Do green deals attract higher premiums?

*A study of the potential effect of ESG score on acquisition premium
during times of uncertainty*

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Abstract

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Purpose: The study aims to investigate whether the ESG score of the target influences the premium paid in M&A transactions. It seeks to contribute to the existing literature by shedding light on the intricate relationship between ESG scores and M&A premiums, especially amid economic uncertainties caused by the COVID 19 pandemic. Furthermore, it aims to examine the potential contributions of separate ESG components to acquisition premiums.

Methodology: The hypotheses were tested using a multivariate analysis that initially employed the ordinary least squares (OLS) regression model. This approach was further expanded to include random effects models and robustness tests to further validate the findings. The acquisition premium is calculated by observing the percentage change in the target company's stock price between four weeks prior to announcement and the stock price paid by the acquirer. The target ESG score together with COVID-19 variables constitute the explanatory variables of this study.

Theoretical framework: The analysis is based on the theoretical perspectives of information asymmetry and stakeholder theory. The paper then draws upon previous empirical studies done on the relationship between ESG and acquisition premium and factors of uncertainty and acquisition premium.

Empirical foundation: The empirical foundation is based on 340 acquisitions deals where the target firms are based in the North American market, specifically the US and Canada.

Conclusions: The findings reveal that ESG scores generally do not significantly impact acquisition premiums. Though, during the COVID-19 pandemic the individual scores positively influenced premiums, particularly through social and governance scores, indicating their increased value under uncertain times.

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1. Introduction

1.1 Background

In recent years, there has been a notable shift in investment strategies towards Environmental, Social, and Governance (ESG) considerations in mergers and acquisitions (M&A), signaling a significant move towards green deals. Within the corporate sector, ESG factors have traditionally been seen as secondary risk assessments. Amid a global push towards sustainability they are now increasingly recognized as primary drivers for value creation. This shift is reflective of changing regulatory landscapes, consumer preferences, and the evolving metrics for assessing corporate performance and resilience in the face of environmental challenges (Krantz, 2024). As the relevance of ESG continues to grow, the financial dynamics of M&A transactions have evolved to reflect the rising importance of these factors. This is largely driven by increasing competition for ESG-compliant assets, which are perceived to have better long-term growth prospects and lower operational risks compared to their non-green counterparts (Zhao et al., 2019). The COVID-19 pandemic has added a layer of complexity to the M&A landscape. During these uncertain times, the market has placed a heightened emphasis on the resilience and adaptability of business operations. Companies with robust ESG credentials, particularly those engaged in green deals, are often viewed as more capable of weathering economic disruptions, a perspective supported by research from Magnanelli, Nasta, and Ramazio (2022). This resilience comes from their compliance with future regulations and societal expectations which are increasingly focused on sustainability. The pandemic has further put emphasis on the strategic importance of investing in sustainable practices, not just as a moral or environmental gesture but as a way to mitigate risks associated with global uncertainties and to capitalize on shifting market dynamics (J.P. Morgan, 2020). This has moreover fueled the premium on green M&A deals as investors and corporations seek to align with entities that demonstrate foresight, innovation, and a commitment to sustainable development.

1.2 Problematization & research question

Studies by Gomes and Marsat (2018), Ma (2023) and Nguyen et al. (2024) among others, have shown a positive relationship between ESG performance and higher M&A bid prices, suggesting that acquirers value sustainable corporate actions and sustainability metrics highly. The study by Jost et al. (2022) introduces a contradiction, revealing that CSR performance does not significantly affect M&A premiums. Various other studies also point to the fact that other variables contribute uniquely to the acquisition premium (Ozdemir, Binesh, and Erkmen, 2021; Cho, Han, Kim, and Kim, 2021; Malik and Mamun, 2024). CSR and ESG are in many ways related and the discrepancy suggests that the relationship between ESG scores and M&A premiums is not as straightforward, indicating a complex interplay of various components. The influence of ESG metrics on M&A outcomes may vary depending on their integration and perception within various corporate governance frameworks. As a first step in our study, our research aims to dissect the relationship between ESG scores and M&A bid premiums to determine if ESG scores influence M&A valuations as indicated by existing research.

The global COVID-19 pandemic adds an additional layer of relevance to our analysis. During such periods of heightened economic uncertainty, firms with ESG profiles are often viewed as lower-risk and more resilient, which may lead to higher valuation premiums. Studies like those by Gatti and Chiarella (2013) and Magnanelli, Nasta, and Ramazio (2022) indicate that ESG standings could mitigate negative impacts on valuation premiums during crises. Examining how ESG scores influence M&A bid premiums during uncertain times can provide deeper insights into the strategic value of robust ESG practices in stabilizing company valuations. Given this context, two research questions will be examined in this study is:

1. *Is the premium paid in M&A transactions influenced by the ESG-score of target firms?*
2. *Is this influence affected by uncertain times such as the COVID-19 pandemic?*

1.3 Aim of study

Our analysis seeks to explore the multifaceted impacts of ESG scores on M&A premiums, particularly focusing on whether ESG ratings provide a stabilizing effect on company valuations during economic downturns, like the COVID-19 pandemic. This investigation will contribute to

the understanding of the importance of ESG activities when valuing M&A deals and offer guidance on how companies might better leverage ESG metrics to enhance their market positioning and resilience in the face of future uncertainties.

1.4 What the authors do

The results are based on multivariate analysis, using the OLS-regression framework with a data collection consisting of 340 acquisition deals of target firms in the Northern American market, specifically the US and Canada. ESG performance is measured using Refinitiv Eikon's ESG scores while the acquisition premium is calculated using the stock price paid by the acquirer and target stock price 4 weeks prior to the announcement date. To further analyze the impact of ESG, a separate analysis was conducted for each of the environmental, social, and governance scores. This analysis also utilizes the random effects method, incorporating adjustments for industry and year effects. In an attempt to enhance accuracy and strengthen the reliability of the results robustness checks were conducted.

