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Thesis Title

**ACQUIRER'S ESG PERFORMANCE, VALUE AND M&A
ABNORMAL RETURNS**

by

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Dedications

This thesis is dedicated to my parents and my brother.

For their support and encouragement.

*"A ship in harbor is safe, but
that is not what ships are built for"*

Shedd, J.A. (1928)

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Abstract

In this study, I examine the relationship between the acquirers' environmental, social, and governance (ESG) performance and firms' value. Also, I examine the effect of ESG performance on acquirer firms' abnormal returns around the announcement dates of M&A deals. Based on event-study method using a sample of 482 completed US domestic mergers from 2010 to 2021, in which acquiring firms' ESG performance ratings are available, I find strong evidence that acquirers' ESG performance has a significant positive effect on the firms' value, when using Tobin's Q as the dependent variable ($p < 0.1$). Also, I identify the impact of ESG performance on cumulative abnormal returns. Empirical results suggest that ESG performance significantly increases firms' cumulative abnormal returns ($p < 0.01$) in short term. The results are robust that consider a range of 56 trading days (-28, +28) as an event window period, ESG performance measurement, and other control variables.

Keywords: Corporate sustainability; ESG (Environmental, Social, Governance); Stakeholder theory; Shareholders theory; Agency theory; Sustainable investing; Mergers & Acquisitions; Tobin's Q; Abnormal return.

Περίληψη

Σε αυτή τη μελέτη, εξετάζω τη σχέση μεταξύ της περιβαλλοντικής, κοινωνικής και διακυβερνητικής (ESG) απόδοσης των εξαγοράζουσων εταιριών και της αξίας της εταιρείας. Επίσης, εξετάζω την επίδραση της ESG απόδοσης των εξαγοράζουσων εταιριών στις μη αναμενόμενες αποδόσεις των εταιρειών γύρω από τις ημερομηνίες ανακοίνωσης των συμφωνιών συγχωνεύσεων και εξαγορών. Με βάση τη μέθοδο μελέτης συμβάντων χρησιμοποιώντας ένα δείγμα 482 ολοκληρωμένων εγχώριων συγχωνεύσεων στις ΗΠΑ από το 2010 έως το 2021, στις οποίες είναι διαθέσιμες οι αξιολογήσεις απόδοσης ESG των εξαγοράζουσων εταιρειών, βρίσκω ισχυρές ενδείξεις ότι η ESG απόδοση των αγοραστών έχει σημαντική θετική επίδραση στην αξία της εταιρείας, όταν χρησιμοποιείται το Tobin's Q ως εξαρτημένη μεταβλητή ($p < 0,1$). Επίσης, εξακριβώνω τον αντίκτυπο της ESG απόδοσης στις σωρευτικές μη αναμενόμενες αποδόσεις. Τα εμπειρικά αποτελέσματα υποδηλώνουν ότι η ESG απόδοση αυξάνει σημαντικά τις σωρευτικές μη αναμενόμενες αποδόσεις των εταιριών ($p < 0,01$) βραχυπρόθεσμα. Τα αποτελέσματα είναι εύρωστα και λαμβάνουν υπόψη ένα εύρος 56 εργάσιμων ημερών (-28, +28) ως περίοδο παραθύρου συμβάντος, μέτρηση απόδοσης ESG και άλλες μεταβλητές ελέγχου.

Λέξεις-κλειδιά: Εταιρική βιωσιμότητα; ESG (Περιβαλλοντική Κοινωνική Διακυβέρνηση); Θεωρία ενδιαφερόμενων; Θεωρία μετόχων; Θεωρία αντιπροσωπείας; Βιώσιμη Επένδυση; Συγχωνεύσεις και εξαγορές; Tobin's Q; Μη αναμενόμενη απόδοση.

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1.Introduction to ESG

1.1 Landscape of ESG

The practice of environmental, social and corporate governance (ESG) investing began in the past as socially responsible investing (SRI). There are several claims as when exactly may have begun, it is however interesting that the investors followed SRI strategy to avoid investments in certain stocks or industries through negative screening, according to defined ethical guidelines or to express religious or moral values (Caplan et al., 2013). Today, these considerations and their alignment with other market-based incentives become increasingly integrated into investment analysis of many ESG investors and issuers who do not merely consider the financial objectives on investment but also its impact on environmental, ethical or social change. Moreover, ESG issues have expanded to consider financial materiality affecting corporate profitability and valuation (Freiberg, et al, 2020). Evaluating how ESG factors potentially affect a firm may provide analysts with a broader perspective on the risks and investment opportunities of a firm's stock returns. But, understanding how exactly the materiality of ESG information varies across countries, industries and firm strategies it is of primary importance. (Amel-Zadeh & Serafeim, 2018) document that investors exhibiting different ESG investing styles and that the majority of investors use ESG data because of financial reasons and stakeholder demand rather than ethical reasons. Moreover, positive ESG screenings related to active ownership provide investors information needed for their asset allocations. Since 1995, the size of the US sustainable investment assets, have increased from \$639 billion to \$17.1 trillion in 2020. (US SIF)¹. In the United States, the SEC adopted regulations requiring all publicly traded corporations to publish their environmental compliance costs and choose from a variety of regulatory filings to disclose their ESG information. Listed firms must also adopt and publicize a code of corporate behavior and ethics, according to the New York Stock Exchange (NYSE) and the NASDAQ, the two largest stock exchange operators in the United States with a combined market capitalization for domestic listed companies of nearly 45 trillion U.S. dollars. On the other hand, governments and regulators pay little attention² to the practice of ESG reporting among Small and Medium Sized enterprises (SMEs) as information disclosure remains mainly voluntary despite the fact that there are 32.5 million SMEs³ making up around 99% of US

¹ US Sustainable and Responsible Investment forum https://www.ussif.org/store_product.asp?prodid=42

² The relaxed restrictions in private market have dramatically increased its growth. In 2019, registered offerings accounted for \$1.2 trillion (30.8 percent) of new capital, compared to approximately \$2.7 trillion (69.2 percent) that we estimate was raised through exempt offerings. <https://www.federalregister.gov/documents/2021/01/14/2020-24749/facilitating-capital-formation-and-expanding-investment-opportunities-by-improving-access-to-capital>

³ US Small Business Administration Office of Advocacy <https://advocacy.sba.gov/2021/08/30/2021-small-business-profiles-for-the-states-the-district-of-columbia-and-the-u-s/>

businesses and value nearly above \$100 billion and only, 10% of reports in the GRI Sustainability Disclosure Database come from SMEs.

On the issue of global comparability, ESG ratings mechanism tends to differ substantially and result in low correlations between ESG scores across different rating providers. The ESG score differences occurred because of different frameworks, data, key indicators, metrics, qualitative judgment and weighting of subcategories. (Berg et al, 2019) The absence of a universally accepted global set of principles and guidelines for consistent reporting further creates a barrier to the effective comparability across firms and jurisdictions and integration of sustainability-related factors (Boffo & Patalano, 2020). ESG disclosure is global issue and need global solutions. It would be paradox for multiple standards to apply to the same risks countered by the same companies that registered and operate in multiple markets.

Moreover, lack of transparency among data providers about peer group and ranges for ESG metrics creates market wide inconsistencies and undermines their reliability (Kotsantonis & Serafeim, 2019). Additionally, intentionally misleading communication of companies to influence the perceptions of their stakeholders incurs the phenomenon known in literature as “greenwashing”; organization acting deceitful by spending more time and money on marketing itself as environmentally friendly rather than on actually minimizing its environmental impact. Greenwashing and lack of transparency could threaten the development of the global market.

In response, global regulators are taking action to ensure the legitimacy of the expanding ESG rating industry (IFFR events, 2022)⁴. In July 2020, the EU took the lead by introducing a Taxonomy Regulation (Journal of E.U)⁵ a classification system establishing a list of environmentally sustainable for economic activities. It does not set mandatory requirements for companies or financial products but, it introduces mandatory disclosure obligations for companies and financial market participants. It aims at providing companies, investors and policymakers with appropriate definitions and common set of rules for which economic activities can be considered environmentally sustainable. These regulations encourage investors and portfolio managers to consider sustainability-related risks in investments and prevent greenwashing. Moreover, it encourages market participants to achieve environmentally sustainable status, mitigate market fragmentation and help investments allocation where it is most needed. This regulatory change is one of the first major steps in the EU’s efforts to prioritize sustainability and transparency through ESG-related investment risks. The EU Taxonomy will align with the Corporate Sustainability Reporting Directive (CSRD) in 2024 determining compulsory reporting criteria on environment, social affairs, and governance for large companies and listed SMEs and will involve in the digitization of standardized ESG data (financial and non-financial) and the promotion of dual materiality.

⁴ Institute of Finance and Financial Regulation (IFFR), ESG for Banks, Firms and Institutional Investors: Advances and Challenges, on 24-25 May 2022, <https://iffr.gr/events/>

⁵ Document 32020R0852, <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32020R0852>

In contrast with EU, US regulators have not yet developed a green taxonomy but it is open to debate. In terms of coordination, there is a possibility for a joint taxonomy in the future. However, in 2021 USA the Securities and Exchange Commission (SEC) announced the creation of the Environmental, Social and Governance Task Force as a part of its Division of Enforcement⁶. It was established to ensure clarity by identifying material gaps or misstatements with ESG requirements and develop initiatives to support reliable disclosure and investment.

1.2 ESG Scores and Ratings

An ESG score or rating is the measure of a firm's Environmental, Social and Governance perceived risk or overall performance. ESG “*score*” and ESG “*rating*” are used often interchangeably. A key difference lies in the use of numerical *scores* and letter *ratings*, which differs between rating agencies. For example, Morgan Stanley Capital International (MSCI) uses letter ratings ranging from *CCC* (Laggard) to *AAA* (Leader). Institutional Shareholder Services (ISS) uses numerical scores ranging from *1* (best) to *10* (worst) and other organizations such as Standard & Poor's Global (S&P Global) publish sustainability ratings in classes, like “*S&P Global Gold Class*” for firms with a minimum total score of 60 and whose score is within 1% of the top-performing firm's score in their industry and “*S&P Global Bronze Class*” for firms whose score is at least 54 and is within a range of 5% to 10% of the industry's top-performing firm's score.

Regardless of whether an agency uses a score or a rating, the goal of the result is still the same: to show a firm's ESG performance or ESG risk in a tangible and comparable way. These scores or ratings are used by investors like Asset owners, Institutional investors, Firms, Regulators and other stakeholders who want to comprehend a firm's long-term risk and performance and to make more informed purchasing decisions. Also, to highlight activities that the firm engages in and possibly counter public criticism of the alleged harm of any of these activities.

These scores usually take into account a set of standards with regard to a firm's environmental risks management, firm's utilization of natural resources and the effect of its operations on the environment both in direct operations and across supply chains. Any firm that neglects to consider the effects of its policies and practices on the environment and climate change may be exposed to higher levels of financial risk. Also, these standards consider firm's relationships with its employees, suppliers, customers, societies and the political environment in which operates, the firm's leadership management,

⁶ <https://www.sec.gov/news/press-release/2021-42>

workplace diversity, corporate transparency, code and values, audits, internal controls, payments, compensations and shareholder rights.

Score and rating criteria differ depending on the rating agency delivering the score. ESG materiality is measured through a variety of methods qualitative and quantitative assessments, data analysis, and stakeholder feedback. A “good” ESG score will differ depending on the rating system too. This means that high scores are not necessarily the best since some rating firms assess the overall performance and some others the perceived risk. Using, Refinitiv, Bloomberg or Dow Jones Sustainability indices a score of 0 is the worst. On the other hand, using Sustainalytics a score of 0 is the best (negligible risk). The ESG risk rating provides investors with an overall firm score based on an assessment of how much of a firm’s exposure to ESG risk is unmanaged. The more this risk is unmanaged, the higher the ESG risk rating score.

1.3 ESG/CRS Literature

Greater transparency in a firm helps to alleviate information asymmetry (Ritter, 1984; Kim & Verrecchia 1994) argue that voluntary disclosure reduces information asymmetries among investors. As a result, they can be relatively confident that stock transactions occur at a fair price, increasing liquidity in the firm’s stock.

Firms with ESG disclosure established long-term engagement with stakeholder, have greater transparency thus, reduced agency costs and a better ability to innovate. Moreover, significantly outperform over the long-term, both in terms of stock market as well as accounting performance (Eccles et al., 2014).

Also, firms with ESG information disclosure exhibit significantly higher operational performance and market value and attract more investors with long-term orientation (Economidou et al., 2022).

CSR contributes substantially to reducing firms cost of equity, expand the firm’s investor base and enhance the value of the firm for shareholders (El Ghouli et al., 2011). High CSR performance enables companies to have more access to financing, which may be attributed to the increase of transparency and accountability which in turn reduce informational asymmetries between firm and investors thus mitigating perceived risk. Moreover, stakeholder engagement based on mutual trust and cooperation reduces potential agency and enhance the revenue (Cheng et al., 2014).

