synergy	Li, Wang, and Xu (2019)	Why Chinese financial market investors do not care about corporate social responsibility: evidence from mergers and acquisitions	3500	China (2010-2017)	Investors' assessments on mergers are unaffected by CSR.

Drawing upon the preceding discourse, we proceed to formulate our initial objective as follows:

Objective 1: To determine if the acquirer's acquisition announcement returns get significantly affected due to pre-acquisition environmental, social, and governance (ESG) scores (overall ESG and E, S and G separately) of the acquirers in India.

2.3. ESG Performance and Market Valuation

Weber (2014) observed that the performance of ESG factors has a substantial impact on the market value of acquirers. In the same vein, Kaspereit and Lopatta (2016) asserted a favorable correlation between corporate social responsibility and market value.

It has been observed that Tobin's Q not only serves as a conventional indicator of the acquirer's market worth (Busch & Hoffmann, 2011; Kwon & Lee, 2019; Xie et al., 2019) but also takes into account market expectations, financial risks, and reputational consequences (Busch & Hoffmann, 2011) and signifies the firm's enhanced potential for growth due to superior investment choices (Kwon & Lee, 2019). Tobin's Q is calculated as the sum of the market value of equity and the book value of preferred stock and debt, divided by the book value of all assets.

This leads to the objective 2.

Objective 2: To evaluate if the post-acquisition market value of the acquirer increases due to an increase in the post-acquisition ESG performance (overall ESG and E, S and G separately) of the acquirer in relation to its pre-acquisition ESG performance.

3. RESEARCH DESIGN AND HYPOTHESES

The research examines the justification for employing ESG as a determinant in acquisitions. It investigates the extent to which acquirers' pre-acquisition environmental, social, and governance (ESG) ratings significantly influence their returns following the announcement of the acquisition. Additionally, it assesses whether the acquirer's market value post-acquisition enhances when its ESG performance increases relative to its pre-acquisition ESG performance. Figure 1 illustrates the research design through a model that delineates the relationship between the dependent and independent variables across the pre- and post-acquisition periods.

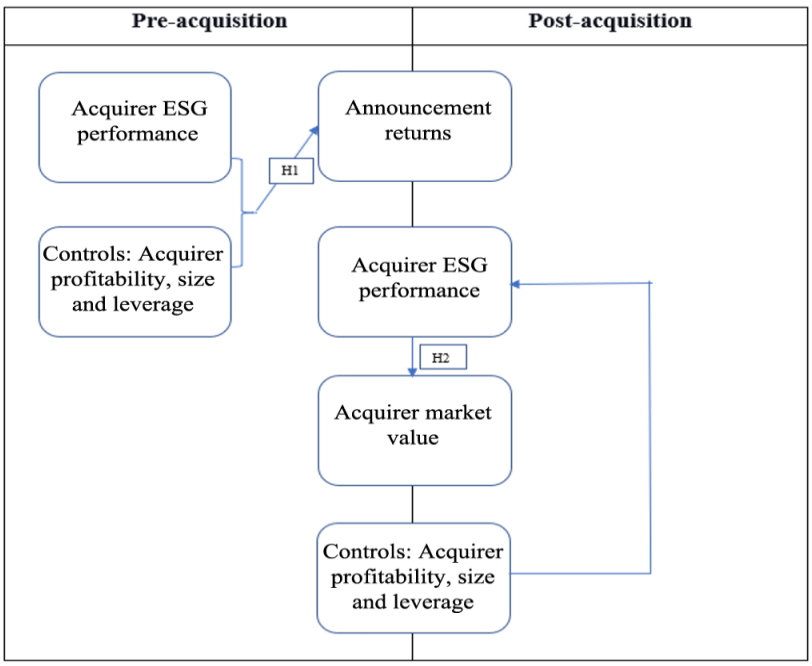

Figure 1. Research design.

Based on the objectives and research design, the following null hypotheses are formed.

H_1: Environmental, social and governance scores do not affect the Cumulative abnormal returns.

H_{1a}: Environmental scores do not affect the Cumulative abnormal returns.

H_{1b}: Social scores do not affect the Cumulative abnormal returns.

H_{1c}: Governance scores do not affect the Cumulative abnormal returns.

H_2: Change in acquirer's ESG performance does not affect change in acquirer's market value.

H_{2a}: Change in acquirer's environmental performance does not affect change in acquirer's market value.

H_{2b}: Change in acquirer's social performance does not affect change in acquirer's market value.

H_{2c}: Change in acquirer's governance performance does not affect change in acquirer's market value.

4. DATA AND METHODOLOGY

4.1. Sample and Data

4.1.1. Sample Unit and Sample Companies

Each acquisition is a sample unit, and the acquirers are sample companies. The acquisition data are collected from the Bloomberg database for the financial years 2010-11 to 2019-20. Two hundred and nine companies from 19 industries are chosen among 620 acquisitions from the NIFTY 500 index that underwent acquisition from January 2010 to December 2020. The final sample consists of 250 firms from 19 industries. The number of industry-wise acquisitions is presented below. Out of these 250 acquisitions, the top 8 industries according to the number of acquisitions are chosen for the analysis, as they contain considerable data for the analysis. The industry categorization is provided by NSE. Table 2 presents the number of industry-wise acquisitions between 2010 and 2020 in India.

Table 2. Number of acquisitions as per industries.

Industries	Number of acquisitions
Metals & mining	27
Financial services	25
Fast moving consumer goods	23
Healthcare	22
Information technology	20
Oil gas & consumable fuels	18
Capital goods	16
Chemicals	16
Automobile and auto components	12
Telecommunication	12
Construction materials	10
Consumer durables	10
Media entertainment & publication	10
Construction	8
Power	8
Diversified	5
Realty	4
Consumer services	2
Services	2

The final list of industries for the analysis includes metals and mining, financial services, fast moving consumer goods (FMCG), healthcare, information technology (IT), oil, gas & consumable fuels, capital goods and chemicals.

4.1.2. Rationale Behind Choosing the Specified Industries

Metals and mining industry, due to its inherent nature of extracting and supplying resources to the people, is strategic in nature and a growth driver of an economy (Rodrigues & Mendes, 2018; Yang & Chen, 2022). It is

extractive and environmentally degrading in nature and hence being socially responsible is a challenge for the management of the mining firms.