1.5 The main findings

The empirical findings show that the ESG scores did not significantly impact acquisition premiums across most models tested. However, when considering the influence of the COVID-19 pandemic, the individual ESG scores showed varying significance levels, suggesting that the ESG-premium relationship is enhanced during the COVID-19 period. Firms with higher ESG scores are perceived as more valuable, which aligns with the theoretical perspective that sustainability efforts and greater transparency might mitigate risks and attract higher premiums. Additionally, the study points to the importance of considering a range of factors beyond ESG scores in determining the effects on the acquisition premium, such as operational investments, growth expectations, and transaction specifics.

1.6 Contribution

Our study adds to the existing literature on the role of ESG scores in the context of M&A deals. By further delving into the findings by Gomes & Marsat (2018), the influence on acquisition premium is examined and measured. The pandemic offers a unique context to examine whether

firms with strong ESG profiles are viewed as lower-risk and more resilient, potentially leading to higher valuation premiums, as studies by Gatti and Chiarella (2013) and Magnanelli, Nasta, and Ramazio (2022) are pointing at. By including the uncertainty aspect that COVID-19 underscores, the study sheds new light on the role of ESG during times of crisis.

1.7 Structure of the paper

The remainder of this paper is organized as follows: Section 2 provides a literature review that outlines the theoretical framework, reviews previous research, and presents the formulation of the hypotheses. This is followed by the data description in section 3 and the methodology of the paper in section 4. Section 5 discusses the results and section 6 presents the analysis of the results. Lastly, chapter 7 presents the conclusions.

2. Literature Review

2.1 Theoretical framework

2.1.1 Stakeholder theory

The concept of CSR has spurred contrasting perspectives within the business realm. The stakeholder theory, developed by Freeman (1984), is one of the views challenging the traditional one that a business's primary responsibility is to maximize profits for its shareholders (Friedman, 1970). Instead, it posits that firms should create value for all stakeholders involved or impacted by their operations, and not just for shareholders (Freeman, 1984).

Several studies have been analyzing M&A activities from a stakeholder point of view. Cording et al. (2014) examined the significant influence of stakeholder relations on the returns yielded from transactions. Their research, centering on CSR and organizational authenticity, reveals that applying stakeholder theory is useful not only in merger integration processes but in joint actions like strategic alliances as well. Consequently, it highlights the importance of considering stakeholder interests, such as those of employees and customers (Cording et al., 2014). As societal awareness and scrutiny regarding corporate behavior is growing, stakeholders demand

greater accountability and transparency from companies. Working with CSR has become a way to cope with these new demands. Simultaneously, it has become harder to work solely for shareholder value maximization as companies risk dealing with inconveniences such as reputational damage, boycotts and even legal issues if they do not act accordingly (Fatemi and Fooladi, 2013).

According to the findings by Godfrey et al. (2009), firms with better CSR performance have an advantage when building relational assets and moral capital. They found that CSR helps generate protection and a reciprocal relationship with their stakeholders, decreasing the risk of negative sanctions (Godfrey et al., 2009). Aurori (2019) found evidence in his study that firms may benefit greatly from their CSR engagement since there is considerable evidence that firms with high CSR involvement reduce their exposure to uncertainty (Aurori, 2019). Consequently, this theory would underscore a positive relationship between targets with high ESG scores and the acquisition premium, as companies prioritizing CSR initiatives typically enjoy enhanced reputation, diminished risk, and overall competitive advantage.

2.1.2 Information asymmetry

In the context of M&A, there is often a substantial information asymmetry between the acquiring firm and the target firm. This informational imbalance is exacerbated during periods of heightened market volatility and unpredictability. Therefore, it is imperative for the acquirer to conduct thorough due diligence to extract all relevant information about the target firm. By doing so, the acquirer aims to uncover the operational and financial strengths and weaknesses of the target, thereby mitigating the information asymmetry inherent in the transaction (Laamenen, 2007).

In 1970, Akerlof developed a groundbreaking theory about how information asymmetry can lead to market failure and inefficiency, highlighting the importance of information disclosure among other things. Akerlof's paper focuses on how information disparities between buyers and sellers can distort markets. He uses the example of the used car market, where sellers have more information about car quality than buyers. This asymmetry leads buyers to be cautious and pay lower prices. Similarly, in M&As, if the acquirer lacks information about the target firm, they

may be reluctant to pay higher prices due to uncertainty, echoing Akerlof's findings (Akerlof, 1970). In their study on information asymmetry in the takeover market Cheng et al. 2008 finds evidence that contradicts Akerlof's theory. They saw a positive correlation between bidding premiums and the proxies for information asymmetry of target firms when they analyzed publicly traded companies spanning from 1985 to 2006. Moreover, the study observed that information asymmetry proxies positively correlated with the announcement returns for target firms. Consequently, when there is more uncertainty or lack of information about the target firm, acquirers tend to pay higher premiums for the acquisition. This positive correlation suggests that acquirers may perceive targets with greater opacity as having hidden value or strategic advantages, which justifies the higher premiums paid (Cheng et al., 2008).

Similarly, but from the acquirer's perspective, Dianonne et al. (2015) examined the impact of information asymmetry on bid premiums and found that informed bidders tend to pay a lower premium than uninformed bidders. According to the authors, this is explained by the fact that uninformed bidders tend to suffer from the winner's curse. Altogether the theory about information asymmetry would suggest that the relationship between ESG scores and bid premiums in M&A transactions is enhanced under uncertain times such as the COVID-19 pandemic. This is because the presence of ESG scores naturally provides a higher level of transparency and could indicate hidden value making such targets more attractive and justifying higher acquisition premiums amidst heightened uncertainty.

2.2 Empirical Framework

2.2.1 ESG

The ESG concept, standing for environmental, social, and governance, was first introduced by the United Nations Global Compact in 2004. It denotes a group of criteria for evaluating the ecological and societal influence of an organization, playing an ever more crucial role in the decision-making process for investments over time. For example, the environmental impact of a business is assessed by measuring carbon emissions relative to its revenue, whereas company labor practices are evaluated by analyzing its employee turnover rates. ESG continues to be of importance as the world faces climate and social related issues (Krantz, 2024).