Socially responsible firms could obtain lower cost bank loans especially, those with higher customer awareness, higher R&D intensity, and opaque information environment in country-specific (Cheung et al., 2020). In the United States loans with terms tied to environmental, social and governance targets (ESG) have jumped to about 52 billion dollars in 2021, a 292% increase compared with all of 2020 (Bloomberg data, 2021)⁷. On the other hand (Barnea & Rubin, 2010) found that firms with higher leverage have lower social ratings, and argue that debt obligations may discourage overinvestment in CSR because of monitoring by creditors.

(Goss & Gordon, 2011) exploit banks as a “quasi-insider” that are able to discriminate between sincere attempts of firm’s management to align the goals of the firm with the broader societal good and value-destroying agency costs. As, a result management that attempts to use CSR in order to manipulate stakeholders are unlikely to be successful. Moreover, lenders threat low-quality borrowers that engage in discretionary CSR spending, with higher loan spreads and shorter maturities.

On the other hand, firms with ESG ratings mitigate credit risk and tend to have lower credit default swap (CDS) spreads (Barth et al., 2022).

Well-governed firms have well-established purpose, clear notion of the values and incentivize people to the delivery of the success of those purposes. Firms with ESG factor may be more selective in hiring and able to retain and engage employees, where employees share these firm values, leading to higher levels of effort and higher labor productivity (Barrymore & Sampson, 2021) SRI screen based on employee welfare generate long-term returns for high employee satisfaction and may improve investment performance (Edmans, 2011). CSR also helps firm to retain talented employees’ and reducing the propensity of firm’s disclosure valuable knowledge. (Flammer & Kacperczyk, 2019). Based on the stakeholder theory, the firm's commitment to invest in employee wealth is reflected and associated with a higher level of cash holdings (Dang et al., 2015) and low debt ratios (Bae, 2010). Based on Sustainability Wage Gap of (Krueger et al., 2021) workers accept lower wages to work in more environmentally sustainable firms and sectors. This is in contrast to the efficiency wage theory of (Akerlof & Yellen, 1986) who argues that excess satisfaction can increase effort and satisfied employees work harder, and produce better for the organization. Failure to integrate ESG factors can lead to increase exposure to various risks including reputational risk for public firms. ESG reputational risk has a negative impact on firm growth opportunities, mitigating thus market longevity (Fafaliou et al., 2022).

Strong ESG correlates with higher equity returns, from both a tilt and positive momentum perspective (Khan et al., 2016; Nagy et al., 2016). Moreover, (Berg et al., 2021) propose a simple model that establishes a relationship between ESG performance and stock returns. In this model they instrument ESG ratings with ratings of other ESG rating agencies and they show that stocks with higher ESG performance have higher expected returns than

⁷ <https://www.bloomberg.com/news/articles/2021-05-24/u-s-sustainability-linked-loans-are-292-more-than-all-of-2020>

previously estimated; biased downward by about 60% demonstrate that the effect of ESG performance on stock returns is stronger. (Gibson et al., 2019) use ESG ratings from seven different data providers for a sample of S&P 500 firms between 2010 and 2017, found that stock returns are related to ESG rating disagreement, suggesting a risk premium for firms with higher ESG rating disagreement. (Serafeim et al., 2021) show that in the presence of high disagreement between raters, the relation between news and market reactions weakens while the rating with the most predictive power predicts future stock returns. (Khan, 2019) show that firms with governance variables such as: ownership dispersion, shareholder orientation, and institutional strength have higher average returns. Also, the profitability and investment factor exposures were positive, suggesting more profitable firms with lower investment were more likely to be in the good governance than in the poor governance quartile.

ESG screening improves risk-adjusted returns, adding about 0.16% in annual performance on average and from a risk perspective, there is downside in volatility, and conditional value at risk (CVaR). The amount of specific risk for ESG firms is more than offset by the excess risk-adjusted returns (Eccles et al., 2016).

(Chang et al., 2020) construct a market-level ESG index based on 38 ESG scores and apply different alternative methods they find strong positive predictive power on the market returns, from both cash flow and discount rate channels. A meta-analysis of aggregates findings from more than 1,000 research papers authored between 2015-2020 show that there is positive correlation between ESG performance and operational efficiencies, stock performance, corporate financial performance and investment performance and lower cost of capital (Whelan et al., 2021). One more meta-analysis of more than 2100 focused studies which released since the 1970s suggest a positive relation of ESG factors and corporate financial performance specifically, in regions such as North America and Emerging Markets (Friede et al., 2015).

1.4 ESG/CRS in M&A Literature

(Alexandridis et al., 2017) based on a research of U.S. deals announced between 1990-2015 argues that M&A deals create more value for acquiring firm shareholders post-2009 than ever before. They suggest that the higher acquisition gains appear to be linked with profound improvements in the quality of corporate governance among acquiring firms. Using a large sample of mergers in the US (Deng, et al. 2013) shows that mergers by high CSR acquirers take less time to complete and are less likely to fail than mergers by low CSR acquirers. These results suggest that acquirers' social performance is an important

determinant of merger performance and probability of merger completion. Moreover, it supports the stakeholder value maximization view of stakeholder theory. CSR activities have a positive effect on shareholder wealth because focusing on the interests of stakeholders increases their willingness to support a firm's operation. Stakeholders, have the ability to influence the expected outcome of M&A deals since the outcome of M&A bid depends on their assessment. As a result, the way a firm treats its stakeholders should be a key component of a firm's stakeholder engagement strategy (Arouri et al., 2019).

Strategic acquisition can lead to greater market share, and top-line growth. More innovative companies are more likely to engage in acquisition activities and achieve better long-term new outcomes as well as improved operating and stock market performance. Moreover, capture technological overlaps and common knowledge base has positive and significant impact on merger pairing. (Bena & Li, 2014).

(Hoberg & Phillips, 2010) found that firms with asset complementarity are more likely to merge. On the other hand, firms with similar rivals in a competitive market are less likely to merge. Also firms with patents, copyrights and trademarks are more likely to be targets. Using a DMP (Diamond-Mortensen-Pissarides) model (Kropf & Robinson, 2008) show that mergers typically pair together firms with similar M/B ratios as a natural consequence of a prediction from the property rights theory of the firm; that complementary assets should be placed under common control. (Leland, 2007) urges that the optimal scope of the firm results from the hedging opportunities between the two firms' separately and the merged firm entails, that positive financial synergies can occur due to the reduced risk and the potential for greater leverage, but at the cost of losing separate debt/equity choices and separate limited liability.

Based on, a study of (Boone & Uysal 2020) considering firm environmental reputation in M&A show that firms with negative reputations exhibit a significantly lower probability of participating in M&A either as acquirer and target, because they have potential for negative spillover effects. The returns to acquirers are lower when they acquire targets with lower reputational thus, acquirers tend to avoid these targets.

High CSR acquirers realize higher merger announcement returns and post-merger long-term operating performance and stock returns (Deng et al., 2013). A research made by (Aktas et al., 2011) using intangible value assessment (IVA) ratings showed that the stock market rewards the acquirer for making socially and environmentally responsible investments by acquiring a SRI target. Also, an increase in the target rating increases acquirer abnormal returns and the environmental and social performance.

(Arouri et al., 2019) suggest that the CSR of acquirers is an important determinant of the way market participants assess the outcome of M&As worldwide and find that deals conducted by acquirers with strong CSR are associated with lower uncertainty as evidenced by narrower arbitrage spreads thus, there is a negative association between arbitrage spreads and acquirers' CSR.

2. Finance Theories

2.1 Agency Theory

Agency Theory describes the relationship between the principal (shareholders) and the agent (management) in the organization which depends upon the nature of a contract (Jensen & Meckling, 1976). Agency problems arise because contracts are not costlessly written and enforced. Agency costs include the costs of structuring, monitoring, and bonding a set of contracts among agents with conflicting interests (Fama & Jensen, 1983). Agency cost depends on the perquisites available in the firm, the discretion given to the agent, the complexity and the geographical dispersion of the operations (Ross, 1973; Jensen & Meckling, 1976).

Based on, agent theory the agent may act independently from the principal desires, on behalf of his interests and goals while the principal is unable to control these actions (Moral Hazard). The principal cannot verify if the agent behaves appropriate and it is costly to engage in monitoring him to assure that. Specifically, the principal is unable to determine whether the actions of the agent are optimal as a result of informational asymmetry (Adverse Selection). This could occur through manipulation of financial information and result in expropriating principal's wealth.

Agency problem usually occurs in M&A transactions between the management and the shareholders. In USA in 2013, 94 percent of M&A deals valued over \$100 million were litigated while, in 2017 this percentage was 73 percent (Sinha, 2018). Deal litigation filed on behalf of a class of the target firm's shareholders, alleging that the directors of the firm breached their fiduciary duties of care and loyalty in connection with the transaction. Common allegations include the failure of management to conduct a sufficiently competitive sale, discouraged additional bids, fail of disclose information and conflicts of interests.

Whenever one individual depends on the action of another, an agency relation arises (Pratt & Zeckhauser, 1984).

An Agency problem could occur during M&A transactions, between firms. In this case the acquirer firm is the principal and the target firm is the agent. M&A transactions represent a substantial investment for an acquirer that takes control and ownership of a target firm and results in the consolidation of assets and liabilities as a single entity. Thus, M&A transactions are governed by complex contracts. Generally, these contracts contain regulations about the principal's payments and the agent's obligations. Both parties negotiate for a more favorable position within the zone of possible agreement. In this situation the principal is the uninformed party and the agent is the informed party hence, the agent is in an advantageous position. Almost, all M&A contracts address moral hazard

by containing interim covenants and information asymmetry concerned with characteristics actions and intentions of the agent. Asymmetric information usually indicates increased effort to protect the acquiring firm from integration risk such as lack of due diligence and overpayment. Based on, (Akerlof, 1970) theory of the lemons problem which refers to a form of adverse selection there is an overvalued firm in the market due to asymmetry in the amount of information (material knowledge), available to bidders and sellers. Since, the sellers typically know more about the value of their firm than the bidder do, there is an opportunity for the sellers in the market to sell the overvalued firm to unaware bidders. Thus, the bidders encounter the probability of extreme loss due to a risk that was not divulged at the time of a purchase.

Information asymmetry significantly influences the premium paid by the acquirer during a takeover. However, blockholders who hold at least 5% of the target shares before the announcement of the offer pay a significantly lower premium (70% lower) than other firms (Dionne et al., 2015). Also, (Brockman & Yan, 2009) show that blockholders have access to firm specific information thus, having an advantage to evaluate the performance and fair value of the target firm.

Agency problem could also occur between shareholders who are distinguished as controlling⁸ and noncontrolling shareholders.

Controlling shareholder means any shareholder owning more than fifty percent (50%) of the voting stock in the firm or more than twenty-five percent (25%) of voting stock if no other shareholder owns a larger share. Thus, they have tremendous influence on fundamental corporate issues and can act as directors.

Non-Controlling Shareholder means, individually, any shareholder who holds less than five percent (5%) of the issued and outstanding shares of the firm's common stock and collectively, with all other non-controlling shareholders, holds less than 25%. All stocks calculated on a fully-diluted basis, as of any date.⁹

The former may have idiosyncratic goals and the ability to act in self-interest, often to the detriment of the latter. When a controlling stockholder acts, there are two primary consequences: imposition of fiduciary duties¹⁰ and enhanced action scrutiny. Additionally, controlling stockholders are generally subject to entire fairness only when they engage in a conflicted transaction presumed that they act in the best interest of the corporation.

Moreover, there is a conflict among shareholders that can arise in a speculative or irrational market (Bolton et al., 2006). This conflict shows that stock prices reflect not

⁸ Delaware courts have traditionally referred to the amount of stock required for controlling stockholder status as substantial. Recently, the courts have de-emphasized the substantiality requirement or declined to engage in an analysis of substantiality at all. "Controller Confusion: Realigning Controlling Stockholders and Controlled Boards". Note. MAR 10, 2020, 133 Harv. L. Rev. 1706.

⁹ <https://www.lawinsider.com/dictionary/non-controlling-shareholder>

¹⁰ Under Delaware law, stockholders typically do not owe fiduciary duties (133 Harv. L. Rev. 1706 MAR 10, 2020).

merely, the firm's fundamental value but also a short-term speculative component. Short term focus shareholders may choose to incentivize CEO by offering compensation contracts for short-term stock performance thus, to artificially increase the stock price by all means even, with manipulation of earnings. Despite that CEO has a duty of loyalty he may choose to act in short term, in accordance with their interest and at the expense of long term shareholders' value which indicates weak corporate governance. These actions could negatively affect the market. Due to information asymmetry investors may pay more than the fundamental value of a stock because, they believe that will sell it higher in the future. In this case, the stock market could develop speculative bubbles.