As the financial intermediaries play a crucial role in allocation and diversion of resources for investment, able governance and transparency forms the bedrock of a sustainable investment performance, especially on the backdrop of countless scandals in the last few decades (Crespi & Migliavacca, 2020). As a result, major financial hubs all around the world have started to include sustainability measures in their respective business plans (Boubaker & Nguyen, 2019).

The FMCG sector impacts individuals across all age demographics and various income levels through its diverse products, including food, beverages, and tobacco. Customers exhibit environmental consciousness regarding food contamination, quality maintenance, and the intentional use of chemicals, as well as social awareness concerning alcoholic and non-alcoholic beverages (Michalski, 2024).

The boom in healthcare industry necessitated the investors to have a closer look at the sustainable practices of the industry. Being highly regulated, the industry needs constant governance (Singh & Garg, 2014) Singh Moreover, corrupt corporate practices in regards to hazardous waste disposal, greenhouse gas emission, profiteering from clinical trial manipulation etc. can be environmentally and socially hazardous (Raggi & Paglicci, 2015).

Information technology (IT) is affected indirectly by manufacturing operations, which are mostly outsourced to suppliers. If a firm works prudently with its supply chain, the environmental impact in relation to equipment and semiconductors can be reduced significantly. The social risk, on the other hand, involves information security, data privacy, and the risk of leakage of sensitive company information. Lastly, governance components involve litigation, antitrust disputes, and technology-related intellectual property (IP) disputes (Egorova, Grishunin, & Karminsky, 2022).

The oil and gas sector is recognized for its environmental carbon footprints, making it essential for the business to comply with ESG principles to maintain competitiveness (Xu, Hou, Main, & Ding, 2022). As a result, there is noticeable pressure of government and public to minimize the environmental impact (Agbaji, Morrison, & Lakshmanan, 2023).

Capital goods industry is prone to ESG issues and hence slowly gravitating towards Green Technological Innovation (GTI) which positively affects the ESG performance of the firms (Barbieri, Marzucchi, & Rizzo, 2020). The adoption of GTI promotes cleaner technologies, improve process efficiencies by adopting new manufacturing methods and gradually reduce the dependency on fossil fuels thereby bringing down the carbon emission (Uzar, 2024).

While researchers have addressed the issue of sustainable development in the chemical industry on occasion (Beloff, Lines, & Tanzil, 2005; Mitra, Agrawal, & Ghosh, 2015) subjects such as environmental, social, and governance (ESG) and sustainable development goals (SDGs) have received relatively little attention thus far (Nechita, 2021).

The aforementioned rationales necessitated that academics examine the impact of sustainable practices in specified industries on market value.

4.1.3. Rationale Behind the Period of Study

The 2008 financial crisis, primarily due to the decline of corporate ethical practices in the US, led to a global shift in companies restricting their ESG metrics. The crisis persisted until 2009, and the global economy experienced another decline in 2020 due to Covid-19. The bibliometric analysis of research papers too, reveals that most researches on M&A in relation to the acquirer's ESG profiles are done between 2010 and 2020. As a result, this study choses January 2010 to December 2020 as the study period.

4.1.4. Type of Data

The study is based on secondary data collected from the Bloomberg database as well as NSE. Acquisition data and data on ESG, Tobin's Q, size, leverage, profitability (Size – Ln of BV, Leverage – BV of Debt/BV of asset,

Profitability – ROA) are collected from the Bloomberg database. The share prices data are collected from NSE and Cumulative abnormal returns (CAR) are calculated thereafter.

4.2. Methodology

4.2.1. Event Study

The event study method calculates substantial abnormal returns (AR) by contrasting actual and anticipated returns during a designated clean period. AR diverges from real return based on relational data, omitting informational assimilation. Day '0' signifies the acquisition date.

For each company, 291 daily return observations from day -250 to day +40 is collected. Out of which 210 days, i.e. day -250 to day -41 (Brown & Warner, 1985) is considered as a clean period in which no information regarding the event is expected to reflect on the stock price. From day -40 to +40, different variations of event window are used and cumulative abnormal returns (CAR) are calculated for those event windows.

Market model of Sharpe (1963) is used to compute the abnormal return (AR). The model is as follows:

$$AR_{it} = R_{it} - (\alpha_1 + \beta_1 R_{mt})$$

Where,

AR_{it}= Abnormal return of security i at time t.

R_{it} = Observed return on security i for time t.

R_{mt} = Return on market index at time t.

Cumulative abnormal return is thereafter calculated as follows.

$$CAR\ (t1, t2) = \sum_{t=t1}^{t2} AR_t$$

4.2.2. Regression Models

After the CAR's are calculated, Hypothesis 1 is tested with the following regression models in line with the research design provided earlier.

For hypothesis H1, H1a, H1b and H1c: Dependent variable - Cumulative Abnormal Return (CAR); Independent variables –Environmental score, social score, Governance score, overall ESG score; Control –size, leverage, profitability.

$$CAR_{it} = \beta_0 + \beta_1 ESG_{i,t-1} + \beta_2 ROA_{i,t-1} + \beta_3 Leverage_{i,t-1} + \beta_4 BVps_{i,t-1} + e_{it}$$
$$CAR_{it} = \beta_0 + \beta_1 E_{i,t-1} + \beta_2 ROA_{i,t-1} + \beta_3 Leverage_{i,t-1} + \beta_4 BVps_{i,t-1} + e_{it}$$
$$CAR_{it} = \beta_0 + \beta_1 S_{i,t-1} + \beta_2 ROA_{i,t-1} + \beta_3 Leverage_{i,t-1} + \beta_4 BVps_{i,t-1} + e_{it}$$
$$CAR_{it} = \beta_0 + \beta_1 G_{i,t-1} + \beta_2 ROA_{i,t-1} + \beta_3 Leverage_{i,t-1} + \beta_4 BVps_{i,t-1} + e_{it}$$

(Size – Book value per share, Leverage – BV of Debt/BV of asset, Profitability – ROA).