During the last two decades there has been a growing fascination with investments that extend beyond the conventional earnings of companies. This trend is closely aligned with businesses that make significant contributions to the environment and society, and those that maintain transparent governance practices (De Lucia, Pazienza, and Bartlett, 2020). The strategy of focusing on ESG investments emerges as a fastly expanding area with growing investor interest (Boffo & Patalano, 2020). By adopting a more holistic strategy, companies are securing a sustainable competitive edge in the global market. As a result, businesses that implement sustainability practices are likely to outlast traditional enterprises and attain greater market influence (Zhao et al., 2019). There is a general consensus in academic publications that company dedication to ESG principles decreases uncertainty and risk and simultaneously enhances its reputation among investors. Companies that neglect environmental or employee welfare risk losing the confidence of potential investors (Ding, Ferreira, and Wongchoti, 2016).

2.2.2 ESG and bid premium

Corporate Social Responsibility (CSR) and Environmental, Social, and Governance (ESG) metrics are interconnected. Thus, studies on CSR provide valuable insights for our research. Both concepts deal with a business's societal duties. CSR captures these commitments qualitatively, whereas ESG quantifies them, enhancing the measurement of CSR impacts. In the study by Gomes and Marsat (2018) they assess the impact of CSR on bid premiums in M&As. They analyze 588 M&A deals from 2003 to 2014 and differentiate between domestic and cross-border transactions. The analysis controls for factors such as firm size, market-to-book ratio, and leverage. Findings indicate a statistically significant positive correlation between a target firm's CSR performance and the bid premiums offered in M&A transactions, suggesting that acquirers are willing to pay a premium for strong CSR attributes. Environmental Performance is valued across all transaction types and reflects a universal appreciation for environmental initiatives. Social Performance is found to be particularly crucial in cross-border transactions, underscoring its importance in managing the complexities of international deals. CSR attributes are overall seen to reduce perceived risks like regulatory or reputational risks and enhance potential synergistic gains from acquisitions (Gomes and Marsat, 2018).

The fact that CSR has a positive impact on the acquisition premium is also supported by Cho, Han, Kim, and Kim (2021), who found that if the target firm's CSR performance is stronger relative to that of the acquirer, it tends to yield higher premiums for the shareholders of the target firm. Ozdemir, Binesh, and Erkmen (2021) as well as Malik and Mamun (2024) found that the environmental performance of the target firm shows the strongest effect on acquisition premiums, indicating that environmental factors are particularly valuable and scrutinized during the M&A process, likely due to their potential risks and benefits which can significantly affect the long-term sustainability and profitability of the acquisition.

The relationship between CSR and acquisition premiums is nuanced, with studies reporting different aspects and influences, illustrating the complexity of this area of research. In contradiction to most studies, Jost et al. (2022) find that CSR performance alone does not significantly impact the M&A premium when considered in isolation. This also holds true when examining different aspects of CSR such as environmental and social responsibilities, both individually and in the context of cross-border deals. The research suggests that neither specific CSR components nor the overall CSR performance of the target firms contribute significantly to affecting the acquisition premiums in mergers and acquisitions. This suggests a complex interplay that is not in line with traditional shareholder or stakeholder theories. However, it aligns with previous findings that the relationship between CSR and M&A premiums is neither straightforward nor entirely predictable by existing theories (Jost et al., 2022).

Fewer studies have been made on the relationship between ESG and the acquisition premium. Ma (2023) researched 5,658 M&A deals from 2009 to 2020 and found a positive correlation between ESG ratings and bid prices, noting that high ratings in environmental and governance aspects are associated with higher premiums. High social ratings alone did not significantly correlate with bid prices. The study also notes that high ESG performance is linked to shorter negotiation times, which benefits shareholder value and facilitates quicker post-M&A integration, especially when the target has strong environmental performance. Targets with high ESG performance use their sustainability strengths to negotiate higher prices, thereby meeting or exceeding shareholder expectations (Ma, 2023). Nguyen et al. (2024) explore the effect of acquiring companies with higher ESG ratings on the acquirers' post-merger outcomes, noting that these acquisitions command higher bid premiums. They find a significant positive

correlation where each unit increase in a target's relative ESG rating boosts the bid premium by 0.1 percentage points. This indicates that acquirers value higher ESG ratings due to the anticipated benefits, including improved sustainability and potential for long-term financial gains (Nguyen et al.,2024).

2.2.3 The effect of uncertain times on M&A bid premium

As COVID-19 hit the economy it was evident that the impact on the financial markets and the global economy as a whole would be substantial, with a subsequent recession. Naturally, M&A transactions became objects of reconsideration in this period of time. M&A activity was already on a slight decline before the pandemic and predicted to accelerate in the short term due to the financial market downturn and economic uncertainty (Kengelbach et al., 2020). Depending on the company's governance structure and size, M&A activities during COVID-19 varied significantly. Smaller, owner-run firms were more likely to adopt defensive strategies, focusing on short-term survival, whereas larger, listed companies were more proactive in seeking strategic advantages that could pay off in the long term (Bauer, Friesl, and Dao, 2021). Economic downturns can create opportunities for strategic acquisitions that generate long-term value, and deals made during weak economic times tend to outperform those made during strong economies. Even though lower valuations might seem attractive, acquisitions in recessions may not always come at a discount. Shareholders often demand significant premiums, as observed during the Great Recession, where premiums for public takeovers jumped substantially above the average (Kengelbach et al., 2020).