2.2 Stakeholder and Shareholder Theory

According to the neoclassical economic theory of shareholder the social responsibility of business is to maximize its profit (Friedman, 1970) while social and environmental issues should be resolved by the market itself. He argues that the management is not obligated to any social responsibilities because it requires intensive capital therefore, is subject to approval by the shareholders who are the final decision makers for financial resources. Based on, shareholder theory the managers have the priority to protect and to increase assets for the benefit of shareholders therefore, management should make decisions that maximize the combined value of dividends and stock price increases. The notion to modify the mission of the management with broader objectives than just maximize shareholders value adds some cost to the firm, making it more difficult for management to raise funds from investors. Multiple objectives and more performance criteria may also weaken managerial accountability; at the extreme, too many missions amount to no mission at all (Dewatripont et al. 1999).

The stakeholder theory, suggests that managers must act strategically, on behalf of groups and individuals who have a stake in the firm. In accordance, they should manage and integrate the relationships and interests of both internal and external stakeholders such as: shareholders, employees, customers, suppliers, communities, government and others who involved with, or indirectly affected by those actions in a way that ensures long-term success of the firm. A stakeholder approach is a value-based management incorporated in a firms strategy actively, emphasizes management of the firm's environment, relationships and the promotion of shared interests (Freeman, 1984). The stakeholder approach claims that corporate success and social welfare are not a zero-sum game (Porter & Kramer, 2006) and that CSR activities increase stakeholders' support, create shared value and ultimately benefit shareholders gaining great competitive benefit. This view is closely related to contract theory (Coase, 1960) claims that in a world without

'transactions costs' rational individuals can always negotiate to an allocation of resources that is efficient thus, leads to efficient institutions. It has important implications for wealth creation and wealth distribution processes, as well as for governance, by including all stakeholders that are either receivers as well as providers of benefit or risk. On the other hand, firms may overinvest in CSR for their private benefit of managers who seek high reputations as responsible global citizen and ethical at the expense of shareholders (Barnea & Rubin, 2010).

2.3 Blockholders and Minority Stakeholders

Shareholder protection rights against self-dealing activities of insiders correlate strongly with corporate control and ownership concentration. (Aminadav & Papaioannou, 2020) Ownership concentration is largely dispersed in the United States because of U.S - specific policies that discourage ownership concentration undertaken under political pressure from professional corporate managers (Roe, 1994). A study made by (Konijn et al., 2011) using a large sample of U.S. firms show a negative correlation between Tobin's Q and blockholder dispersion, suggesting that a concentrated ownership structure is to be preferred. A large shareholder with sufficient rights is beneficial to stakeholders as he mitigates the agency problem between management and stakeholders as he pressure managers to adopt value-increasing policies. (Karpoff et al. 1996) On the other hand, a large shareholder can be detrimental to firm value if he pursues his own objectives, expropriating value from other stakeholders, such as minority shareholders as creditors. Thus, the classic agency problem between management and shareholders is replaced by an agency problem between blockholders and minority stakeholders of the firm (LaPorta et al. 2002).

2.4 Efficient Markets Hypothesis (EMH)

A comprehensive review of the theory and evidence on market efficiency was first provided by (Fama 1970). He defined a market in which asset prices at any time fully reflect all available information as efficient and he introduced three kinds of hypothesis of EMH that are concerned with different sets of relevant information. Efficiency depends

on two dimensions: Types of information incorporated into price and the speed of new information that is incorporated into price.

There are three variations of the hypothesis **1)** the weak-form based on the past history of prices, **2)** the semi-strong form based on all public information, including the past history of price **3)** the strong-form which represents three different assumed levels of market efficiency.

Weak-form

The weak form of the EMH assumes that all historical prices of securities have already been reflected in the market prices of stocks but may not reflect new information that is not yet available to the public. It additionally assumes that past information regarding price, volume, and returns is independent of future prices thus; it is not possible to make abnormal gains by practicing technical analysis. The weak form leaves the possibility that practice an in-depth fundamental analysis may provide a means of outperforming the overall market average return on an investment but only in the short term.

Semi-strong form

The semi-strong form of the EMH assumes that all publicly known available information including all historical price information already been reflected in the market prices of stocks. This implies that neither fundamental nor technical analysis can provide usefulness. The semi-strong form of the EMH incorporates the weak-form assumptions and expands by assuming that stock prices adjust rapidly to any new public information that becomes available, therefore rendering fundamental analysis incapable of having any predictive power about future price movements. Accordingly, an investor could not earn consistent abnormal returns by acting on surprise announcements since the market would rapidly react to the new information. The semi-strong form leaves the possibility that only information that is not readily available to the public may provide a means of outperforming the overall market average return on an investment but only in the short term.

Strong-form

The strong form of the EMI assumes that all publicly known available information and private information (insider information) already been reflected in the market prices of stocks. The strong form of the EMH incorporates the weak and semi-strong form assumptions and expands by assuming that stock prices adjust rapidly to any new public and private information thus, neither technical analysis which is the study of past stock

prices in an attempt to predict future prices, nor even fundamental analysis which is the analysis of financial information such as firm's earnings, asset values, etc. would enable an investor to outperform the overall market average return on an investment rendering fundamental analysis incapable of having any predictive power about future price movements. An accepted view is that an investor who holds a randomly selected portfolio of individual stocks with comparable risk could achieve greater returns.

3. Focus on Sustainable or Quarterly investing

The financial crisis of 2008 has made investors to consider a long term model of ‘sustainable investing’ instead of ‘quarterly investing’. Sustainable investing drives many investors and managers to focus on long-term performances increase firm value. In contrast, quarterly investing drives shareholders to focus in short term performances prevent corporate governance (Bhide, 1993) and act in expense of long term shareholders. Speculative management could have responded with actions in order to generate artificial earnings, boost share prices and deliver immediate returns to short term shareholders. These actions based on accrual accounting manipulation, buybacks, dividend increases or cut investments aim to inflate earnings, based on SECs study 30 days after buyback announcement could leads to an increase of stock price with abnormal returns of more than 2.5%¹¹. They usually have detrimental effect on investing in innovation, skilled labor or essential capital expenditures necessary to sustain long-term growth. Moreover, these actions could lead to market inefficiencies, excess volatility and speculative bubbles (Tirole, 1982). Also, firms that buyback when stock prices are high instead of “Buying low, sell high”, rendered financially fragile in economic downturns.

Buybacks could be used by management to manipulate earnings which in turn could inflate their own stock option compensation packages. According to Institutional Shareholder Services (ISS), in 2018, 58 percent¹² of performance based compensation was linked to EPS. Buybacks were banned in the US during the 1930s until 1982, as a form of market manipulation. Later it was reintroduced under the Reagan administration to combat corporate raiders. In 2018 S&P500 stock buyback surged 50% to an all-time high of over \$806 billion¹³ but just 43% of the registered companies had any research and development expenses. As of 2022, US companies are currently on pace to spent \$1.2tn on buybacks while USA is the only country where money spent on buybacks exceeds dividends. The increase proportion of buyback was due to the corporate tax breaks contained in Tax Cuts and Jobs Act of 2017¹⁴.

¹¹ https://www.sec.gov/news/speech/speech-jackson-061118#_ftn22

¹² <https://www.issgovernance.com/esg/governance-data/executive-compensation-data/>

¹³ <https://www.spglobal.com/spdji/en/search/?query=Buybacks+2021&activeTab=all>

¹⁴ <https://www.taxpolicycenter.org/briefing-book/how-did-tax-cuts-and-jobs-act-change-business-taxes>

3.1 Institutional investor's classification

(Bushee, 1998) classifies institutional investors into three groups: Transient, Dedicated, and Quasi-indexer based on their past investment patterns of portfolio turnover, diversification, and momentum trading.

Transient institutional investors defined as institutions with short investment horizons, high portfolio turnover and small investment stakes and influence to managers. Usually, short-term investors encourage myopic managerial behaviors. A disproportionate presence of transient institutions in a firm investor base could intensify pressure to managers for short-term performance which result in excess volatility in the stock price. Transient investors are attracted to firms with investor relations activities geared toward forward-looking information and events that constitute trading opportunities

Dedicated institutions investors which provide stable ownership and take large position are likely to perform monitoring gather information and influence managers and preserves them from capital market pressure. Firms with more stable ownership are beneficial in improving corporate governance and are engaged in lesser sales manipulation and overproduction. Moreover, stable equity holdings reduce value-destroying managerial interventions in firm operations.

Quasi-indexers investors position as long-term investors with highly diversified portfolios, trade infrequently, own small stakes, closely mimic an index and attempt to perform monitoring on firms corporate governance. They are attracted to firms that focus their disclosure activities on historical information.

3.2 Short term and Long term investing Literature

(Graham et al., 2005) describe a trade-off between the short-term earnings and the long-term value-maximization and show that managers focus short term on influencing current stock prices by sacrifice some economic future firm value such as: search and development (R&D), advertising and maintenance expenditures, while some others by cutting long-term investments. Moreover, managers matter less on positive agency cost of debt, agency cost through compensation contracts that minimizes it, and political cost (positive information and lobbying) which both considered and are a function of reported profit (Watts & Zimmerman, 1990).

In the presence of short-term investors firms spend less on R&D to report higher earnings because, cutting R&D can boost a firm's stock price in the short term (Bushee, 1998; Cremer et al., 2019) show transient investors who may benefit from temporarily inflated valuations, in burden of long-term shareholders usually, exit the firm shortly afterwards.

(Zang, 2011) show how managers trade off real activities manipulation (overproducing inventory, cutting discretionary expenditures) and accrual-based earnings management over the period 1987–2008. When firms have limited accounting flexibility due to higher level scrutiny, as result of the Sarbanes-Oxley Act, (SOX), they use real earning management. On the other hand, firms use more accrual-based earnings management when experience higher levels of monitoring from institutional investors.

(Cohen et al., 2008) document an increase in accrual-based earnings management in the period preceding SOX concurrently, they find a positive significant correlation between discretionary accruals and the percentage of equity based compensation received by managers, suggests they were provided with incentives to manipulate earnings upwards.

(Bolton et al., 2006) urges that regulatory intervention aims at restraining managerial discretion could impose cost on firm, inhibit the management initiative towards risk-taking, rather than protect future shareholders against future speculative action. They suggest that CEOs should be encouraged to take a long term perspective by lengthening the directors' position and tying their compensation to the long-term performance of the stock. Indeed, (Egger et al., 2014) show that vesting time of options or stocks granted to CEOs and directors has a negative impact on speculation institutional investors' as captured by asset turnover.

(Borochin & Yang, 2017; Heflin, 2003) show that regarding to information distribution, the Regulation Fair Disclosure (Reg. FD)¹⁵ in the interest of fairness reduces both future overvaluation and misvaluation of firms with transient institutional investors. Also, dedicated institutional investors hold firm with less earnings management and higher payouts. This implies that the firm distributes more dividends to shareholders. Also, dedicated investors are associated with better future governance characteristics, while transient investors are not.

Deep studying of the mechanisms driving the impact of ESG information performance on firms' IPO stock price returns and the behavioral bias of investors (Economidou et al, 2022) suggest that firms in order to attract investors with longer-term orientations they should improve their ESG performance but it needs to be visible to the market, through rating practices, to reap benefits concluding that “it pays off to do good and to have the right investors” thus, ESG performance is a way to attract the right investors who are longer-term oriented shareholders.

¹⁵ The regulation apply only to an issuer's communications with market professionals, and holders of the issuer's securities under circumstances in which it is reasonably foreseeable that the security holders will trade on the basis of the information. <https://www.sec.gov/news/extra/seldsfct.htm>

Shareholders' investment horizons affect a takeover during M&A. Weaker monitoring from short-term shareholders could allow managers to proceed with value-reducing acquisitions as well as higher long-run underperformance on behalf of their personal benefits at the expense of shareholder returns. Moreover, target firms with short-term shareholders get lower premiums. (Gaspar et al., 2005) short-term shareholders in the acquirer firm provide more deviation for managers to overbid and carry out value-reducing acquisitions. On the other hand target firms prefer long-term shareholders because they have bigger incentives to monitor managers which mean that are less likely to trade off firms long term value for their own personal benefit. Hence, long-term institutional investors focus on monitoring and influencing, by engaging in long-term value investment adjustments rather than trading for short term gains. Monitoring prevents information asymmetry and information pays off when management makes the right investment decisions which are rewarded by the market with higher returns. Short term institutions investors are not associated with better merger performance or fail to close the deal (Chen et al., 2007).

4. Mergers and acquisitions (M&A)

4.1 Introduction

Mergers and acquisitions (M&A) refer to domestic or global transactions between two or more firms privately held or public firms in which the ownership of the firm or their operating units are transferred to or consolidate with another firm.