Nest set of hypotheses are tested in the following way:

For hypothesis H2, H2a, H2b and H2c: Variables: Dependent –Change in acquirer's market value; Independent – Change in acquirer's environmental performance, social performance, governance performance and overall ESG performance; Control – size, leverage, profitability.

Firstly, pre- and post-acquisition Tobin's Q, book value, Debt ratio and Return on Assets (ROA) values are used to calculate the change within the timeframe of January 2010 to December 2020. Thereafter the following regressions are conducted to examine the effect of change in ESG performances on change in market value.

Firstly,

$$\Delta AcquirerMarketValue_{it} = \beta_0 + \beta_1 \Delta AcquirerESGPerformance_{it} + \beta_2 \Delta Size_{it} + \beta_3 \Delta Leverage_{it} + \beta_4 \Delta Profitability_{it} + e_{it}$$

$$\Delta AcquirerMarketValue_{it} = \beta_0 + \beta_1 \Delta AcquirerEPerformance_{it} + \beta_2 \Delta Size_{it} + \beta_3 \Delta Leverage_{it} + \beta_4 \Delta Profitability_{it} + e_{it}$$

$$\Delta AcquirerMarketValue_{it} = \beta_0 + \beta_1 \Delta AcquirerSPerformance_{it} + \beta_2 \Delta Size_{it} + \beta_3 \Delta Leverage_{it} + \beta_4 \Delta Profitability_{it} + e_{it}$$

$$\Delta AcquirerMarketValue_{it} = \beta_0 + \beta_1 \Delta AcquirerGPerformance_{it} + \beta_2 \Delta Size_{it} + \beta_3 \Delta Leverage_{it} + \beta_4 \Delta Profitability_{it} + e_{it}$$

Where,

$$\Delta AcquirerMarketValue = \frac{AcquirerTobin'sQ_{t+1} - AcquirerTobin'sQ_{t-1}}{AcquirerTobin'sQ_{t-1}}$$

$$\Delta AcquirerESGPerformance = \frac{AcquirerESGScore_{t+1} - AcquirerESGScore_{t-1}}{AcquirerESGScore_{t-1}}$$

$$\Delta AcquirerEPerformance = \frac{AcquirerEScore_{t+1} - AcquirerEScore_{t-1}}{AcquirerEScore_{t-1}}$$

$$\Delta AcquirerSPerformance = \frac{AcquirerSScore_{t+1} - AcquirerSScore_{t-1}}{AcquirerSScore_{t-1}}$$

$$\Delta AcquirerGPerformance = \frac{AcquirerGScore_{t+1} - AcquirerGScore_{t-1}}{AcquirerGScore_{t-1}}$$

$$\Delta Size = \frac{BVps_{t+1} - BVps_{t-1}}{LnBVofAsset_{t-1}}$$

$$\Delta Leverage = \frac{AcquirerTD/TA_{t+1} - AcquirerTD/TA_{t-1}}{AcquirerTD/TA_{t-1}}$$

$$\Delta Profitability = \frac{AcquirerROA_{t+1} - AcquirerROA_{t-1}}{AcquirerROA_{t-1}}$$

4.2.3. Error Correction

All four variables namely ESG, E, S and G individually affects both cumulative abnormal return (CAR) and Tobin's Q. Hence, there are four equations for one CAR period as well as Tobin's Q. When there are multiple tests, controlling the type I error is important to make the results reliable. To control the family wise error rates (FWER) due to presence of more than one model, Bonferroni correction method is applied (Armstrong, 2014). The Bonferroni correction is given by.

$$\text{Adjusted } \alpha = \frac{\alpha}{\text{Number of tests}}$$

Where α = significance level of 5%.

However, Bonferroni correction is conservative in nature and with a large number of tests, chances of Type-II error increases. To correct it, a less conservative approach of Holm-Bonferroni correction is used (Eichstaedt, Schwartz, & Kern, 2013). The Holm-Bonferroni correction is given by.

$$\text{Adjusted } \alpha = \frac{\alpha}{m-i+1}$$

Where α=significance level of 5%.

m = Total number of tests.

i = Rank of P value in ascending order.

Hence, Holm-Bonferroni test, being the better among the two, is used to test the significance level for this research. Hence, the adjusted α for the four models are.

$$\text{For rank } 1, \alpha = \frac{.05}{4-1+1} = 0.0125$$

$$\text{For rank } 2, \alpha = \frac{.05}{4-2+1} = 0.0167$$

$$\text{For rank } 3, \alpha = \frac{.05}{4-3+1} = 0.025$$

$$\text{For rank } 4, \alpha = \frac{.05}{4-3+1} = 0.05$$

4.2.4. Winsorized Tobin's Q

Tobin's Q is susceptible to outliers resulting from misreported or distorted market values and replacement cost values arising from market anomalies or accounting practices. This leads to distorted statistical outcomes and erroneous interpretations. Winsorization of Tobin's Q is necessary to mitigate the influence of outliers, thereby stabilizing variance and enhancing normality. This study applies winsorization to the extreme 1st and 99th percentiles of Tobin's Q, as outlined by Brown and Caylor (2006). The procedure entails substituting values exceeding the 99th percentile with the 99th percentile value and those below the 1st percentile with the 1st percentile value.

5. EMPIRICAL FINDINGS, ANALYSIS, AND INTERPRETATIONS

5.1. Empirical Findings

5.1.1. Findings Based on Objective 1

The primary focus of the analysis in this study relies on the more stringent Holm-Bonferroni measures, as they exhibit a robust nature. The outcome without Holm-Bonferroni is also examined to enhance the primary analysis and to determine if any outliers are present.

5.1.1.1. Effect of Overall ESG Score on CAR

Following the stringent measures, overall ESG data affects the CAR values in the metals and mining and chemical industries. It is seen in the event window of (0, 40) that the parameter of -0.009 is significant in the metals and mining industry. In the chemical industry, on the other hand, significant parameters are 0.007 for both the event window of (-20, 0) and -20. The result points towards a negative influence of ESG measures on CAR created out of an acquisition in the metals and mining industry and a positive influence of ESG measures on CAR in the chemical industry. Table 3 depicts the impact of total ESG scores on CAR values across the selected eight industries.