Existing literature has paid limited attention to the effects of distress periods on M&A transactions, especially in health crises. One paper examines the impact of health crises (COVID-19) on M&A, focusing on bid premiums and cumulative abnormal returns (CARs). The authors find that bid premiums rise during health crises, which suggests that firms are willing to pay more for acquisitions despite uncertainties. Conversely, CARs decrease, which reflects the market's negative reaction to M&A announcements amid heightened risk and uncertainty. The paper validates that the COVID-19 pandemic exerts a positive influence on bid premiums, attributed to the inflexibility of market agents' pricing expectations (Magnanelli, Nasta, and

Ramazio, 2022). Gatti and Chiarella (2013) find that in times of market turmoil, bid premiums in M&A transactions are generally higher. Companies face greater risks and uncertainties and acquirers have to offer higher premiums to compensate target shareholders. Fluctuating economic conditions make valuations more challenging, often leading acquirers to pay more to meet the expectations of the target's shareholders. Although bidders may have more leverage in negotiations, they still need to offer attractive premiums to overcome the reluctance of targets to sell during volatile times. Higher premiums help make offers more attractive and align the interests of both parties, sharing the risks and potential rewards post-acquisition. These factors contribute to higher premiums as companies strive to secure deals and mitigate the heightened uncertainties of turbulent market environments (Gatti and Chiarella, 2013).

Existing research indicates that market reactions to M&A announcements are generally negative during uncertain times. CAR tends to decrease, resulting in companies being valued lower than usual. However, despite these conditions, bid premiums often increase due to a variety of contributing factors such as price stickiness of market agents, limited M&A opportunities and pre-crisis valuations among others (Magnanelli, Nasta, and Ramazio, 2022).

2.3 Hypothesis development

Our first hypothesis posits that higher ESG scores influence the premiums paid in M&A transactions. Supporting evidence includes studies like those by Gomes and Marsat (2018) and Ma (2023) among others, which show a correlation between CSR and ESG performance and higher M&A bid prices. Nguyen et al. (2024) further quantify this effect, revealing a 0.1 percentage point increase in bid premiums for each unit increase in ESG rating, suggesting acquirers place substantial value on robust ESG metrics. However, the study by Jost et al. (2022) presents a notable contradiction. It found that CSR performance alone does not significantly affect M&A premiums when studied in isolation. This contradiction makes it interesting to further analyze whether higher ESG scores have an impact on M&A valuations, prompting a deeper exploration into how different components of ESG interact and influence acquirer valuation strategies. Various studies have also demonstrated that different factors contribute uniquely to the value of the acquisition premium. Ozdemir, Binesh, and Erkmen (2021), Cho, Han, Kim, and Kim (2021), and Malik and Mamun (2024) each identify distinct variables that

significantly influence the magnitude of acquisition premiums. This highlights the complex interplay when measuring and valuing sustainability in corporate settings, indicating that the relationship between ESG scores and M&A premiums might not be as straightforward. Also, most studies have been made on the relationship between CSR and the acquisition premium and not ESG. Present research has to a much lesser degree been conducted on the correlation between ESG and M&A premiums, which makes it a subject of interest. To test if ESG score has an impact on the acquisition premium, the following hypothesis is formulated:

Hypothesis 1*: ESG score has a positive influence on the bid premium paid in M&A transactions.*

In developing our second hypothesis that companies with higher ESG ratings experienced less negative impact on their M&A valuation premiums during COVID-19, we draw on existing research indicating that while M&A bid premiums generally rise during economic downturns due to increased uncertainties, companies with robust ESG standings might fare better. Studies like those by Gatti and Chiarella (2013) and Magnanelli, Nasta, and Ramazio (2022) suggest that during crises, firms with strong ESG profiles are perceived as lower-risk and more resilient, potentially justifying higher premiums. This observation supports the notion that higher ESG ratings can mitigate the negative impacts on valuation premiums during periods of heightened uncertainty, such as the COVID-19 pandemic. Thus, our hypothesis posits that ESG strength could provide a stabilizing effect on the valuations of companies involved in M&A transactions during such crises. To investigate the impact of uncertain times on the acquisition premium on companies with different levels of ESG scores, the following hypothesis is formulated:

Hypothesis 2*: ESG score has a positive influence on the bid premium paid in M&A transactions, and this relationship is enhanced during uncertain times (COVID-19).*

In relation to these two hypotheses, we will also analyze each separate component of ESG to assess if any of the components contributes more or less to the acquisition premium.

3. Data

3.1 Sample description

Since the initial subset of deals involving targets and acquirers exclusively based in Europe fell short, we turned to the North American market, more specifically the US and Canada, to ensure a robust sample size. The initial screening process returned 3902 M&A transactions within the North American market. This region proved to have a broad market of both M&A deals and ESG reporting, especially since ESG driven deals have gained increased political attention in recent years (Norton Rose Fulbright, 2024). Only completed deals within the specified time frame – January 1, 2010 to December 31, 2023 – were included, reducing the sample additionally. The chosen time period of 14 years captures more nuanced samples by including more up-to-date transactions and thus ensures more extensive ESG scoring. Further refinement was made by only including completed deals where the targets were publicly listed at the time of acquisition to ensure adequate financial disclosure. The exclusion of the financial and real estate industries was motivated by the lack of comparability due to the heavy regulations of these industries (Fuller et al., 2002). Lastly, consistent with prior studies, transactions were also filtered to include only those with a deal value exceeding $1 million, and all transactions must explicitly disclose the deal value in dollar terms. Ultimately, we ended up with a final sample of 340 deals.

3.2 Variables of investigation

3.2.1 M&A Premium

In order to examine the influence of ESG on deal premia, the first step is to derive the premium paid in a transaction, which also serves as the dependent variable. This is done by comparing the target company's stock price four weeks prior to the acquisition with the stock price paid by the acquirer. This is in accordance with Gomes (2018) and Jost et al. (2022). The stock prices are collected from Refinitiv Eikon, as are the M&A transactions and all other financial data. The Eikon platform has documented over 1.3 million mergers and acquisitions (M&A) transactions from 1970 to the current date and allows users to tailor their queries based on specific criteria. The percentage change in the target stock price over the four weeks before announcement, compared to the price paid, constitutes the transaction premium. By selecting a four-week period

before the announcement date, potential impact of rumors and speculation is mitigated. Nonetheless, this specific time frame is commonly employed in premium analysis (Betton, 2008).