Although mergers and acquisitions (M&A) are used interchangeably, they come with different legal meanings based on the forms of integration. From a financial point of view, both mergers and acquisitions generally result in the consolidation of assets and liabilities into one entity.

Regarding the process of M&A transactions is that it can be friendly or hostile, depending on the approval of the target firm's board of directors. In a friendly acquisition, the board of the target firm agrees with the acquisition transaction. On the other hand, in a hostile acquisition, the target firm's board refuses the offer. In this case, the acquiring firm offers a price higher than the target firm's market price prior to the acquisition and invites stockholders in the target firm to tender their shares for the price. The difference between the acquisition price and the market price prior to the acquisition is called the acquisition premium.

4.2 Classification of M&A

Acquisition

Acquisition usually occurs when the acquirer firm is larger than the target firm and purchases most or entire shares of the target firm with the formal vote of its shareholders. As a controlling shareholder of the target firm the acquirer can take decisions without any approval of the others. However, the acquired firm will continue to exist as long as there are minority shareholders who refuse the offer. Therefore, the bidder may decide to make a tender offer to buy the outstanding share of the target firm at a premium price. Consequently, tender offers are used to carry out hostile takeovers.

Finally, the target firm may become a wholly-owned subsidiary or merged with the bidder. Generally, most tender offers become mergers, if the acquiring firm successfully

gains control of the target firm. In a merger the target firm ceases to exist after the deal as a separate entity and becomes part of the acquiring firm.

A firm can be acquired by its own management or by a group of investors, usually with a tender offer. After the transaction, the acquired firm can cease to exist as a publicly traded firm and become a private business. These acquisitions are called management buyouts, if managers are involved, and leveraged buyouts, if the funds for the tender offer come predominantly from debt.

Triangular or Subsidiary Merger

A triangular merger involves three entities: the acquirer firm, its subsidiary, and the target firm. This merger type involves the creation of a wholly-owned subsidiary firm of the acquirer in order to facilitate a share exchange between the bidder and the seller as a form of indirect merger. There are two types of triangular mergers forward and reverse.

1) Forward triangular merger

In a forward triangular merger, the subsidiary firm acquires the target firm with the subsidiary surviving and the target ceases to exist. The result of the transaction is that the target becomes a wholly-owned subsidiary of the acquirer. Because the merger transaction takes place between the target and the subsidiary, the acquirer does not assume the target's liabilities. If the acquirer had directly acquired the target, the acquirer would, by operation of law, have received its liabilities. This is the main reason for entering into a forward triangular merger to allow the acquiring entity to acquire the target without assuming its liabilities. However, because the target firm ceases to exist, performing a forward triangular merger can be difficult in terms of business continuity because the target firm's contracts may have to be reassessed.

2) Reverse triangular merger

In a reverse triangular merger, the subsidiary firm and the target firm merge, with the target firm surviving and the subsidiary firm ceases to exist. The acquirer receives all of the target's ownership interests which continue to operate as a wholly owned subsidiary of the acquirer. The acquirer does not assume the target's liabilities and does not have to sign new contracts. However, the acquirer must use firm stock to acquire at least 80 percent of the target firm's stock. This makes the transaction less flexible in terms of payment options.

Consolidation

A consolidation usually refers to a merger in which two or more firms usually of similar size and scope consolidate to form a new single entity. After, the transaction both firms cease to exist and a completely new entity is formed. Both the acquiring firm and target firm stockholders receive shares in the new firm. The assets, liabilities and operations of these firms are transferred to the new one.

4.3 M&A Types of Integration

Horizontal

A horizontal integration is a strategy that involves one or more firms that operate in similar industries and offer the same products or services. When competition tends to be higher among firms that operate in the same industry, synergies and potential gains in market share are much greater for merging firms. Firms that choose horizontal integration gain strong advantages some of which are the following:

- 1)** Growth also known as inorganic growth through horizontal integration. Usually, a faster way for a firm to achieve higher revenues with less resources as compared to growing organically moreover, without having to take the risk of developing products or services from the initial stage.
- 2)** Market power or monopoly power refers to the ability of the firm to raise and maintain price of product or services above the level that would prevail under competition.
- 3)** Realize economies of scale thus reducing marginal costs.
- 4)** Reshape the firm's competitive scope by reducing intense rivalry. A high intensity of rivalry means competitor firms are targeting each other's markets and aggressively pricing the products or services. This results in potential costs to all competitors within the industry.
- 5)** Creating synergies, share complementary skills and resources. Exploiting cost-based and revenue-based synergies the merged firm may exercise greater control over pricing and achieve cost reduction and higher revenues. Also, increase innovation.
- 6)** Tax benefits in mergers may arise because of unused tax losses, unused debt capacity, surplus funds, and the write-up of depreciable assets. Acquiring a firm with tax losses enables the acquirer to use the tax losses to offset the acquiring firm's future income. Also, interest payments on debt are a tax-deductible expense.

Vertical

Vertical integration is a strategy that allows a firm to extend its operations by taking direct ownership of various stages of its production process rather than relying on external contractors, suppliers or distributors. A vertical merger associated with a vertical expansion through the acquisition of suppliers that produce the intermediate goods needed by the firm or through the acquisition of distribution process (logistics or networks) for its finished products. These types of mergers consolidate firm's position in the industry, leading to economies of scale and competitive advantage, as the firm will expand by gaining control of its supply chain and distribution network thus it could improve operational efficiency, increase revenue, reduce production costs, expand customer base, avoiding external shocks, etc.

There are three types of vertical integration based on firm's aim to move up or down:

- 1) Backward (upstream) vertical integration occurs when a firm controls subsidiaries that produce some of the inputs that are used in the production of its own products.
- 2) Forward (downstream) vertical integration occurs when a firm controls distribution centers and retailers where its products are sold.
- 3) and balanced (both upstream and downstream) vertical integration.

Conglomerate

This type of transaction is usually done for diversification reasons and is occurred between firms that operate in unrelated industries. In a conglomerate, the acquirer owns a controlling stake in one or several smaller firms and conducting different business operations separately and independently. Taking part in many different markets could help the conglomerate firm to diversify the risks posed by being in a single market. Firms that choose conglomerate integration gain strong advantages some of which are the following:

1) Diversification firms that operate in cyclical industries feel the need to diversify their products or services to avoid significant losses during a slowdown in their industry. As a result acquiring a target in a non-cyclical industry enables a firm to diversify and reduce its market risk while smooth cash flows during external shocks. **2)** Moreover, a firm can achieve economy of scope and increase efficiency, by diversifying its products and services which results in a reduction of average cost. **3)** A firm could widen its target customer and increase customer base and number by offering a wider range of products or services thus, increase its revenue. **4)** Also, diversification may help to lower the total operating costs, require fewer resources and have access to internal capital markets, enabling greater ability to grow.

If a target firm is big enough, it might not become a subsidiary instead, it might actually merge with the acquiring firm combining into one new legal entity.

4.4 Mergers and acquisitions payment patterns.

Method of payment in M&A transactions can reduce the risk of overpayment and a deal failure. Due to information asymmetry, the decision of the cash (equity) payment method signals to the market that the shares are undervalued (overvalued) and therefore creates positive (negative) excess returns for the acquirer (Travlos, 1987). Accordingly, when the target firm suffers from information asymmetry unable them to value the bidders' stock, the likelihood of accepting a cash offer increases as the bidder's stocks might turn out to be a costly option if is overvalued. Overvalued shares allow firms to acquire firms at a sufficient discount. When bidders possess information about their firm value, they are more likely to use stocks in transaction when their firm stock is considered overvalued and cash when their firms' stock is considered undervalued. Due to the asymmetric information of the target firm, bidders prefer stock payments to reduce the risk. Specifically, in a stock M&A transactions, the synergy risk is shared proportionally between the bidder's and the target's shareholders to the percentage of the merged firm's stake.

The higher credit and rate quality of the firm could lower financial constraints and enhanced access to public debt markets. This affects the choice of payment method in M&A transaction as there is a positive relation between a bidders' credit rating level and cash payment method (Harford et al., 2014).

Managers with higher ownership stakes in the bidding firm are more likely to use cash as a payment form in takeover bids due to the fact that issuance of new stock is likely to dilute their stake in the bidding firm leading to a loss of control and outside intervention (Amihud et al., 1990).

Based on, the pre-deal ownership structure, the larger the target's potential ownership stake in the merged firm the more stock is used in the method of payment. Stock payment could signal the target shareholders willing participation in the merge firm (De-Bod et al., 2022).

5. Event Study Methodology

5.1 Introduction

Finance theory suggests that capital markets reflect all available information in the firms' stock prices. Based on this premise, we can study how a particular event changes a firm's financial prospects by quantifying the impact of the event on the firm's stock. In other words an event study method is a statistical method to assess the impact of an event on an outcome of interest. It can be used to describe the dynamic of the outcome of interest before and after the event and to evaluate its impact.

However, to conclude that there is an abnormal performance when none exists due to the market efficiency theory it is considering an anomaly. This anomaly prompted researchers to develop hypotheses about market inefficiency stemming from investors' information processing biases and security mispricing. Thus, the hypothesis that investors behavioral biases might be persistent and that arbitrage forces take a long time to correct the mispricing leads to the existence of an abnormal performance over short and long horizons. But, still it is an unresolved issue among financial economists.

Common applications of event studies include investigations of stock performances in M&A transactions or public offerings of equity (IPO) seasoned equity offering or secondary equity offering (SEO) etc.

Returns on the announcement of a M&A deals reveal information about different things such as; how the market reassess the acquirer's business, the potential synergies, the acquirer and target firms' specific characteristic etc.

Such studies draw on the theory of rational expectations and market efficiency assuming that stock prices reflect the discounted value of future profits, and adjust rapidly to reflect new public information such as M&A transactions.

Generally, there are three central methodological assumptions and depending on the expected return model that is used there are more:

- 1) The stock returns in the event window accurately reflect the economic impact of the event.
- 2) It is assumed that the event is unexpected and has not yet been reflected into the stock price thus the abnormal stock returns indicate the market reaction to the unanticipated event.
- 3) There are no other events during the event window, which cause the stock prices to change.

Stock price reactions of the acquiring firm, the target firm or the merging entity at or around the day of the announcement of a deal can serve as a proxy for expected future profits from the M&A transaction. Although, the majority of previous literature research used event study to measure the effect of an event on stock price return there are several studies examine stock trading volume, or return volatility.

Return event methodology quantifies an event's impact in the abnormal rate of return which is the actual return generated by a given stock or portfolio over a period of time deducted by the return generated by its benchmark or the expected rate of return. It is a measure of performance on a risk-adjusted basis. An abnormal return can be either positive or negative.

Some of the expected return models in the event study methodology are: **1) Market Model**, **2) Market Adjusted Model**, **3) Mean Adjusted Model**, **4) Capital Asset Pricing Model**,(CAPM) **5) Arbitrage Pricing Theory Model (APT)**, **6) Fama-French Three Factor Model**, **7) Carhart Four Factor Model**, etc.

Each model has been developed under different assumptions for different purposes by using different inputs and has its advantages and disadvantages.

5.2 Event period

When examine an event study, we consider the length of the event period and the expected availability of data in determining the effect on stock prices. Choices of event periods based on return frequency can be daily, weekly, monthly, or annually.

We often use the initial event study with daily or weekly data to capture short-term effects of events on stock prices. For long term effects, we use a related methodology that has been developed with monthly or annual data to capture the persistent impact of the event on stock prices over long periods of time for several months or years after the event respectively.

There are two related approaches for long period event studies analyses:

- 1) The buy-and-hold abnormal return approach
- 2) The calendar-time portfolio approach also referred to as Jensen's alpha approach.

5.2.1 Buy-and-hold abnormal return (BHAR)

The buy-and-hold abnormal return (BHAR) approach is often used in long-run event studies, to replace CAR. It is an investment strategy where an investor buys stocks and holds them for a long time thus, is an investing strategy of passive management. This approach implies investor's confidence that the value of the investments will be higher in the future. Investor does not engage in market timing or calendar effect. The BHAR calculates abnormal returns by deducting the normal buy-and-hold return from the realized buy-and-hold return.