5.1.1.2. Effect of Environment Score on CAR

Environmental scores are seen to have affected the metals and mining and financial services industries. The significant parameter values are -0.008, -0.005, -0.012, -0.009, and -0.007 for the event windows of (-20, 0), (0, 40), (-30, +30), (-20, +20), and -20 respectively in the metals and mining industry. The CAR belonging to the event window of (0, 10) is significant in the financial services industry with the parameter value of 0.019. It may be noted that ESG scores exerted a negative effect on CAR in the metals and mining industry and a positive effect on CAR in the financial services industry. Table 4 demonstrates the impact of environmental scores on CAR values across the selected eight industries.

Table 3. Effect of overall ESG score on CAR.

Type of Event Window	Regressand - ESG	Metals and mining		FMCG		Financial services		Healthcare		IT		Oil & gas		Capital goods		Chemical	
	Event window	Coeff.	P value	Coeff.	P value	Coeff.	P value	Coeff.	P value	Event window	Coeff.	P value	Coeff.	P value	Coeff.	P value	Coeff.
Trailing	(-40.0)	-0.009	(0.292)	-0.005	(0.377)	-0.001	(0.827)	0.004	(0.662)	-0.011	(0.115)	0.001	(0.85)	0.003	(0.652)	0.011**	(0.014)
	(-30.0)	-0.011	(0.148)	-0.003	(0.584)	-0.002	(0.461)	0.004	(0.58)	-0.008*	(0.099)	-0.002	(0.695)	0.001	(0.854)	0.007**	(0.028)
	(-20.0)	-0.012**	(0.048)	-0.002	(0.587)	-0.002	(0.321)	0.002	(0.749)	-0.004	(0.388)	-0.002	(0.651)	0.002	(0.644)	**0.007*** **	(0.008)
	(-10.0)	-0.007	(0.123)	0.003	(0.288)	-0.002	(0.364)	0.004	(0.51)	0	(0.919)	0.001	(0.707)	0.004	(0.17)	0.005**	(0.018)
	(-5.0)	-0.005*	(0.093)	0.003	(0.194)	-0.001	(0.767)	0.004	(0.414)	0.002	(0.448)	0.002	(0.304)	0.004*	(0.08)	0.002	(0.162)
	(-2.0)	-0.002	(0.232)	0.003*	(0.06)	0	(0.773)	0	(0.898)	-0.001	(0.744)	0	(0.833)	0.003*	(0.073)	0.002	(0.226)
Forward	(0.2)	0	(0.938)	-0.002	(0.314)	0	(0.83)	0	(0.958)	-0.001	(0.551)	0.002	(0.407)	0	(0.992)	0.002	(0.345)
	(0.5)	-0.001	(0.637)	0	(0.889)	-0.001	(0.406)	-0.001	(0.874)	-0.003	(0.394)	0.002	(0.729)	0.001	(0.659)	0.002	(0.436)
	(0.10)	-0.001	(0.8)	0.007	(0.133)	-0.003	(0.212)	0.001	(0.754)	-0.003	(0.517)	0.001	(0.895)	0.001	(0.713)	0.003	(0.38)
	(0.20)	-0.004	(0.289)	0.002	(0.606)	0.001	(0.827)	0	(0.937)	-0.006	(0.346)	-0.001	(0.88)	0	(0.907)	0.002	(0.591)
	(0.30)	-0.009*	(0.063)	-0.001	(0.817)	0.001	(0.857)	0.003	(0.507)	-0.006	(0.21)	-0.002	(0.738)	0.002	(0.717)	0.003	(0.407)
	(0.40)	**-0.009****	(0.013)	-0.008	(0.169)	-0.001	(0.862)	0.001	(0.899)	-0.008	(0.163)	-0.002	(0.87)	0.004	(0.494)	0.006	(0.193)
Total	(-40, +40)	-0.016*	(0.087)	-0.013	(0.157)	-0.001	(0.815)	0.005	(0.567)	-0.018**	(0.031)	-0.001	(0.944)	0.005	(0.652)	0.017**	(0.022)
	(-30, +30)	-0.018*	(0.067)	-0.004	(0.638)	-0.001	(0.797)	0.008	(0.32)	-0.013**	(0.035)	-0.005	(0.51)	0.001	(0.956)	0.01**	(0.028)
	(-20, +20)	-0.014*	(0.056)	0	(1)	-0.002	(0.717)	0.003	(0.723)	-0.009	(0.153)	-0.003	(0.492)	-0.001	(0.833)	0.009*	(0.07)
	(-10, +10)	-0.006	(0.25)	0.01*	(0.053)	-0.005	(0.185)	0.005	(0.44)	-0.003	(0.43)	0.001	(0.841)	0.002	(0.386)	0.007*	(0.063)
	(-5, +5)	-0.005	(0.154)	0.003	(0.343)	-0.002	(0.495)	0.004	(0.62)	-0.001	(0.827)	0.003	(0.561)	0.002	(0.325)	0.003	(0.195)
	(-2, +2)	-0.001	(0.725)	0.002	(0.548)	-0.001	(0.771)	0	(0.933)	-0.002	(0.613)	0.001	(0.419)	0.001	(0.801)	0.003	(0.103)
Trailing (Excluding event date)	-40	-0.007	(0.362)	-0.005	(0.387)	-0.001	(0.844)	0.005	(0.611)	-0.01	(0.151)	0.001	(0.898)	0.001	(0.911)	0.011**	(0.014)
	-30	-0.01	(0.177)	-0.003	(0.594)	-0.002	(0.461)	0.005	(0.528)	-0.008	(0.152)	-0.003	(0.604)	-0.001	(0.838)	0.007**	(0.03)
	-20	-0.01*	(0.052)	-0.002	(0.597)	-0.002	(0.325)	0.003	(0.699)	-0.004	(0.47)	-0.002	(0.586)	-0.001	(0.896)	**0.007****	(0.011)
	-10	-0.005	(0.149)	0.003	(0.241)	-0.002	(0.361)	0.005	(0.46)	0	(0.988)	0	(0.858)	0.001	(0.754)	0.004**	(0.028)
	-5	-0.004*	(0.07)	0.003	(0.143)	-0.001	(0.778)	0.004	(0.352)	0.002	(0.338)	0.001	(0.548)	0.001	(0.582)	0.001	(0.278)
	-2	-0.001	(0.414)	0.003**	(0.038)	0	(0.762)	0	(0.945)	0	(0.834)	-0.001	(0.699)	0.001	(0.654)	0.001	(0.31)

Note: *** = .01 sig. **=.05 sig. *=.10 sig. Figures in Bold are through Holm-Bonferroni measures.