$$Premium = \frac{Stock\ price\ paid\ by\ acquirer - Target\ stock\ price\ 4\ weeks\ prior\ to\ announcement}{Target\ stock\ price\ 4\ weeks\ prior\ to\ announcement} * 100$$

3.2.2 ESG Score and COVID-19

Once the premium is established, the next step is to look at the other main aspects of the study, which is the ESG score and COVID-19 influence, hence our explanatory variables. ESG data for this study has been obtained from Refinitiv Eikon, a platform renowned for its comprehensive ESG datasets. Since 2002, Refinitiv Eikon has meticulously tracked ESG scores, now encompassing over 630 ESG metrics and covering more than 90% of global market capitalization (Refinitiv, 2022). These scores are derived from company-reported data and involve intricate processes such as materiality matrices and controversies score calculation. In this study, the primary focus lies on assessing the overall impact of ESG score on acquisition premiums, but individual component scores will be examined as well. While higher ESG scores typically indicate superior performance, the emphasis here is not on distinguishing between high and low ESG scores. Instead, the objective is to understand how the aggregate ESG performance of companies influences the premiums paid in mergers and acquisitions. The COVID-19 pandemic, caused by the SARS-CoV-2 virus, began with initial cases detected in China in December 2019. The World Health Organization (WHO) declared a Public Health Emergency of International Concern on January 30, 2020, and characterized it as a pandemic on March 11, 2020. On May 5, 2023, it was announced that COVID-19 no longer constituted a Public Health Emergency of International Concern, though its presence continues to this day (WHO, 2024). The sudden economic shocks, global supply chain disruptions, financial market volatility, policy uncertainty, behavioral changes, and ongoing health concerns in the wake of the pandemic all contributed to a huge economic unpredictability. In the U.S. GDP fell by 11.2% from the fourth quarter of 2019 to the second quarter of 2020, marking the largest drop since the Great Depression (Altig et al., 2020). Against this background, we have defined COVID years

(uncertain) in our study as 2020, 2021, 2022 and 2023 and all previous years represent normal (certain) years. One dummy variable and one interaction variable related to COVID-19 were formed, serving as proxies for uncertain economic times.

3.2.3 Control variables

To enhance the analysis in this thesis further, a comprehensive set of control variables has been incorporated to mitigate their impact on the acquisition premium and disentangle their influence on the variables of primary interest. The selection of control variables were chosen based on their proven effect on premiums from previous studies in this area of research. The first variable, a size indicator, is represented by the natural logarithm of the target company's market capitalization. This variable is included based on the research of Zhang (2019) who found that targets that are larger in size usually mean increased complexity in the organizational structure and business operations, which leads to higher integration costs leading in turn to a lower acquisition premium (Zhang, 2019). Furthermore, larger firms typically exhibit lower information asymmetry, implying a negative effect on the deal premium (Draper and Paudyal, 2008). Asset and debt levels are always considered important factors in any M&A deal and serve as an indicator of financial health. Therefore, the leverage variable, defined by total debt to total assets, is included. Gondhalekar et al. found that more leverage is associated with closer monitoring and hence lead to a higher premium (Gondhalekar et al., 2004). A contradicting finding suggests that a target company with significant debt is less appealing, and naturally as a consequence of this the premium offered to acquire it should be lower (Dionne et al., 2015). Price-to-Book ratio has also been incorporated to capture potential market undervaluation effects. Additionally, Ji-Yub (Jay) Kim et al. found that acquisition premiums are significantly influenced by the target firm's performance. Acquirers are more willing to pay a high premium for strongly performing targets because they are more attractive than poorly performing ones (Ji-Yub (Jay) Kim et al., 2011). We have used the profit margin as a performance metric to identify high-performing companies, while revenue growth, expressed as the long term growth mean, is also considered. Acquiring companies frequently offer higher premiums for firms exhibiting robust profitability ratios, anticipating superior returns on investment and increased synergistic advantages (Eichner, 2019). Moreover, capital expenditures, scaled by total assets of the target company for comparability, are accounted for in accordance with the study by Gomes

and Marsats (2018), who used it as a proxy for potential takeover synergies. Apart from the COVID-dummy variable addressed above, an additional set of dummy variables have been selected to capture deal-specific characteristics impacting the acquisition premium. These include a cross-border dummy variable that catches the effect of cross-border acquisitions, a deal-attitude dummy variable to measure whether the takeover was friendly or not, and a cash dummy variable to measure the effect of the financing method on the acquisition. All dummies assume the value one if yes, and the value zero if no.

Table 1 Variable Description

Variables	Description	Source
Premium	Dependent variable.	EIKON Refinitiv
ESG Score	A combined measure of a company's environmental, social, and governance performance.	EIKON Refinitiv
Environmental Score	The environmental pillar of ESG.	EIKON Refinitiv
Social Score	The social pillar of ESG.	EIKON Refinitiv
Governance Score	The governmental pillar of ESG.	EIKON Refinitiv
Price-to-Book ratio(PB)	Price divided by book value of equity	EIKON Refinitiv,
Capex	CAPEX normalized by total assets	EIKON Refinitiv
Long-term-growth	Mean of long term growth	EIKON Refinitiv
Profit margin	Net income divided by revenue	EIKON Refinitiv
Size	Natural logarithm of the market cap	EIKON Refinitiv
Leverage	Total debt divided by total assets	EIKON Refinitiv
Cash	Dummy variable for deals paid in all cash.	EIKON Refinitiv

Friendly	Dummy variable for friendly takeovers	EIKON Refinitiv
Cross-border	Dummy variable for cross-border deals	EIKON Refinitiv
Covid	Dummy variable for year 2020, 2021, 2022, 2023	EIKON Refinitiv

3.3 Summary statistics

Summary statistics are presented in Table 2 and offer a detailed display of the variables studied. The average acquisition premium is noted at 36.51 with a median of 15.65 suggesting somewhat lower typical values. This is indicative of moderate yet varied premium levels. This variation is shown by the large standard deviation and the wide range between the lowest and highest values, indicating that some acquisitions have very high premiums, while others are obtained at significant discounts. For ESG scores, the mean of 35.31 and a median of 30.9 reveal a modest skew towards lower scores, indicating that governance generally scores higher than social and environmental components. The scores vary, indicating a large difference in ESG performance among the firms. This variance may reflect different strategic priorities or industry standards. The Price-to-Book (PB) ratio displays extreme values suggesting the presence of outliers, which persist even after winsorizing. The profit margin shows a large standard deviation, indicating that some firms within the sample are experiencing substantial losses, potentially affecting their acquisition values. Variables such as size and leverage have distributions that are closer to normal, likely because the size variable was transformed using logarithms. The study also looks at dummy variables like payment methods and deal characteristics, highlighting that 63% of deals were paid entirely in cash, 61% were friendly takeovers, 24% were cross-border, and 25% happened during the COVID-19 pandemic.