The BHAR model is defined as:

$$\text{BHAR}_{i,h} = \prod_{t=1}^H (1 + R_{i,t}) - \prod_{t=1}^H (1 + R_{m,t})$$

where

$\text{BHAR}_{i,h}$ is the abnormal return of the asset i over the period h

$R_{i,t}$ is the trading month return of the asset i , and

$R_{m,t}$ is trading month return of the benchmark portfolio or index m

5.2.2 Calendar-time portfolio (CTIME)

The calendar-time portfolio (CTIME) or Jensen-alpha approach calculates the abnormal return of a portfolio consisting of all firms that experienced the same event. For each calendar month, the portfolios are rebalanced, i.e., the firms that reach the end of their last month period drop out and new firms that have just executed a transaction are added. Then calculate the portfolio mean monthly abnormal return a_{it} by regress its excess return on the model i.e., the Carhart Four Factor Model. Technically, the alpha a_{it} has often been estimated with ordinary least square (OLS) estimator and monthly data set and refers to the intercept of a regression on actual returns. An intercept, significantly different from zero represents the abnormal returns occurred at the event date. Positive alpha means that the security or a portfolio outperform the market, while negative alpha means that the security or a portfolio underperform the market so, the higher alpha, the better performance of security or a portfolio of securities.

Carhart Four Factor Model:

$$R_{pt} - R_{ft} = a_{it} + \beta_1 (R_{mt} - R_{ft}) + \beta_2 SMB_t + \beta_3 HML_t + \beta_4 UMD_t + e_{pt}$$

where,

R_{pt} is the equal or value-weighted return for calendar month t for the portfolio of firms that experienced the event within the previous T months

R_{ft} is the risk-free rate

R_{mt} is the return on the CRSP value-weight market

SMB_t is the size factor which is the difference between the return on the portfolio of “small” stocks and “big” stocks

HML_t is the value factor which is the difference between the return on the portfolio of “high” and “low” book-to market stocks

UMD_t is the momentum factor which is difference between the return on the portfolio of past one-year “winners” and “losers”

a_p is the average monthly abnormal return (Jensen alpha) on the portfolio of event firms over the T-month post-event period

$\beta_1, \beta_2, \beta_3, \beta_4$ are sensitivities (betas) of the event portfolio to the four factors

5.3 Event Window

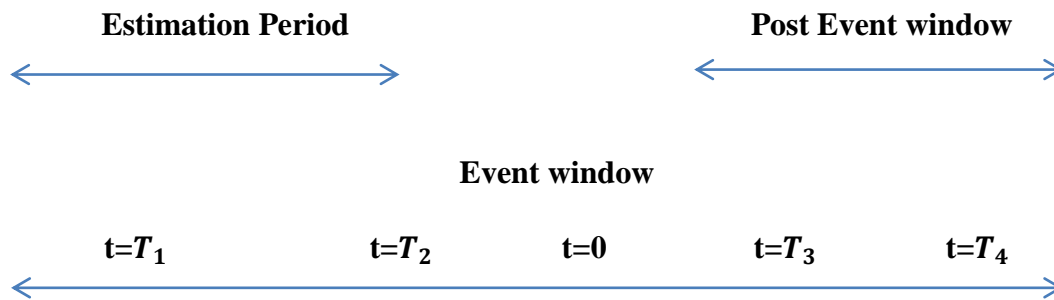
In each event time period there is the event window, the estimation period and the post estimation period.

The estimation window which is in a range of T1 to T2 covers a period over which the expected return of the sample stocks will be estimated. The estimation window is assumed as a period free from disturbances that may affect the economy and the market, that is a period that reflects the stock's normal price movements.

The event window is in a range T2 to T3 around the event day or announcement date “0” as shown in the figure. In the event window the impact of the event on abnormal returns is examined. As mention before the expected return is used as the benchmark return and

compared with the actual return during the event window. The event day is defined as the announcement date in case of studying the impact of mergers and acquisitions on the stock returns or generally, when a significant market event occurs on day “0”.

The post event window which is in a range of T3 to T4 allows us to measure the long term impact of the event it can be in a range of one month or of several years depending on the event. As mentioned above studies focus on the event on stock returns over short event periods or long event periods.



5.4 Cumulative Abnormal Return (CAR)

Cumulative Abnormal Return (CAR) refers to the sum of abnormal returns over a given period of time. It allows investors to measure the performance of an asset or security return over a specific period of time. CAR is typically calculated over the length of the event window/forecast interval. In the dummy variable approach (Karafiath, 1988) there is a dummy variable for each day of the event window giving rise to as many dummies as the number of days in the event window. These coefficients may then be aggregated to provide the traditional cumulative prediction error (abnormal return) over a desired interval.

Usually, the calculation of cumulative abnormal return happens over a small window of time. This short duration is because daily abnormal returns can create bias in the results.

$$CAR(t_1, t_2) = \sum_{t=t_1}^{t_2} AR_{i,t}$$

where, CAR is the Cumulative Abnormal Return (CAR) the t_1 s is the first day of the event window and t_{21} is the ending day.

5.5 Limitations of the Event Study

The assumptions used in event study may not valid.

Due to market inefficiency observed stock prices may not fully and immediately reflect all information. Moreover, events might be anticipated in some situations and unforeseen events could also have an effect on the sample stocks, which could lead to biased stock returns. Therefore, abnormal returns are not the result of market reaction to the specific event of interest.

The choice of model to estimate expected returns could affect the results and the significance of abnormal returns thus, could lead to biased information in the event study results.

Precise estimation periods are not easy to determine. Moreover, the estimation period is difficult to control for other confounding effects if researchers select long estimation periods or long event window.

6. Empirical Research

6.1 Introduction

My study contributes to the ongoing debate about the impact of acquirers' ESG on shareholders' wealth. Although there are many studies that examine the impact of ESG factors on merger announcement returns, their analysis focuses on the effect of the target firms' ESG on the acquirers' shareholder wealth moreover, they find a positive relation between the target's ESG factors and acquirer's returns.

The necessity of demonstrating the existence of an association is based on the disclosure of non-financial information in corporate reporting that fully incorporates ESG material combined with financial information. Non-financial information presents the long-term prospects of a firm which is focused on the value creation process, as opposed to financial information which is limited to historical data and short-term goals such as profit maximization.

In order to describe the value creation process, the firm is analyzed from stakeholders' points of view and the interdependencies created between the firm and the stakeholders. Therefore, the value based management of the ESG firm may attract new capital from investors by showing that there is a positive association between ESG performance and firms' value. This study assesses the possibility of an association between ESG factors and firm's value by developing a linear regression model. The main finding is that there is a positive association between acquirer's ESG performance and firm's value and the firm's policy to include non-financial information disclosure, namely ESG performance could attract new capital.

Specifically, I use the Tobin Q as the dependent variable to count for the market value of a firm's assets I perform a cross section regression analysis using robust standard errors and I find that the coefficient of ESG performance has a positive and significant impact 0.745 ($p < 0.1$) on Tobin's Q during the M&A announcement.

Also, my study complements previous literature on the market for corporate control by showing that acquirers ESG performance is an important determinant of merger returns. I show that acquirer firms' ESG performance effectively reduce agency cost; conflicts of interest between management and shareholders and other stakeholders by improving the welfare of both parties moreover, markets may react favorably to ESG-friendly transactions. Firms that invest more in ESG factors tend to have a stronger reputation for keeping their commitments associated with the implicit contracts, rendering them trustworthy and accountable hence; firms' stakeholders are likely to have stronger incentives to contribute resources to these firms. This implies that the interests of

stakeholders with high ESG performance firms are in a great alignment. As a result, stakeholders are more likely to contribute to firms' profitability and wealth.

Acquirer's ESG performance may influence the target firms' shareholder decisions to support or reject a proposed M&A deal, particularly where the transaction includes shares of the acquirer. An acquirer firm with an ESG performance disclosure creates a good reputation that could help target firms to make stronger decisions to their shareholders. Thus, acquirer firms that fulfill its implicit contracts with their stakeholders and maintain good relations with them are also crucial for an M&A's success, suggesting that M&A are an important channel through which ESG can have a significant effect on shareholder wealth.

Moreover, I examine whether ESG performance helps acquirers to realize higher merger announcement abnormal returns. Abnormal returns convey information about the acquirers firm. These abnormal returns are seems to be related to ESG factors, the firms' expected managerial performance and implicit contracts.

I find that an acquirer's ESG performance has a significant positive impact on its market returns in short term during the M&A's announcement. Specifically, I perform a cross-sectional regression analysis using robust standard errors and I find that the coefficient of ESG factors has a positive and significant impact 0.012 ($p < 0.01$) on the short-term cumulative abnormal returns CAR (-5, +5) which I estimate by using the market-adjusted model.

I assume that there is a semi-strong form efficiency in the market which means that only information that is not readily available to the public may provide a means of outperforming the overall market average return on an investment but only in the short term.

6.2 Sample selection

For my study I collect data that contain US public firms that are registered in the Nasdaq and NYSE Amex stock index. Nasdaq is the most active stock trading market in the US by volume and ranked second on the list of stock exchanges by market capitalization of shares. Investors can trade large cap firms with a market capitalization value of more than \$10 billion and mid cap firms with a market capitalization between \$2 billion and \$10 billion. Nasdaq is a well-known tech-heavy stock index. The NYSE Amex Composite Index is a market-cap weighted index of securities listed on the NYSE American exchange. The index is composed primarily of small-cap firm with a market value

between \$250 million and \$2 billion and micro-cap firms with a market value less than \$250 million.

My data consists of M&A transactions of US firms from Refinitiv datastream and Compustat. M&A transactions are merely domestic as both acquirer and target are US registered firms. By concentrating in a domestic market the study is more well-represented, I avoid any misrepresentation in the results due to other factors as firms in different countries face heterogeneous legal, regulatory, and market conditions or macroeconomic factors for example a higher GDP growth indicates that there is growing demand, and this will lead to the reallocation of economic resources to a more appropriately investment, which could lead to an increase in M&A thus, more potential profits.

M&A transactions are completed between the periods 2010 to 2021 (11 years). This specific period was intentionally chosen so to avoid include data during the major global financial crisis between mid-2007 and early 2009, a period of extreme stress in global financial markets and banking system. Generally, crises are unexpected occurrences that create conditions with the potential to render traditional research procedures difficult. Even though, data collected in more naturalistic settings may have stronger validity, data collected in more controlled environments may provide greater confidence in accounting for extraneous influence.

1) The deal value of the M&A transactions disclosed in Compustat database is greater than \$1million, 2) the acquirer holds less than 50% of the target's shares before the announcement and the event between the acquirer and the target takes place after the completion of the transaction, 3) the acquirer is publicly traded and has stock returns and financial data available from Compustat database 4) also, the acquirer has stock returns and financial data available from Refinitiv datastream, 5) the acquirer is not in the financial or utilities industries i.e. (firms with primary Standard Industrial Classification (SIC) codes between 6000 and 6999 or between 4900 and 4999). These restrictions result in a final sample of 482 successful mergers.

I do not include acquisition events in my study such as: purchases of assets such as plants, divisions, or subsidiaries from the targets because unlike a consolidation transaction in which the acquirer and the target merge to form a new firm, in these acquisitions the target that sells these assets to the acquirer still exists after the transaction and operates as an independent legal entity. Therefore, target stakeholders probably might not need to renegotiate their contracts with the acquiring firm thus, including these acquisition events in my study makes it difficult to draw unbiased conclusions from the results unlike in consolidation transactions where the effects of acquirer ESG on stakeholders' willingness to support the transactions and target's stakeholder wealth are clear.

6.3 Variables

6.3.1 Depended variables

Tobin's Q: (Brainard & Tobin 1968) introduced the ratio of the market value of a firm's assets which is defined as the market value of common stock plus the book value of total assets minus the book value of common equity, all divided by the book value of total assets which is the net difference between that firm's total assets and total liabilities.

This variable expresses the relationship between market and book value and measures a firm's growth opportunities.

Tobin's premise is that firms should be worth what their assets are worth, so anything above one (>1) theoretically indicates that a firm is overvalued because it implies that a firm's stock is more expensive than the replacement cost of its assets while any value between zero and one ($0-1$) indicates that the stock is undervalued because the cost to replace a firm's assets is greater than the value of its stock.

CAR The cumulative abnormal returns are calculated by using an event study. Event studies are useful to measure the impact of a specific event on the firm's financial performance or value (MacKinlay, 1997). For my study, the specified event is the announcement date of the M&A transaction. Specifically, I use an event window of 56 trading days. To be able to calculate cumulative abnormal returns, the daily stocks and index returns are obtained from Compustat. Section (6.4) of this research elaborates further on calculating cumulative abnormal returns.

6.3.2 Explanatory variables (control variables)

ESG I use the Refinitiv ESG score framework which measures the firm's ESG performance based on verifiable reported data in the public domain. ESG scores are calculated for more than 11,800 companies around the world by over 350 content research analysts. It calculates over 630 firm-level ESG measures of which 186 (of the most comparable and material per industry, contribute to the overall firm assessment and scoring process.

There are 10 categories (Emission, Innovation, Resource use, Human rights, Product responsibility, Workforce, Community, Management, Shareholders, CSR strategy). These 10 categories form the three pillar scores and the overall ESG score, which is a reflection of the firm's ESG performance, commitment and effectiveness based on publicly reported information.