Table 4. Effect of environment (E) score on CAR.

Type of Event Window	Regressand - E	Metals and mining		FMCG		Financial services		Healthcare		IT		Oil & gas		Capital goods		Chemical	
	Event window	Coeff.	P value	Coeff.	P value	Coeff.	P value	Coeff.	P value	Event window	Coeff.	P value	Coeff.	P value	Coeff.	P value	Coeff.
Trailing	(-40.0)	-0.007*	(0.063)	-0.021*	(0.055)	-0.004	(0.189)	0.004	(0.388)	-0.005	(0.172)	0.001	(0.825)	-0.005	(0.589)	0.005	(0.122)
	(-30.0)	-0.009**	(0.021)	-0.017*	(0.058)	-0.003*	(0.089)	0.002	(0.637)	-0.004	(0.141)	-0.001	(0.696)	-0.005	(0.501)	0.002	(0.318)
	(-20.0)	**-0.008*** **	(0.004)	-0.009	(0.293)	-0.002	(0.269)	0.002	(0.472)	-0.004	(0.141)	-0.001	(0.662)	-0.001	(0.779)	0.003	(0.149)
	(-10.0)	-0.005**	(0.027)	-0.001	(0.838)	-0.002	(0.311)	0.006*	(0.061)	-0.001	(0.54)	0.001	(0.69)	0.002	(0.522)	0	(0.634)
	(-5.0)	-0.004**	(0.017)	-0.001	(0.797)	-0.001	(0.712)	0.004	(0.103)	0	(0.894)	0.001	(0.408)	0.004	(0.161)	0.002	(0.165)
	(-2.0)	-0.002*	(0.097)	0.001	(0.74)	0	(0.733)	0	(0.996)	0	(0.858)	0	(0.762)	0.003	(0.176)	0.001	(0.254)
Forward	(0.2)	0	(0.718)	-0.002	`	0	(0.638)	0.001	(0.611)	0	(0.803)	0.001	(0.414)	0	(0.981)	0.002	(0.287)
	(0.5)	-0.001	(0.345)	0.005	(0.169)	-0.001	(0.26)	0	(0.87)	-0.001	(0.584)	0.001	(0.726)	0.001	(0.615)	0.002	(0.34)
	(0.10)	-0.001	(0.554)	**0.019** **	(0.014)	-0.003*	(0.067)	0.001	(0.391)	0.001	(0.758)	0	(0.876)	0	(0.987)	0.002	(0.347)
	(0.20)	-0.002	(0.157)	0.01	(0.215)	0.001	(0.756)	-0.001	(0.705)	-0.003	(0.374)	0	(0.979)	-0.003	(0.544)	0.001	(0.601)
	(0.30)	-0.005**	(0.025)	-0.001	(0.925)	0.001	(0.691)	-0.001	(0.685)	-0.003	(0.298)	-0.001	(0.814)	-0.001	(0.85)	0.002	(0.363)
	(0.40)	**-0.005*** **	(0.005)	-0.006	(0.568)	0	(0.91)	-0.003	(0.231)	-0.004	(0.168)	0	(0.943)	0	(0.99)	0.004	(0.123)
Total	(-40, +40)	-0.011**	(0.014)	-0.027	(0.134)	-0.004	(0.428)	0.001	(0.892)	-0.009**	(0.044)	0	(0.977)	-0.006	(0.595)	0.009*	(0.068)
	(-30, +30)	**-0.012*** **	(0.009)	-0.017	(0.246)	-0.002	(0.496)	0.001	(0.89)	-0.006*	(0.063)	-0.002	(0.556)	-0.008	(0.45)	0.004	(0.184)
	(-20, +20)	**-0.009*** **	(0.008)	0.003	(0.834)	-0.001	(0.654)	0.001	(0.743)	-0.006*	(0.058)	-0.001	(0.558)	-0.006	(0.306)	0.004	(0.261)
	(-10, +10)	-0.004*	(0.086)	0.019**	(0.044)	-0.005*	(0.061)	0.007**	(0.048)	0	(0.839)	0.001	(0.839)	0	(0.945)	0.003	(0.173)
	(-5, +5)	-0.003**	(0.035)	0.005	(0.359)	-0.002	(0.292)	0.004	(0.248)	-0.001	(0.642)	0.001	(0.626)	0.003	(0.246)	0.002	(0.34)
	(-2, +2)	-0.001	(0.474)	0.001	(0.874)	-0.001	(0.498)	0.001	(0.709)	-0.001	(0.787)	0.001	(0.532)	0.001	(0.733)	0.002*	(0.096)
Trailing (Excluding event date)	-40	-0.006	(0.103)	-0.02*	(0.069)	-0.004	(0.169)	0.004	(0.38)	-0.005	(0.197)	0.001	(0.89)	-0.006	(0.457)	0.005	(0.141)
	-30	-0.007**	(0.033)	-0.016*	(0.071)	-0.003*	(0.055)	0.002	(0.66)	-0.004	(0.18)	-0.001	(0.58)	-0.007	(0.384)	0.002	(0.389)
	-20	**-0.007*** **	(0.006)	-0.007	(0.346)	-0.002	(0.199)	0.002	(0.501)	-0.003	(0.175)	-0.001	(0.569)	-0.003	(0.56)	0.002	(0.203)
	-10	-0.004**	(0.046)	0	(0.997)	-0.002	(0.23)	0.006*	(0.065)	-0.001	(0.565)	0	(0.896)	0	(0.971)	0.002	(0.257)
	-5	-0.003**	(0.015)	0	(0.997)	-0.001	(0.558)	0.004	(0.11)	0	(0.871)	0	(0.728)	0.002	(0.512)	0	(0.974)
	-2	0	(0.408)	0.002	(0.478)	-0.001	(0.462)	0	(0.846)	0	(0.847)	-0.001	(0.592)	0.001	(0.53)	0.001	(0.421)

Note: *** = .01 sig. **=.05 sig. *=.10 sig. Figures in Bold are through Holm-Bonferroni measures.