Table 2 Summary statistics

	Mean	Median	SD	Min	Max	N
Premium	36.51	15.65	48.11	-52.47	216.67	340
ESG	35.31	30.9	19.53	4.88	78.05	340
E	22.34	10.96	25.32	2.28	83.6	340
S	39.29	35.45	21.32	3.71	85.86	340
G	41.16	41.13	23.09	2.35	86.21	340
PB	3.36	2.9	11.8	0.07	85.96	340
Capex	.04	.03	.06	0	1.24	340
LTG	18.83	14.24	21.75	-50.3	104.96	340
PM	-17.88	6.62	46.09	-242.29	203.53	340
Size	22.45	22.34	1.97	17.81	26.24	340
Lev	.29	.25	0.22	0	.94	340
Cash	.63	1	0.48	0	1	340
Friendly	.61	1	0.49	0	1	340
CB	.24	0	0.43	0	1	340
Covid	.25	0	0.44	0	1	340

This table presents general descriptive statistics for the premium, target ESG scores and the control variables in the final sample used for regression analysis. The number of observations for each variable is reported, as well as the mean, median, standard deviation, minimum-and maximum value.
All variables except for the dummy variables and the size variable have been winsorized at the 1st and 99th percentile
The size variable is defined as the natural logarithm of the market capitalization of the target company.

Table 3 Macro Industries

Macro Industry	Source
Consumer Products and Services	EIKON Refinitiv
Consumer Staples	EIKON Refinitiv
Energy and Power	EIKON Refinitiv
Healthcare	EIKON Refinitiv
High Technology	EIKON Refinitiv
Industrials	EIKON Refinitiv
Materials	EIKON Refinitiv
Media and Entertainment	EIKON Refinitiv
Retail	EIKON Refinitiv
Telecommunication	EIKON Refinitiv

4. Methodology

4.1 Model description

The aim of this study is to investigate the potential impact of ESG scores – both in their combined form and as individual pillars – on the premiums paid in M&A transactions, with a particular focus on how this relationship is influenced during uncertain times (COVID-19). To address the research question and test the hypotheses, two sets of regression models are employed.

Model 1: ESG Combined Score

Model 1A: ESG Combined Without COVID

The first model examines the effect of the combined ESG score on acquisition premiums without considering the impact of the COVID-19 pandemic. The model specification is as follows:

$$Premium = \beta_0 + \beta_1 ESG_{i,t-1} +$$
$$\beta_2 PB_i + \beta_3 CAPEX_i + \beta_4 LTG_i + \beta_5 PM_i + \beta_6 Size_i + \beta_7 Lev_i +$$
$$\beta_8 Cash_i + \beta_9 DA_i + \beta_{10} CB_i + \lambda_1 Industry_{RE} + \lambda_2 Year_{RE} + \varepsilon_i$$

Model 1B: ESG Combined With COVID (Dummy)

The second model extends the analysis by including a dummy variable for the COVID-19 period to investigate its direct effect on acquisition premiums alongside ESG scores.

$$Premium = \beta_0 + \beta_1 ESG_{i,t-1} +$$
$$\beta_2 PB_i + \beta_3 CAPEX_i + \beta_4 LTG_i + \beta_5 PM_i + \beta_6 Size_i + \beta_7 Lev_i +$$
$$\beta_8 Cash_i + \beta_9 DA_i + \beta_{10} CB_i + \beta_{11} COVID_i + \lambda_1 Industry_{RE} + \lambda_2 Year_{RE} + \varepsilon_i$$

Model 1C: ESG Combined With COVID (Dummy and COVIDxESG Interaction)

The third model further explores the interaction between ESG scores and the COVID-19 pandemic by including an interaction term (COVID x ESG). This allows us to assess whether the effect of ESG scores on acquisition premiums is enhanced during the pandemic.

$$Premium = \beta_0 + \beta_1 ESG_{i,t-1} + \beta_2\, COVID\ x\ ESG_i +$$
$$\beta_3 PB_i + \beta_4 CAPEX_i + \beta_5 LTG_i + \beta_6 PM_i + \beta_7 Size_i + \beta_8 Lev_i +$$
$$\beta_9 Cash_i + \beta_{10} DA_i + \beta_{11} CB_i + \beta_{12}\, COVID_i + \lambda_1 Industry_{RE} + \lambda_2 Year_{RE} + \varepsilon_i$$

Model 2: ESG Pillar Scores

Model 2A: ESG Pillar Scores Without COVID

This model examines the individual effects of the Environmental, Social, and Governance pillars on acquisition premiums without considering the COVID-19 pandemic.

$$Premium = \beta_0 + \beta_1 E_{i,t-1} + \beta_2 S_{i,t-1} + \beta_3 G_{i,t-1} +$$
$$\beta_4 PB_i + \beta_5 CAPEX_i + \beta_6 LTG_i + \beta_7 PM_i + \beta_8 Size_i + \beta_9 Lev_i +$$
$$\beta_{10} Cash_i + \beta_{11} DA_i + \beta_{12} CB_i + \lambda_1 Industry_{RE} + \lambda_2 Year_{RE} + \varepsilon_i$$

Model 2B: ESG Pillar Scores With COVID (Dummy and COVIDxESG Interaction)