When firms are involved in ESG controversies for example legislation disputes, lawsuits or fines based on negative media stories, there is an ESGC score which its main objective is to discount the ESG performance score by incorporating the impact of significant, material ESG controversies in the overall ESGC score. The ESG controversies score is calculated based on 23 ESG controversy topics. The controversies score also addresses the market cap bias. Larger firms tend to have higher ESG scores because they tend to receive greater scrutiny from investors, investment analysts, and the media attention, than smaller-cap firms. As a result larger firms may feel pressured to provide greater ESG reporting and disclosures. Moreover, larger firms have the financial resources available to address ESG issues that smaller companies.

The pillar weights are normalized to percentages ranging between 0 and 100 therefore is not sensitive to outliers. ESG pillar score is a relative sum of the category weights which vary per industry for the "Environmental" and "Social" categories and as for "Governance", the weights remain the same across all industries.

Category Scores Calculation Methodology

This methodology considers three key factors:

- i)** The number of firms that are worse than the current one
- ii)** The number of firms that have the same value and
- iii)** The number of firms that have a value at all.

$$\text{Score} = \frac{\text{no.of companies with a worse value} + \frac{\text{no.of companies with the same value}}{2}}{\text{no.of companies with a value}}$$

Table 1 - Refinitiv ESG firm scores

Score range		Description
0 to 25	First Quartile	Scores within this range indicates poor relative ESG performance and insufficient degree of transparency in reporting material ESG data publicly
>25 to 50	Second Quartile	Scores within this range indicates satisfactory relative ESG performance and moderate degree of transparency in reporting material ESG data publicly
>50 to 75	Third Quartile	Scores within this range indicates good relative ESG performance and above average degree of transparency in reporting material ESG data publicly
>75 to 100	Fourth Quartile	Score within this range indicates excellent relative ESG performance and high degree of transparency in reporting material ESG data publicly

Source: Refinitiv (May 2022), “Environmental, Social, and Governance (ESG) scores from Refinitiv”.

The conversion from a percentile score to a letter grade is based on the logic shown in the (table 2) below

Table 2 - Refinitiv ESG firm percentile& letter grade scores

Score range		Grade
0.0 <= score <= 0.083333	First Quartile	D-
0.083333 < score <= 0.166666		D
0.166666 < score <= 0.250000		D+
0.250000 < score <= 0.333333	Second Quartile	C-
0.333333 < score <= 0.416666		C
0.416666 < score <= 0.500000		C+
0.500000 < score <= 0.583333	Third Quartile	B-
0.583333 < score <= 0.666666		B
0.666666 < score <= 0.750000		B+
0.750000 < score <= 0.833333	Fourth Quartile	A-
0.833333 < score <= 0.916666		A
0.916666 < score <= 1		A+

Source: Refinitiv (May 2022), “Environmental, Social, and Governance (ESG) scores from Refinitiv”.

Category and benchmark

To calculate the environmental and social category scores, as well as the controversies score, the Refinitiv Business Classification is used as the benchmark, for the reason that both the environmental and social topics are more relevant and material to firms within the same industries. Where firms have multiple business segments, a representative business is selected according to the largest revenue contribution also, there are some other factor considered such as profitability, asset utilization, market perception and growth perspective. For example, a 60% of total revenue threshold is used to assign an industry to firms that operate in two business segments. If neither segment meets this revenue threshold, the criteria is applied first to assets then operating profit. Accordingly a 51% of total revenue threshold is used to assign an industry to organizations with three or more segments. To calculate the governance categories, the country of incorporation is used as the benchmark, as best governance practices are more consistent within countries

Methods for calculating the magnitude matrix.

1) Industry median which is used for numeric data points with environmental and social impact. Materiality weighting is determined by the relative median value in that industry group. The relative median values for each industry group to which the data point is material are compared, and decile ranks are assigned. The decile rank determines the relative weight assigned from 1 to 10.

2) Transparency weight which is used for Boolean data points. Boolean data points are measures with a value of 'Yes' or 'No'. Magnitude is determined based on the disclosure of relative level in that industry group. The disclosure percentage for each industry group to which the data point is material is identified, and decile ranks are assigned. The decile rank determines the relative weight assigned from 1 to 10.

Category weight calculation

The magnitude weights of all 10 categories are summed up for each respective industry group. Each category's magnitude weight is divided by the sum of the magnitude weights of the respective industry group to derive the category weight.

$$\text{Category weight of an industry group} = \frac{\text{Magnitude weight of a category}}{\text{Sum of magnitudes of all categories}}$$

Materiality matrix below provides a detailed view on the ESG themes covered in each category, with the respective data points evaluated as proxies of ESG magnitude per industry group.

Table 3 - Materiality matrix

Pillars	Categories	Themes	Data points	Weight method
Environmental	Emissions	Emissions	TR.AnalyticCO2	Quant industry median
		Waste	TR.AnalyticTotalWaste	Quant industry median
		Biodiversity		
		Environmental management systems		
	Innovation	Product innovation	TR.EnvProducts	Transparency weights
		Green revenues, (R&D) and (CapEx)	TR.AnalyticEnvRD	Quant industry median
	Resource use	Water	TR.AnalyticWaterUse	Quant industry median
		Energy	TR.AnalyticEnergyUse	Quant industry median
Sustainable packaging				
Environmental supply chain				
Social	Community	Equally important to all industry groups, median weight of five is assigned to all		Equally important to all industry groups
	Human rights	Human rights	TR.PolicyHumanRights	Transparency weights
	Product responsibility	Responsible marketing	TR.PolicyResponsibleMarketing	Transparency weights
		Product quality	TR.ProductQualityMonitoring	Transparency weights
		Data privacy	TR.PolicyDataPrivacy	Transparency weights
	Workforce	Diversity and inclusion	TR.WomenEmployees	Quant industry median
		Career development and training	TR.AvgTrainingHours	Transparency weights
		Working conditions	TR.TradeUnionRep	Quant industry median
Health and safety		TR.AnalyticLostDays	Transparency weights	
Governance	CSR strategy	CSR strategy	Data points in governance category and governance pillar	Count of data points in each governance category/all data points in governance pillar
		ESG reporting and transparency		
	Management	Structure (independence, diversity, committees)	Data points in governance category and governance pillar	Count of data points in each governance category/all data points in governance pillar
		Compensation		
	Shareholders	Shareholder rights	Data points in governance category and governance pillar	Count of data points in each governance category/all data points in governance pillar
		Takeover defenses		

Source: Refinitiv (May 2022), “Environmental, Social, and Governance (ESG) scores from Refinitiv”.

Free Cash flow (FCF) is defined as the difference between Operating Cash Flow and Capital Expenditures divided by the book value of total assets.

FCF represents the cash that a firm generates after accounting for cash outflows. It estimates the quality of a firm's earnings, how efficiently the firm is using its assets to generate cash. The more free cash flow a firm has, the more it can allocate to dividends, paying debt, and growth opportunities. Generally, it reflects firm's financial health.

Unlike earnings, free cash flow excludes the non-cash expenses of the income statement and includes spending on equipment and assets as well as changes in working capital from the balance sheet.

As I specified previously in this study, free cash flow disclosure provides better information to investors than earnings. That's because managers often engage in earnings management a strategy that uses accrual-based accounting methods to artificially reduced earnings variability and to present an excessively positive view of a firm's financial positions, by inflating earnings. Free cash flow does not suffer from that pitfall of accrual-based earnings measures it accounts for the actual timing of cash inflows and outflows and provides better insight into the firm's business operations.

Moreover, free cash flow may be particularly valuable for firms with higher asymmetric information such as young, research and development-intensive technology firms, for which earnings are less informative.

Investors consider the cash flow statement as a valuable measure of profitability and firms' long-term outlook. Firm growth due to continual cash flow can lead to heavy profits in future. It's a sign of the long-term prosperity of the organization.

The market reaction is also greater for firms that disclose free cash flow in their earnings announcements.

Leverage (Lev) is defined as the ratio of total debt (long-term debt plus short-term debt) divided by the book value of total assets.

Leverage ratio is used to determine the relative level of debt load that a firm has incurred. A ratio less than 1 indicates that the firm owns more assets than liabilities, consider it less risky. A ratio greater than 1 indicates that a large portion of firm's assets are funded with debt and it is likely to be viewed as a high-risk firm by investors or financial institutions. A high leverage ratio is associated with a high risk of bankruptcy since a rise in interest rates can affect the firm's ability to meet its repayment obligations thus, resulting in a default and at a considerable risk of bankruptcy. Moreover, due to the high risk shareholders would require a greater return to compensate them. Generally, an excessive amount of debt increases interest payments, earning volatility and weighted average cost of capital (WACC) and lowers the market value of the firm.

However, using debt rather than equity typically seen as positive news known as debt signaling means that the firm is creditworthy and is raising capital for the purposes of growth. Also, a modest amount of leverage can be beneficial to shareholders because it avoids dilution and because of tax deductibility.

Based on the Optimal Capital Structure theory an optimal mix of debt and equity financing minimizes the cost of capital, the WACC and maximizes a firm's market value (shareholder wealth) thus, firms have to find the optimal point at which the marginal benefit of debt equals the marginal cost.

The ratio is only useful in comparing firms within the same industry, as the capital structures of firms is specific to their industry and differs from firms in other industries. For example, for industries where there is a large proportion of tangible assets the book value of intangible assets may be minimal and cannot be compared to other industries that have a comparable funded debt to asset ratio, but where the assets are mostly held in intangible forms.

Cash Flow volatility (CFV) is defined as the standard deviation of operating cash flows divided by the average sales during the period.

High CFV is associated with lower investment and higher costs of accessing external capital. In contrast, low cash flow volatility indicates "safer" firms with higher investment and lower costs of accessing external capital. The returns of both types of firms are inversely affected by investor sentiment.

Volatility can affect capital costs because of information asymmetry. CFV is significantly related to lower analyst which, results in greater information asymmetry and a higher cost of accessing equity capital.

Moreover, higher CFV implies that a firm is more likely to have periods of internal cash flow shortfalls. However, a higher frequency of cash flow shortfalls is not the only reason that volatility affects investment decisions.

Reductions in cash flow volatility through risk management can reduce a firm's expected underinvestment costs and may add value to the firm.

Firm Age is defined as the natural logarithm of the firm's age, which is the number of years since the firm's date of incorporation.

One can measure firm age as the time between the firm's date of incorporation and the present time (in years) or as the time between the firm's initial public stock offering IPO

and the present time (also in years) or, the first trading date in the major exchange, in case the date of a firm's initial public stock offering is not available in Compustat.

Firms lose momentum as they get older. There is a negative relationship between firm age and profitability measured by return on assets, return on equity or gross profit margin and Tobin's Q. Usually, older firms either gone bankrupt merged or acquired by other firm.

Firm Size is defined as the natural logarithm of the total assets.

There are different proxies/ measures of firm size, such as total assets, total sales, market capitalization and total number of employees.

Studies conclude that these different proxies of firm size are differently related to practices of corporate finance based on sign, significance and R^2 . All proxies capture different aspects of firm size and have different implications for corporate finance.

Firm size could impact the firm's financial policy, investment policy, dividend policy, firm performance, diversification, managerial compensation and incentives, and the corporate governance.

Herfindahl Index (HHI) is calculated as the sum of square market shares of each firm in the industry in any given period.

The HHI is a common measure of market concentration and is used to determine market competitiveness. It can range from 0 to 1 with lower values indicate a less concentrated market. (The shares are expressed as fractions, where the aggregation of all the portions sum 1 and 10% would be considered as (0,1).

A market with an HHI of less than 0.15 is considered a competitive marketplace, an HHI of 0.15 to 0.25 is moderately concentrated, and an HHI of 0.25 or greater is highly concentrated. A HHI equal to 1 indicates a monopoly and a HHI close to 0 indicates nearly perfect competition.

In addition, to rule alternative explanations for the impact of acquirer's ESG performance on merger performance, I control for competitive industry by including the HHI. For example, firms in competitive industries may want to focus more on ESG activities as an effective marketing strategy. So, ESG score could just capture the extend product of market competition that motivates the manager to be more efficient. As a result, firms in more competitive industries engage in greater value increasing mergers.

Tangibility is calculated as **(PPE)** property, plant and equipment divided by the book value of total assets.

Firms with more tangible assets may have greater access to external funds based on the fact that tangible assets can be pledged as collateral to lenders and thus allow firms to raise debt. Asset tangibility has an important impact on investment especially when firms face credit constraints like investment cash flow sensitivities (ICFS). The level of investments over periods is affected by the firm's cash flows, which is known as investment-cash flow sensitivity (ICFS). Investment cash flow sensitivity is associated with both underinvestment (low cash flows) and overinvestment (high cash flows). The accessibility of external capital is positively correlated with cash flows.