Table 5. Effect of social (S) score on CAR.

Type of Event Window	Regressand - S	Metals and mining		FMCG		Financial services		Healthcare		IT		Oil & gas		Capital goods		Chemical	
	Event window	Coeff.	P value	Coeff.	P value	Coeff.	P value	Coeff.	P value	Event window	Coeff.	P value	Coeff.	P value	Coeff.	P value	Coeff.
Trailing	(-40.0)	-0.002	(0.699)	-0.008*	(0.063)	0	(0.974)	-0.003	(0.484)	-0.01*	(0.079)	0	(0.937)	0.008	(0.404)	**0.008****	(0.015)
	(-30.0)	-0.004	(0.301)	-0.005	(0.142)	-0.001	(0.615)	0	(0.952)	-0.008*	(0.076)	-0.001	(0.727)	0.003	(0.723)	**0.006*****	(0.009)
	(-20.0)	-0.002	(0.392)	-0.003	(0.261)	-0.002	(0.34)	-0.002	(0.52)	-0.002	(0.676)	-0.001	(0.661)	0.001	(0.79)	**0.006*****	(0.003)
	(-10.0)	-0.002	(0.401)	0.001	(0.712)	-0.001	(0.448)	-0.002	(0.48)	0.003	(0.339)	0.001	(0.784)	0.003	(0.351)	**0.004*****	(0.004)
	(-5.0)	-0.001	(0.562)	0.002	(0.315)	0	(0.839)	-0.002	(0.39)	0.003	(0.102)	0.002	(0.148)	0.002	(0.549)	0.002**	(0.048)
	(-2.0)	0.001	(0.566)	0.003**	(0.021)	0	(0.877)	0	(0.919)	0.002	(0.436)	0	(0.955)	0.001	(0.709)	0.001	(0.196)
Forward	(0.2)	0.001	(0.61)	-0.001	(0.293)	0	(0.721)	0	(0.901)	0.001	(0.522)	0.002	(0.447)	0	(0.915)	0.001	(0.375)
	(0.5)	0.001	(0.559)	0.001	(0.541)	0	(0.853)	0.002	(0.506)	0	(0.971)	0.001	(0.771)	0.002	(0.477)	0.001	(0.557)
	(0.10)	-0.001	(0.757)	**0.009*****	(0.002)	-0.001	(0.402)	0	(0.942)	-0.003	(0.467)	0	(0.96)	0.001	(0.721)	0.001	(0.738)
	(0.20)	-0.003	(0.351)	0.005	(0.114)	0	(0.986)	-0.001	(0.697)	-0.002	(0.648)	-0.002	(0.643)	-0.001	(0.816)	0.001	(0.828)
	(0.30)	-0.004	(0.157)	0.001	(0.864)	0	(0.948)	0.001	(0.779)	-0.006	(0.127)	-0.003	(0.577)	0.003	(0.65)	0.001	(0.595)
	(0.40)	-0.004	(0.575)	-0.004	(0.295)	-0.001	(0.65)	0.002	(0.571)	-0.006	(0.247)	-0.003	(0.696)	0.008	(0.241)	0.003	(0.383)
Total	(-40, +40)	-0.005	(0.503)	-0.012*	(0.064)	-0.001	(0.831)	-0.001	(0.797)	-0.016**	(0.025)	-0.003	(0.746)	0.014	(0.281)	0.01*	(0.052)
	(-30, +30)	-0.004	(0.361)	-0.004	(0.412)	-0.001	(0.798)	0.002	(0.709)	**-0.014****	(0.01)	-0.004	(0.443)	0.004	(0.74)	0.007**	(0.031)
	(-20, +20)	-0.001	(0.748)	0.001	(0.777)	-0.001	(0.65)	-0.002	(0.55)	-0.004	(0.451)	-0.003	(0.38)	-0.002	(0.787)	0.006*	(0.095)
	(-10, +10)	-0.001	(0.729)	**0.01*****	(0.005)	-0.003	(0.362)	-0.002	(0.659)	0	(0.967)	0.001	(0.866)	0.003	(0.421)	0.004	(0.121)
	(-5, +5)	0	(0.867)	0.003	(0.227)	0	(0.886)	0	(0.962)	0.003	(0.263)	0.003	(0.445)	0.001	(0.617)	0.002	(0.182)
	(-2, +2)	0	(0.995)	0.001	(0.442)	0	(0.788)	0	(0.897)	0.003	(0.376)	0.002	(0.228)	-0.001	(0.616)	0.002	(0.113)
Trailing (Excluding event date)	-40	-0.002	(0.733)	-0.008*	(0.062)	0	(0.913)	-0.003	(0.537)	-0.011*	(0.087)	0	(0.932)	0.006	(0.544)	0.007**	(0.017)
	-30	-0.004	(0.288)	-0.005	(0.132)	-0.001	(0.688)	0.001	(0.827)	-0.008*	(0.092)	-0.001	(0.713)	0.001	(0.923)	**0.005*****	(0.009)
	-20	-0.002	(0.378)	-0.003	(0.244)	-0.001	(0.401)	-0.002	(0.634)	-0.002	(0.656)	-0.001	(0.679)	-0.001	(0.923)	**0.005*****	(0.005)
	-10	-0.001	(0.318)	0.001	(0.695)	-0.001	(0.513)	-0.002	(0.595)	0.003	(0.398)	0.001	(0.777)	0.001	(0.782)	**0.003*****	(0.007)
	-5	0	(0.558)	0.002	(0.278)	0	(0.961)	-0.002	(0.52)	0.003	(0.126)	0.002	(0.221)	0	(0.945)	0.001*	(0.095)
	-2	0	(0.558)	0.003**	(0.015)	0	(0.935)	0	(0.629)	0.002	(0.4)	0	(0.959)	-0.001	(0.515)	0.001	(0.281)

Note: *** = .01 sig. **=.05 sig. *=.10 sig. Figures in Bold are through Holm-Bonferroni measures.