The final model includes interaction terms between each ESG pillar score and the COVID-dummy variable to assess how the pandemic modifies the impact of each ESG component on acquisition premiums.

$$Premium = \beta_0 + \beta_1 E_{i,t-1} + \beta_2 S_{i,t-1} + \beta_3 G_{i,t-1} + \beta_4 COVID \: x \: E_i + \beta_5 COVID \: x \: S_i + \beta_6 COVID \: x \: G_i$$

$$+ \: \beta_7 PB_i + \beta_8 CAPEX_i + \beta_9 LTG_i + \beta_{10} PM_i + \beta_{11} Size_i + \beta_{12} Lev_i +$$

$$\beta_{13} Cash_i + \beta_{14} DA_i + \beta_{15} CB_i + \beta_{16} COVID_i + \lambda_1 Industry_{RE} + \lambda_2 Year_{RE} + \varepsilon_i$$

4.2 Methodological approach

In all of the models the acquisition premium is the dependent variable and independent variables consist of both firm-specific (PB, Capex, LTG, PM, size, leverage) and deal specific (cash payments, friendly takeovers, cross-border deals) variables. The variable ESG t-1 represents the ESG score of the target firm one year before the announcement date. The same temporal relationship applies to the individual pillar scores (E, S, and G). The control variables assume the same fiscal year as the deal date, t.

In order to respond to the second hypothesis variables corresponding to the uncertainty aspect are formulated, namely COVID-dummy and COVID x ESG. Transactions that took place during the pandemic years (2020, 2021, 2022, and 2023) are identified using a COVID-dummy variable. This allows for measuring the isolated effect of COVID-19 on acquisition premiums. To further assess whether the positive relationship between ESG scores and premiums is enhanced during uncertain times, the interaction term ESG x COVID has been included. The same construction for interaction terms applies to the individual pillar scores (E, S, and G). This enables a more nuanced analysis of whether the ESG score demonstrates resilience in the face of heightened market uncertainty exacerbated by the pandemic and if it is reflected in their valuation premiums. Lastly, the inclusion of industry and year random effects helps control for unobserved heterogeneity across different industries and time periods.

4.3 Econometric approach

For our econometric approach we adopted multivariate analysis in line with the methodology described by prior studies (Gomes & Marsat, 2018; Ozdemir, Binesh, & Erkmen, 2021; Jost et al., 2021). The multivariate analysis is based on ordinary-least squares (OLS) regressions that are used to answer the hypotheses. While the OLS approach offers a straightforward method for regression analysis, it relies on several key assumptions; if these are not fulfilled it can

significantly affect the reliability and validity of the results. To address potential issues, a series of statistical tests have been performed and will successively be addressed separately in this section.

4.4 Regression approach

Three distinct regression methods are employed to robustly analyze the impact of ESG scores on acquisition premiums. Initially, we apply OLS with clustered standard errors by industry, which allows us to account for potential similarities within industries that may influence the variance of the observations due to shared economic, regulatory, or market conditions. OLS is favored for its simplicity and applicability in scenarios where unobserved heterogeneity is not a concern.

Suspecting the presence of unobserved heterogeneity in our data, we considered implementing either fixed effects (FE) or random effects (RE) models. The Hausman test, detailed by Brooks (2019), is employed to assess the suitability of RE over FE models by testing the null hypothesis that the RE model is appropriate. Results from this test, presented in Appendix 2 with a p-value of 0.954, lead us to reject the null hypothesis and subsequently favor the RE model. Following the recommendations of Pan, Liu, and Wang (2019), we opted for the RE model, which effectively handles potential endogeneity and captures variations both within and between industries. This model assumes that variations across entities are random and uncorrelated with the regressors suitable for data where each deal may have unique but random characteristics influencing the premium. Additionally, clustering of standard errors is crucial for addressing intra-industry correlations, ensuring that the model accounts for any unobserved or omitted variables common to specific industries. This methodology enhances the robustness of our analysis, allowing for a more comprehensive understanding of the factors influencing acquisition premiums.

Finally, we revert to a OLS model but incorporate robust standard errors to manage potential heteroskedasticity in error terms that differ among data points. This adjustment is crucial for maintaining the reliability of the model against violations of standard OLS assumptions, such as constant error variance across observations. Robust standard errors help stabilize the regression against outliers and potential model misspecifications that are not directly managed by clustering.

The sequential application of these models serves multiple purposes. It allows for a comparative analysis to decide which model most appropriately fits the data, acts as a robustness check to validate the consistency of the results across different statistical treatments, and demonstrates methodological thoroughness. By analyzing the effects of ESG scores on acquisition premiums through these varied lenses, we ensure that our findings are not merely artifacts of particular assumptions or overlooked data structures, thereby enhancing the credibility and reliability of the results.

4.5 White's Test for Heteroskedasticity

In his 1980 article, Halbert White presents a procedure for conducting a robust test for heteroskedasticity but also a method for obtaining consistent parameter estimates if the homoscedasticity assumption is violated. The theorem presented by White (1980) forms the basis of this test. In accordance with Brooks (2019), the White's test in Appendix 2 serves as a diagnostic tool prior to our regression analysis to assess the presence of heteroskedasticity. The null hypothesis of the test posits that the error terms are homoscedastic, implying constant variance across observations. Conversely, the alternative hypothesis suggests unrestricted heteroskedasticity, characterized by varying variance among the error terms. To tackle eventual issues with heteroskedasticity we will employ robust standard errors, clustered by industry. Clustering standard errors is vital for robust inference in econometric analysis, as it accommodates arbitrary correlation and differing variances within each cluster. While clustered standard errors are generally larger, their conservative approach provides more reliable inferences, particularly in the presence of heteroskedasticity (Wooldridge, Wadud & Lye, 2016).

5. Empirical Results & Analysis

This section will present a comprehensive summary of the regression results. Each model will be handled individually to provide a more clear picture of the findings. Subsequently, an in-depth analysis of the results will be presented drawing parallels to the literature review, along with a discussion of potential limitations of the report.