6.4 Expected return model

Examining the effect of a firm's ESG performance on merger announcement returns and firms wealth, I include as control variables acquirer- specific characteristics (firm size, firm age, leverage, free cash flow, Cash flow volatility, Tobin's q, and CAR calculated using the market-adjusted model in an event window of 56 trading days (-28, +28). Data on the daily stock price and the market price is collected to be transformed into the daily actual stock return and market return. The expected return is estimated based on the historical return. Therefore, daily stock return and market return are calculated using formula presented equation (i) and (ii).

$$R_{it} = \ln P_{it} - \ln P_{it-1} \text{ (i)}$$

where R_{it} is the stock return, P_{it} is the stock price on closing on day t , and P_{it-1} is the stock price on closing one day before day t .

$$R_{mit} = \ln P_{mit} - \ln P_{mit-1} \text{ (ii)}$$

where, R_{mt} is the market return and P_{mit} market price on closing on day t , and P_{mit-1} is the stock price on closing one day before day t .

For my study I use the Market Adjusted Model. It is the difference between the firm asset's return and a market index return therefore I do not use any other factors such as risk-free return or any other outside returns. The Market Adjusted Return model performs as well as the more sophisticated Market and Risk Adjusted Returns models too. The abnormal return on a distinct day t within the event window represents the difference

between the actual stock return (R_{it}) on that day and its reference market's return ($R_{m_{it}}$) on the same day. Equation (iii) describes the model.

In the market adjusted model, the observed return of the reference market on day t $R_{m_{it}}$ is subtracted from the return R_{it} of the observation i on day t.

The abnormal return: $AR_{it}=R_{it}-R_{m_{it}}$ (iii)

where, R_{it} = Stock Return observed on day t and $R_{m_{it}}$ = Market or Index return observed on day t.

To measure the total impact of an event over a particular time period (event window), I sum up individual abnormal returns to create a cumulative abnormal return. As shown in equation (iv).

A fifty-six trading days event window is selected, in that '0' which is defined as event day (the date on which the M&A event is publically announced), -28 day to 0 event trading days is called pre-announcement period in event window and 0 days to +28 event trading days is called post-announcement period in event window.

The cumulative abnormal returns in the event window range (-28, +28)

$$CAR(t_1, t_2) = \sum_{t=t_1}^{t_2} AR_{i,t} \text{ (iv)}$$

6.5 Econometric Analysis

Using a large sample of US firms that are registered specifically in the Nasdaq and NYSE Amex stock index I empirically examine the effect of Environmental, Social and Governance (ESG) performance on firms value and announcement returns in domestic mergers and acquisitions (M&As) transactions during the period 2010 to 2021.

Specifically, I perform a cross-sectional regression analysis of the acquirers' Tobin's Q as the dependent variable to investigate the relationship on control variables with the focus on ESG factors.

I also, perform a cross-sectional regression analysis of the acquirers' cumulative abnormal return (CAR) which I have calculate based on the Market adjusted model using an event period of 56 trading days (-28, +28) to investigate the relationship between firm's

Environmental, Social and Governance (ESG) performance and announcement returns in mergers and acquisitions transactions (M&As) during the period 2010 to 2021.

The explanatory variables are the ESG scores collected from Refinitiv and other control variables collected from Compustat and described previously in section (6.3). I also, include year and industry fixed effect in my regression models.

I examine the following hypotheses:

Hypothesis 1: The acquirers ESG performance have a significant positive impact on the acquirer's firm value on the M&A announcement date.

Hypothesis 2: The acquirers ESG performance have a significant positive impact on the acquirer's CAR on the M&A announcement date.

Thus, to test the *hypothesis 1*, the regression model is the following:

$$Tobin Q_{it} = \beta_0 + \beta_1 ESG_{it} + \beta_i Controls_{it}$$

where the letter (i) denotes the firm, *Tobin Q_{it}* represents the ratio of the market value of a firm's assets during M&A announcement transaction in an event period of 56 trading days (-28, +28). ESG is the firm's ESG performance measure by its Refinitiv ESG score.

My results focus on coefficient β_1 which captures how ESG performance affects *Tobin Q_{it}* a firm's market value. The vector $\beta_i Controls_i$ represents a series of control variables that account for the impact of firm characteristics on the CAR.

To eliminate omitted variable bias caused by excluding variables that evolve over time I include year fixed effect (Wooldridge, 2010). Also, because ESG factors are highly industry related variable I control for industry fixed effect too, ε_t is the error term.

After adding year and industry fixed effect the regression model is the following:

$$Tobin Q_{it} = \beta_0 + \beta_1 ESG_{it} + \beta_2 Controls_{it} + YearFE_i + IndustryFE_t + \varepsilon_t$$

To test the *hypothesis 2*, the regression model is the following:

$$CAR_{it} = \beta_0 + \beta_1 ESG_{it} + \beta_i Controls_{it}$$

where the letter (i) denotes the firm, CAR represents the firms' cumulative abnormal return during M&A announcement transaction in an event period of 56 trading days (-28, +28). ESG is the firm's ESG performance measure by its Refinitiv ESG score.

My results focus on coefficient β_1 which captures how ESG performance affects a firm's CAR. The vector $\beta_i Controls_i$ represents a series of control variables that account for the impact of firm characteristics on the CAR.

To control for variables that vary over time I include year fixed effect. Also, I control for industry fixed effects, ε_i is the error term.

After adding year and industry fixed effect the regression model is the following:

$$CAR_{it} = \beta_0 + \beta_1 ESG_{it} + \beta_2 Controls_{it} + YearFE_i + IndustryFE_t + \varepsilon_i$$

Depended variables and control variables and definitions used in the models are shown in (table 7).

6.6 Regression Methodology

I remove all NA values to deal with data that are missing at random, and to reduce bias.

I use the robust standard errors method to obtain unbiased standard errors of OLS coefficients under heteroscedasticity which violates the Gauss Markov assumptions that are necessary to render OLS the best linear unbiased estimator (BLUE).

I estimate the standard errors using the Huber-White sandwich estimators. Such robust standard errors can deal with concerns about failure to meet the assumptions, such as problems about normality, heteroscedasticity or some observations that exhibit large residuals, leverage or influence. Leverage observation can have unusual predictor value such as extreme x values which may be particularly high or low for one or more predictors while, the removal of influence observation from the data set would cause a large change in the estimated regression model coefficients. Outliers have a large influence on the fit thus; squaring the residuals magnifies the effects of these extreme data points. If the distribution of errors is asymmetric or prone to outliers model then assumptions are invalidated and parameter estimates, confidence intervals, and other computed statistics become unreliable. Using, the robust method I effectively deal with these concerns. Robust linear regression is less sensitive to outliers than standard linear regression. It is capable of identifying and downweighting outliers in regressions. Their robustness is achieved by giving the data different weights within the calculation of the estimate, so that outlying data have a relatively smaller influence on the regression estimator. Comparatively, in least squares regression all data are treated equally.

However, it is noteworthy that although some outliers in data have been regarded as erroneous they could be caused by exceptional occurrences or could be the results of a factor that not yet considered in a study. Since unusual observations are not necessarily bad observations, it is reasonable to conclude that they should not be deleted or discounted. However, spotting outliers becomes particularly difficult in multivariate data sets as they cannot simply be identified. For example, employ least squares regression and use residual plots to identify outlying data could not necessarily be spotted. The reason is that if the regression line has been pulled towards them such data will not necessarily have large residuals at all. In this situation where outliers cannot be removed with simple justification the robust regression method is been preferred.

6.7 Descriptive statistical Analysis

As shown in (table 4) the dependent variable Tobin Q indicates the market value of firm's assets, the mean is 2.496, and the median is 2.244, indicates that the firms' market value increased during the event period.

Based on, ESG performance score the mean of the firms is 0.359 and the median is 0.316 which indicates that the majority of firms belong to the second quartile of ESG scores calculated by Refinitiv.

The dependent variables (CAR) are estimated with the market-adjusted model, to measure the short-term cumulative abnormal returns of the firms during the announcement returns in mergers and acquisitions (M&A) transaction. The CAR (-5, 5) has a mean of 0.001, and a median close to 0, indicates that more than half of the firms posted positive abnormal returns during the event period.

Regarding to the independent variable free cash flow the mean is -0.046, and the median is -0.024, indicates that all the firms have posted negative free cash flows. Based on (Jensen, 1986) the agency cost is high in the firms with excess free cash flow. According to this the firm sometimes generates more free cash that is required by the manager to be invested in the positive NPV projects. Managers have incentives to cause their firms to grow beyond the optimal size. Growth increases managers' power by increasing the resources under their control. It is also positive related with increases in managers' compensation.

The impact on cash holdings is moderated by corporate ESG disclosure because the ESG factors serve both internal and external monitoring purposes. Firms with high ESG

performance disclosure have better internal governance, which mitigates the opportunistic behavior of managers for holding excess cash. They choose to pay off any debt, to support operations and distribute cash to shareholders, leading to negative financing cash flows. Additionally, these firms enjoy the trust and loyalty of stakeholders, which enables them to gain support and access to the capital market (Cheng et al., 2014).

Then mean of leverage ratio is less than 1 indicates that firms owns more assets than debt, consider them less risky. Specifically, it indicates that the average firms have 25% of their assets financed by creditors, and 75% financed by shareholders equity.

Cash flow volatility is positive for all firms with a mean of 0.068 and a median of 0.041.

Firm age variable, using natural numbers, has a mean of 24.11 and a median of 23 years. The maximum age of a firm is 58 (years), and the minimum is 4 year.

The Herfindahl Index variable has a mean value of 0.081. Smaller values of the HHI indicate greater competition, with 0 being the minimum concentration and 1 being the maximum concentration (in case the shares are expressed as fractions, where the aggregation of all the portions sum one i.e., 10% would be considered as 0.1).

Table 4 - Descriptive statistic

	N	Mean	Median	Std.Dev.	Min	Max
Tobin's Q	482	2.496	2.244	1.332	.646	10.707
ESG	482	.359	.316	.175	.014	.899
Free Cash Flow	482	-.046	-.024	.116	-.879	.117
Leverage	482	.25	.236	.179	0	.838
Firm age	482	24.11	23	11.7	4	58
Cash Flow Vol.	482	.068	.041	.081	.003	.894
Firm size	482	7.815	7.567	1.563	3.227	10.872
HHI	482	.081	.047	.107	.026	1
Tangibility	482	.155	.094	.167	.005	.957
CAR (-5, +5)	482	.001	0	.014	-.034	.041
CAR (-10, +10)	482	0	0	.014	-.036	.042
CAR (-20, +20)	482	0	0	.018	-.048	.052
CAR (-28, +28)	482	0	0	.015	-.04	.038

6.8 Pairwise correlation Analysis

The relationship in pairwise correlation table may not necessary represents causation between the two variables, but it does describe an observable pattern.

As shown in the (table 5) Herfindahl Index has a negative correlation with the ESG performance shows that firms with higher ESG performance score operate in more competitive industries.

Also, the negative association between a firm's ESG performance and leverage suggest that ESG firms may depend mainly on internal financing or equity market and maintaining lower debt respectively. Moreover, both internal and external financial intermediaries may improve with high ESG performance in overcoming financial constraints.

There is a positive correlation between the firm size and ESG performance variables. Larger firms often devote more resources to sustainability reporting and providing ESG data. These firms tend to have higher ESG scores because they tend to receive greater scrutiny from investors, investment analysts and the media. Additionally, the management of larger firms chooses to allocate financial resources to address ESG issues than smaller firms.

Larger firms can provide more collateral than smaller firms, thus being viewed as less risky by lenders. Specifically, firms with tangible assets are charged a lower interest rate on debt. Thus, higher tangibility of assets implies lower risk and firms with more tangible assets generally, utilize debt financing more heavily. On the other hand, the more a firm relies on tangible assets, the less the potential value to be created by ESG investments.

Free cash flows are increasing in the degree of tangibility of firms' assets. This implies that the relationship between capital spending and cash flows is non-monotonic but bidirectional since tangibility may increase cash through external funding.

Free cash flow disclosure provides better information to investors. The more free cash flow a firm has, the more it can allocate to dividends, paying debt, and growth opportunities. Investors are rational and will only pay for a firm's ability to generate cash flow.

However, rising cash flow is not the only factor when considering an investment opportunity. Investors need to be mindful that negative cash flow may be a result of the firm investing more heavily in product innovation, intangible assets or deciding to hold less cash as previously mentioned intensive free cash flow enhances managerial discretion and the likelihood of overinvestment. It's noteworthy that some firms may show positive cash flow from operations, but the nature of their business may require more liquidity and therefore higher capital expenditure to run the operations. Technology & IT firms are heavily reliant on intangible assets thus, must invest more in research and development.