Table 6. Effect of governance (G) score on CAR.

Type of Event Window	Regressand - G	Metals and mining		FMCG		Financial services		Healthcare		IT		Oil & gas		Capital goods		Chemical	
	Event window	Coeff.	P value	Coeff.	P value	Coeff.	P value	Coeff.	P value	Event window	Coeff.	P value	Coeff.	P value	Coeff.	P value	Coeff.
Trailing	(-40.0)	0.011	(0.382)	0.002	(0.635)	0.006	(0.218)	0.004	(0.508)	-0.001	(0.849)	0.008	(0.795)	0.003	(0.428)	0.011*	(0.084)
	(-30.0)	0.013	(0.268)	0.002	(0.464)	0.003	(0.417)	0.002	(0.688)	-0.001	(0.85)	-0.002	(0.925)	0.002	(0.511)	0.008*	(0.077)
	(-20.0)	0.016*	(0.075)	0.001	(0.785)	-0.001	(0.831)	0.002	(0.591)	0.002	(0.617)	0	(0.984)	0.002	(0.402)	0.007*	(0.079)
	(-10.0)	0.01	(0.113)	0.002	(0.134)	-0.001	(0.706)	0	(0.917)	-0.001	(0.86)	0.002	(0.814)	0.002	(0.106)	0.003	(0.244)
	(-5.0)	0.007	(0.161)	0.002	(0.165)	0	(0.883)	0.002	(0.497)	0.001	(0.799)	-0.007	(0.334)	0.002	(0.154)	0.002	(0.328)
	(-2.0)	0.003	(0.36)	0.001	(0.241)	0	(0.818)	0	(0.905)	-0.003	(0.173)	-0.003	(0.52)	0.001	(0.169)	0	(0.919)
Forward	(0.2)	0	(0.9)	-0.001	(0.494)	-0.001	(0.548)	-0.001	(0.686)	-0.004*	(0.059)	0.002	(0.89)	0	(0.89)	0	(0.977)
	(0.5)	-0.001	(0.654)	-0.001	(0.279)	-0.002	(0.383)	-0.005	(0.149)	-0.004	(0.157)	0.003	(0.903)	0	(0.89)	0	(0.927)
	(0.10)	-0.003	(0.494)	-0.001	(0.655)	-0.001	(0.831)	-0.001	(0.562)	-0.006	(0.114)	0.004	(0.847)	0.001	(0.66)	0.004	(0.328)
	(0.20)	0.001	(0.85)	-0.002	(0.49)	0.001	(0.752)	0.004	(0.237)	-0.003	(0.569)	0.014	(0.446)	0.001	(0.73)	0.003	(0.496)
	(0.30)	0.004	(0.614)	-0.001	(0.633)	0	(0.92)	0.005	(0.126)	0	(0.905)	0.016	(0.587)	0.002	(0.414)	0.002	(0.638)
	(0.40)	0.003	(0.572)	-0.004	(0.218)	0	(0.944)	0.004	(0.286)	-0.001	(0.788)	0.023	(0.582)	0.003	(0.303)	0.003	(0.653)
Total	(-40, +40)	0.012	(0.426)	-0.002	(0.654)	0.006	(0.447)	0.008	(0.185)	-0.001	(0.856)	0.026	(0.537)	0.006	(0.36)	0.014	(0.165)
	(-30, +30)	0.014	(0.353)	0.001	(0.85)	0.003	(0.572)	0.007	(0.188)	0	(0.966)	0.009	(0.787)	0.004	(0.493)	0.011*	(0.081)
	(-20, +20)	0.015	(0.19)	-0.001	(0.785)	0.001	(0.869)	0.006	(0.284)	0	(0.979)	0.009	(0.643)	0.002	(0.604)	0.011*	(0.1)
	(-10, +10)	0.005	(0.503)	0.001	(0.645)	-0.001	(0.765)	-0.002	(0.734)	-0.005*	(0.073)	0.002	(0.944)	0.002	(0.165)	0.008	(0.124)
	(-5, +5)	0.003	(0.548)	0.001	(0.731)	-0.002	(0.591)	-0.003	(0.574)	-0.002	(0.374)	-0.009	(0.658)	0.001	(0.536)	0.002	(0.498)
	(-2, +2)	0.001	(0.848)	0	(0.74)	-0.001	(0.685)	-0.001	(0.618)	-0.006*	(0.065)	-0.007	(0.348)	0	(0.997)	0	(0.875)
Trailing (Excluding event date)	-40	0.008	(0.477)	0.002	(0.628)	0.006	(0.201)	0.004	(0.495)	0	(0.989)	0.003	(0.922)	0.002	(0.621)	0.012*	(0.058)
	-30	0.011	(0.33)	0.002	(0.447)	0.003	(0.342)	0.002	(0.696)	0	(0.962)	-0.007	(0.728)	0.001	(0.77)	0.008**	(0.044)
	-20	0.014*	(0.089)	0.001	(0.769)	0	(0.917)	0.002	(0.606)	0.003	(0.473)	-0.006	(0.766)	0.001	(0.786)	0.007**	(0.048)
	-10	0.008	(0.142)	0.002	(0.11)	-0.001	(0.78)	-0.001	(0.892)	0.001	(0.859)	-0.003	(0.797)	0.001	(0.54)	0.004	(0.164)
	-5	0.008	(0.142)	0.002	(0.129)	0	(0.991)	0.002	(0.509)	0.002	(0.415)	-0.012	(0.132)	0.001	(0.649)	0.002	(0.172)
	-2	0	(0.86)	0.001	(0.21)	0	(0.959)	0	(0.81)	-0.002	(0.287)	-0.008	(0.287)	0	(0.789)	0.001	(0.698)

Note: *** = .01 sig. **=.05 sig. *=.10 sig. Figures in Bold are through Holm-Bonferroni measures.

5.1.1.3. Effect of Social Score on CAR

Social scores affect chemical, financial services and information technology industry as observed from Table 5. The window of (-40, 0), (-30, 0), (-20, 0), (-10, 0), -30, -20 and -10 have seen significant CARs with parameters of 0.008, 0.006, 0.006, 0.004, 0.005, 0.005, 0.003 respectively in chemical industry. Financial service industry observed significant CARs on windows of (0, 10) and (-10, +10) with parameters of 0.009 and 0.01 respectively, whereas IT industry observed significant CARs in the combined event window (-30, +30) with a parameter value of -0.014. It is evident that chemical and financial services industry showed a positive impact of social scores on CARs whereas IT industry showed a negative impact. Table 5 illustrates the impact of social scores on CAR values across the selected eight industries.

5.1.1.4. Effect of Governance Score on CAR

None of the industries observed any effect of governance factors in CARs following the stricter measures of Holm-Bonferroni correction. Without the stricter measure chemical industry observed significant effect of governance scores on CARs in the event window of -30 and -20. Table 6 portrays the impact of governance scores on CAR values across the selected eight industries.

5.1.2. Findings Based on Objective 2

The oil and gas industry has demonstrated the greatest influence of ESG issues on market value, as indicated by Tobin's Q. The overall ESG parameters are -0.608, while the environmental and social parameters are -0.262 and -0.249, respectively. The parameter value of ESG is -0.608 indicates that if the percentage change in environmental score increases by 1%, percentage change in firm value represented by Tobin's q declines by 0.608%. The rest may also be interpreted likewise. Conversely, environmental issues have impacted the market value in the metals and mining sector, with a parameter of 0.531. notably, environmental and social expenditures adversely affect the oil and gas sector, while environmental concerns positively influence the market value of the metals and mining industry, as illustrated in Table 7.

Table 7. Effect of ESG on firm value across industries.

Regressand - Tobin's q	ESG	E	S	G
Metals and mining	0.359	**0.531*** **	0.144	-0.89
	0.829	(<0.0001)	0.677	0.62
Financial services	0.041	-0.009*	0.03	0.023
	(0.756)	(0.097)	(0.173)	(0.768)
FMCG	1.566*	−0.0214	0.136	0.481
	(0.072)	(0.957)	(0.957)	(0.495)
Healthcare	0.118	-0.068	0.004	1.672
	(0.892)	(0.263)	(0.981)	(0.224)
IT	-0.108	-0.018	0.015	-0.191
	(0.85)	(0.922)	(0.901)	(0.817)
Oil & gas	**-0.608*** **	**-0.262*** **	**-0.249*** **	-1.63
	(<0.0001)	(<0.0001)	(<0.0001)	(0.237)
Capital goods	-0.511	-0.035*	0.008	0.681
	(0.209)	(0.089)	(0.895)	(0.324)
Chemicals	-0.483	-0.124	-0.018	1.124
	(0.491)	(0.19)	(0.902)	(0.155)

Note: *** = .01 sig. **=.05 sig. *=.10 sig. Figures in Bold are through Holm-Bonferroni measures.

5.2. Analysis and Interpretations

Considering the effect of ESG factors on CAR, it is notable that the environmental scores affect only the metals & mining and financial services industry CARs; social scores influence the financial Services, IT, and chemical industries, and governance scores didn't have any effect on CARs in any of the industries. Whereas, if the effect of

ESG factors on Tobin's Q is considered, environmental scores influence firm value in the metals and mining industry, and overall ESG, environmental, and social scores influence firm value in the oil and gas industry. The above findings can be interpreted as follows.

Firstly, CARs in the metals and mining industry are greatly influenced by environmental factors. The same trend is seen in the firm value. However, it may be noted CARs and negatively influenced and change in firm value is positively influenced by environmental factors. It means that environmental spending is not appreciated by shareholders in a pre-acquisition scenario or in the overall event window but valued after a successful acquisition, guided by a change in ESG scores. This is aligned with Wang et al. (2021) who observed that if the acquirer makes excessive CSR investments, the value of the M&A transaction decreases. Krishnamurti et al. (2021) too prescribed the same.

However, mining companies that demonstrate robust environmental governance and sustainability initiatives are more likely to attract high-caliber investors and encounter reduced financial volatility stemming from environmental risks in a post-acquisition scenario (Brammer & Millington, 2008).

Secondly, the value of chemical industry firms, though, is positively associated with overall ESG scores and social scores. This aligns with Tutko (2023) who observed that CSR activities positively influence firm value in chemical firms.

Thirdly, overall ESG, environmental, and social scores affect the firm's value in the oil and gas industry. Oil and gas companies have engaged themselves in sustainable practices to counter negative public sentiments (Berkowitz, Bucheli, & Dumez, 2017; Du & Vieira, 2012). However, because they are part of a controversial industry, their actions might not always be perceived as sincere (Walker & Wan, 2012). Scanlan (2017) argues that ESG practices in the oil and gas sector serve to mitigate the perceived environmental risks associated with hydraulic fracturing, or fracking, and function as a means to persuade the public of the advantages of this developing technology.

Fourthly, social factors and environmental factors are positively associated with firm value in financial services industry. This is in line with Jo, Kim, and Park (2015) who proclaims that CSR activities improve reputation, and positively affect firm value in financial services industry. This is in line with social impact hypothesis based on stakeholder theory (Freeman, 1984).

Lastly, CSR factors are negatively associated with firm value in IT industry. This is in line with Muñoz, Pablo, and Peña (2015) who found negative relationship between CSR practices and firm value in IT industry. However, the results in few other researches are mostly mixed.

6. CONCLUSIONS

Global adoption of CSR practices has led to the establishment of Socially Responsible Investments, focusing on environmental, social, and governance (ESG) elements.

Hence, along with free cash flow and earnings multiple analysis, if an investor analyzes the environmental, social, and governance issues of a company, he or she may be in a better position to invest in the right type of company, and the investment will bring above-average profit in the short run. Chemical firms can provide better value to investors if they focus on environmental and social issues in a pre-acquisition scenario.

On the other hand, based on environmental and social scores, investors can short metals and mining industry stocks in a pre-acquisition scenario and later sell to book profit in the short run. In post-acquisition, the stocks become investable and provide handsome returns.

Lastly, investors in oil and gas firms can short the stocks and gain attractive returns within a year of an acquisition. Value-driven investors can also base their investing decisions on the results.

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