The assumption that investors' rationality to only pay for a firm's ability to generate cash flow is also challenged by the pressure of ESG practices such as; involvement in high-quality ESG practices requires enhanced investment and corporate funding for sustainable development over time. However, firms may allocate cash flows in order to reinvest and continue to enhance ESG performance. Moreover, ESG investments are rather costly thus; reduce corporate cash and even profitability. That is why investors with longer horizons prefer firms with higher ESG, whereas short-term investors prefer the opposite.

Higher cash flow volatility has a negative correlation with ESG factors and higher costs of accessing external capital. Increased cash flow volatility may imply manipulation activities from managers that focus short term on influencing current stock prices by sacrifice some economic future firm value. Firms in order to attract investors with longer-term orientations they should improve their ESG performance. Moreover, constant positive cash flows are a good signal for external lenders.

Table 5 - Pairwise correlation

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
(1) Tobin's Q	1.000												
(2) ESG	0.025	1.000											
(3) Free Cash Flows	-0.286***	0.173***	1.000										
(4) Leverage	-0.175***	-0.048	0.075***	1.000									
(5) Firm age	-0.155***	0.296***	0.232***	0.058***	1.000								
(6) Cash Flow Vol.	0.301***	-0.206***	-0.500***	-0.098***	-0.190***	1.000							
(7) Firm size	-0.205***	0.505***	0.449***	0.156***	0.426***	-0.353***	1.000						
(8) HHI	-0.076***	-0.076*	0.100***	0.087***	-0.021***	-0.083***	-0.068***	1.000					
(9) Tangibility	-0.154***	-0.086**	0.145***	0.322***	0.096***	-0.189***	0.120***	0.081***	1.000				
(10) CAR(-5, +5)	0.023	0.019	0.045	-0.024	-0.046	0.033	-0.017	0.017	0.023	1.000			
(11) CAR(-10, +10)	0.000	-0.004	-0.047	-0.085**	-0.063	0.078*	-0.050	-0.045	0.029	0.366***	1.000		
(12) CAR(-20, +20)	-0.018	0.029	0.036	-0.009	0.022	-0.024	0.027	-0.086**	0.007	0.475***	0.440***	1.000	
(13) CAR(-28, +28)	-0.015	0.067*	0.048	0.087**	-0.011	-0.123***	0.062	-0.062	-0.027	0.426***	0.422***	0.392***	1.000

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

6.9 Regression Results

The (tables 6) below shows the results of the cross sectional regression on the dependent variable Tobin Q as shown in column (1) and on cumulative abnormal returns CAR (-5, +5), CAR (-10, +10) and CAR (-20, +20) as shown in columns (2,3,4) respectively during an M&A announcement transaction. The Market adjusted model parameters are estimated using an event period of 56 trading days (-28, +28) for acquiring firms on explanatory variables. The standard errors are shown in parentheses below the estimated coefficients. One, two, and three asterisks indicate robust standard errors in parentheses at the 1%, 5%, and 10% levels, respectively. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

The first column and line of (table 6) provides the estimates of the impact of ESG performance on Tobin's Q. Specifically, I find that the coefficient of ESG factors has a positive and significant impact 0.745 ($p < 0.1$) on firm's value during the M&A announcement.

Moreover, the leverage coefficient is -2.136 ($p < 0.01$) which indicates that firm's leverage has a negative and significant impact on Tobin Q. Firms with ESG performance may prefer internal financing for their business operations and investments.

The HHI coefficient is also negative -0.537 on Tobin's Q but not significant.

Overall, firms with higher ESG performance are better governed; maintain lower debt and operate in more competitive industries.

Firm age and size have negative impacts on firms' value. The coefficients of firm's age is -0.010 and significant ($p < 0.05$) while firm's size is -0,047. These results are consistent with previous academic papers.

The coefficients free cash flow 1.246 and tangibility 0.312 have positive impact on Tobin's Q. Under the asymmetric information hypothesis firms may be able to finance attractive investment opportunities because of the adequate free cash flows and the low cost of external fund.

Column (2) shows that the coefficient of ESG factors is 0.012 with an estimated standard error of ($p < 0.01$) indicates that ESG factors have a significant positive impact on firms' abnormal returns in short term (-5, +5) during the M&A announcement. As a result, firms with an increase in ESG performance are related to an increase in CAR (-5, +5).

The rest columns show positive but minimum impact of the ESG factors coefficient on the dependent variables CAR (-10, +10) and CAR (-20, +20) respectively. The impact moves downward thus, it can be assumed that due to information asymmetry the market needs a little time to incorporate all information into the stock price, even though these results are not significant.

Table 6 - Regression Results The sample consists of 482 completed US mergers between 2010 and 2021 that are subject to the following selection criteria: (1) the deal value is greater than \$1 million, (2) the acquirer controls less than 50% of the target's shares prior to the announcement and owns 100% of the target shares after the transaction, (3) the acquirer is publicly traded and has stock returns and financial data available from Compustat & Refinitiv (4) the acquirer is not in financial or utilities industries. The dependent variable in Model 1 is the Tobin's Q which indicates the firm's value. The dependent variable in Models 2, 3 and 4 is the cumulative abnormal return of the acquirer. The abnormal return is calculated using the market model. The results are robust that consider a range of 56 trading days (-28, +28) as an event window period before and after the merger announcement date, ESG performance measurement, and other control variables. All estimations include firm, and year fixed effects. The standard errors are shown in parentheses below the estimated coefficients. One, two, and three asterisks indicate robust standard errors in parentheses at the 1%, 5%, and 10% levels, respectively. *** p < 0.01, ** p < 0.05, * p < 0.1.

	(1)	(2)	(3)	(4)
VARIABLES	Tobins' Q	CAR (-5, +5)	CAR (-10, +10)	CAR (-20, +20)
ESG	0.745*	0.012***	0.006	0.004
	(0.384)	(0.004)	(0.004)	(0.005)
Free cash flows	1.246	0.011	-0.003	0.002
	(1.033)	(0.011)	(0.010)	(0.015)
Leverage	-2.136***	0.001	-0.007	0.002
	(0.351)	(0.005)	(0.005)	(0.006)
Firm age	-0.010**	-0.000	0.000	0.000
	(0.005)	(0.000)	(0.000)	(0.000)
Cash flow volatility	1.102	0.008	0.018	-0.004
	(0.828)	(0.017)	(0.015)	(0.023)
Firm Size	-0.047	-0.001	-0.000	-0.000
	(0.051)	(0.001)	(0.001)	(0.001)
HHI	-0.537	0.001	-0.025	-0.028
	(0.937)	(0.005)	(0.016)	(0.020)
Tangibility	0.312	0.006	0.005	-0.002
	(0.319)	(0.007)	(0.006)	(0.007)
Constant	3.315***	0.004	0.002	-0.001
	(0.437)	(0.005)	(0.005)	(0.006)
Observations	482	482	482	482
R-squared	0.207	0.092	0.079	0.068
Year FE	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES

6.9.1 The R squared value

Regarding the coefficient of determination R-squared is a statistical measure for linear regression models. It indicates the percentage of the variance in the dependent variable that can be explained by the independent variables collectively in the regression model. R-squared values range from 0 to 1 and are commonly stated as percentages from 0% to 100%. An R-squared of 100% means that the variation of the dependent variable is completely explained by variations of the independent variables.

Accordingly, as shown in the (table 6) in the first column for the first regression using the Tobin Q as the dependent variable the R-squared is 0.207 which is considered reliable. It means that a 20% of the variation of the dependent variable is completely explained by the indented variables. The second column represents the results of the second regression and has an R-squared of 0.092 or 9.2% which is considered a moderate effect size. As for the rest of the columns R-squared of 0.079 and 0.068 are not considered sufficient thus the model doesn't explain much of variation of the data.

In this case we can add more independent variables that have an effect on the dependent variable at the announcement returns of a M&A deal such as; the status of the target firm (public, private or a subsidiary) the characteristics of the M&A deal (friendly or hostile), the transaction method of payment (cash, stock, or combination), the total value of the transaction (premium, discount) or other firm specific characteristic of the acquirer and the target firm.

7.Further research

In addition, we can use the ESG factors namely; environmental, social and governance as separate independent variables to examine their effect separately on the M&A announcement returns. These three ESG factors are usually interlinked, and equally drive the sustainable performance of a firm although, at varying degrees. Each of the ESG factors has different effect on the firm depends on the industry sector. Therefore, depending on the industrial sector, a firm's ESG factors may weight differently thus, the impact of each factor on the firm's performance may be different. Consequently, managers need to consider the characteristics of the industry to which the firm belongs in order to determine to which ESG factor should invest more for firm's future performance and value maximization.

Moreover, to extend the research we could create subsamples of high and low acquirers' ESG performance. These subsamples will be divided into high and low ESG performance according to the sample median of adjusted ESG. Then, we will compare mergers by low ESG acquirers with those by high ESG acquirers on announcement returns or on any other depended variable that we are interested to observe.

We can further examine the post-merger changes of (high and low ESG) merged firms' operating performance by using a dependent variable as the difference between the post-merger operating performance of the combined firm (acquirer and target) and the control firm (acquirer). For the pre- and post-merger periods we can consider two or three years prior to and after the event year, respectively.

Summary and conclusion

In this study I examine the stakeholder value maximization view and the shareholder expense view based on the effect of a firm's ESG performance on its merger performance.

The stakeholder value maximization view predicts that acquirer firms with high ESG performance that undertake mergers and benefit other stakeholders thus, leading to greater stakeholder satisfaction, in turn has a positive result to shareholders. In contrast, the shareholder expense view suggests that managers engage in ESG activities to help other stakeholders at the expense of shareholders thus, predict that the managers of high ESG performance firms undertake mergers that reduce shareholder wealth.

I find strong evidence that acquirers' ESG performance have a significant positive effect on acquirer firms' value, when using Tobin's Q as the dependent variable ($p < 0.1$). Also, I identify the impact of ESG performance on cumulative abnormal returns. Empirical results suggest that ESG performance significantly increases firms' cumulative abnormal returns ($p < 0.01$) during the merger announcement. I use year and industry fixed effect to deal with omitted variables bias and dependence in the residuals. The results are robust that consider a range of 56 trading days (-28, +28) event window period, ESG measurement, and other control variables.

Firms with higher ESG performance are better governed. Value based management of ESG firms reduces agency cost which is crucial for M&A success thus; markets may react favorably to ESG-friendly transactions. Moreover, ESG performance increases stakeholders' support creates shared value and benefits shareholders by gaining great competitive advantage. Overall, these results suggest firms that integrate various stakeholders' interests in their business operation engage in competitive industry investment activities that enhance firms' performance and efficiency, increases shareholder wealth, corporate value, trustworthiness and accountability thus, supporting the stakeholder value maximization view. Also, these results are closely related to contract theory (Coase, 1960) that the efficient allocation of resources leads to efficient firms. It has important implications for wealth creation and wealth distribution processes, as well as for governance, by including that all stakeholders are either receivers as well as providers of benefit or risk.

Appendix

Table 7 - Variable definitions.

Dependent Variables		
Tobin Q	$\frac{((PRCC_F * CSHO) + TA - CEQ)}{TA}$	Calculated as the market value of a firm's assets (PRCC_F (Closing Price Fiscal) times CSHO (shares outstanding) plus TA (total assets) minus CEQ (common equity)) all divided by the book value of total assets
CAR	$CAR(t_1, t_2) = \sum_{t=t_1}^{t_2} AR_{i,t}$	Calculated as the sum of abnormal returns of a range of 56 trading days in M&A event window using the market adjusted model
Independent Variables (Control Variables)		
ESG Performance		As measured by Refinitiv
Free Cash flow (FCF)	$(OCF - CapEx) / TA$	Calculated as the ratio difference between operating cash flow and capital expenditures divided by the book value of total assets
Leverage (Lev)	TD/TA	Calculated as the ratio of total debt (long-term debt plus short-term debt) divided by the book value of total assets.
Cash Flow volatility (CFV)	$\frac{\sigma_t}{aver. Sales}$ $\sigma_t = \sqrt{\sum_{i=1}^n (CF_{it} - \overline{CF}_i)^2}$	Calculated as the standard deviation of operating cash flows divided by the average sales
Firm Age	Log(Firm Age)	Defined as the natural logarithm of the firm's age, which is the number of years since the firm's date of incorporation
Firm Size	Log(Firm Size)	Defined as the natural logarithm of the book value of total assets
Herfindahl Index (HHI)	$\sum_{i=1}^N (MS_i)^2$	Calculated as the sum of square market shares of each firm in the industry
Tangibility	(PPE) / TA	Calculated as property, plant and equipment (PPE) divided by the book value of total assets

Table 8 - Efficient Markets Hypothesis (EMH)

	Weak Form	Semi-Strong Form	Strong Form
Technical analysis (Historical prices, Past patterns)	x	x	x
Fundamental analysis (Financial statements, Public information)	✓	x	x
Private information (Inside information, Private assessment)	✓	✓	x

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