5.1 Empirical results

To test our hypotheses, we conducted regressions using multivariate analysis. Model 1 serves as our primary model, addressing Hypothesis 1 by examining the combined ESG score in relation to the deal premium. Model 1 further addresses Hypothesis 2, investigating whether the COVID-19 period affects this potential relationship. Model 2 has been formulated to assess if any of the individual scores contributes more or less to the acquisition premium, and how this is affected during the COVID-19 pandemic. In connection to the first model, three different regressions are estimated: without COVID, with COVID-dummy and with COVID-dummy and interaction term. For the second model only two different regressions are estimated: without COVID and with COVID-dummy and interaction term. Since the second model is not as central for answering our research question, the same enhancement and estimation steps were not considered necessary. All models incorporate independent variables such as financial ratios and deal characteristics while controlling for industry and year effects.

5.1.1 Model 1 – ESG Combined Score

The regression results in Table 6 use the OLS method with clustered standard errors to analyze factors affecting acquisition premiums. Clustered standard errors account for within-group correlation where the acquirer and target are in the same macro industry. As observed in Model 1, the regression results indicate that ESG scores have a negative but not significant impact on acquisition premiums. The overall results from Model 1 suggest that none of the examined factors, including ESG scores, financial ratios, and deal characteristics, have a statistically significant effect on acquisition premiums. Model 2 includes the COVID-dummy variable to measure its effect on acquisition premiums. The results from Model 2 suggest that none of the examined factors have a statistically significant effect. Consequently, the inclusion of the COVID-dummy does not change the overall results significantly. Model 3 introduces an interaction term between COVID and ESG to assess if the relationship between ESG scores and acquisition premiums changes during the COVID-19 period. The coefficient for ESG scores shows marginal significance at the 10% level, suggesting a slight but statistically insignificant negative impact on acquisition premiums. The results from Model 3 suggest that none of the other examined factors have a statistically significant effect on acquisition premiums. These

results suggest that other factors not captured in these models may play a more critical role in determining acquisition premiums, especially during uncertain times like the COVID-19 pandemic.

Table 6 Multivariate analysis (OLS-clustered standard errors)

Regression results

Dependent variable: Premium	(1)	(2)	(3)
	Model 1	Model 2	Model 3
ESG	-0.011	-0.010	-0.013*
	(0.010)	(0.009)	(0.010)
PB	-0.006	-0.005	-0.005
	(0.566)	(0.551)	(0.535)
Capex	-0.184	-0.240	-0.160
	(0.219)	(0.258)	(0.208)
LTG	0.021	0.024	0.025
	(0.019)	(0.021)	(0.022)
PM	-0.379	-0.305	-0.239
	(0.350)	(0.288)	(0.254)
Size	0.037	0.035	0.013
	(0.087)	(0.082)	(0.083)
Lev	0.447	0.352	0.376
	(0.556)	(0.560)	(0.570)
Cash	0.246	0.260	0.146
	(0.307)	(0.311)	(0.336)
Friendly	0.004	-0.016	-0.071
	(0.457)	(0.485)	(0.501)
CB	-0.170	-0.093	-0.121
	(0.278)	(0.256)	(0.291)
Covid		1.082	0.300
		(1.404)	(1.383)
CovidxESG			0.024
			(0.366)
_cons	-1.185	-2.615	0.366
	(1.979)	(2.324)	(2.448)
Industry effect	Yes	Yes	Yes
Year effect	Yes	Yes	Yes
Observations	340	340	340
R-squared	0.356	0.368	0.379
Standard errors	Clustered	Clustered	Clustered
Method	OLS	OLS	OLS

The regression results presented in this table are based on the OLS-method with clustered standard errors.

The regression results presented in Table 7 use the random effects method. This method was chosen based on the results from the Hausman test, which indicated that the random effects method is more appropriate for this dataset.

In Model 1, ESG scores indicate a negative but insignificant impact on acquisition premiums. Capex is negative and highly significant at the 1% level, suggesting that higher capital expenditures by the target firm significantly reduce acquisition premiums. Both profit margin and cross border deals are positive and marginally significant, suggesting that these variables may slightly increase acquisition premiums. In Model 2, the COVID-19 variable shows to be highly positively significant at the 1% level, indicating that acquisitions during the COVID-19 period increase acquisition premiums. Capex remains highly significant and negative, and cross-border deals remain marginally significant. Cash payments show a significant positive impact at the 5% level, suggesting that cash payments increase acquisition premiums. In Model 3 the interaction term is positively significant at the 5% level, indicating that the relationship between ESG scores and acquisition premiums is positively influenced during the COVID-19 pandemic. The coefficient for the COVID- dummy remains positive at the 1% level. ESG scores continue to show no significant impact on acquisition premiums while Capex continues to show a significant negative impact. Cash payments and Cross-border deals remain positively significant.

The lack of statistical significance across all models indicate that ESG scores do not have a substantial standalone impact on acquisition premiums. Capex shows a consistent significant negative impact across all models, suggesting that higher capital expenditures by the target firm consistently reduce acquisition premiums, which is an interesting and to some extent a questionable result. The COVID-dummy variable is highly significant and positive in Model 2, indicating a significant increase in acquisition premiums during the COVID-19 period. However, its significance disappears in Model 3 when the interaction term is included. The interaction term between COVID and ESG is positive and significant in Model 3, indicating that the positive relationship between ESG scores and acquisition premiums is enhanced during the COVID-19

pandemic. Other variables, such as the PB ratio, profit margin, firm size, and leverage, show no substantial impact on acquisition premiums. Cash payments and cross-border deals generally have a positive and sometimes significant impact, highlighting their potential influence on acquisition premiums. In summary, the random effects regression results indicate that while ESG scores do not have a significant standalone impact on acquisition premiums, the interaction between ESG scores and the COVID-19 period positively influences premiums. The COVID-19 period itself significantly increases premiums when considered without the interaction term, highlighting the complex dynamics of acquisition premiums during uncertain times.

Table 7 Multivariate analysis (Random effects)

Regression results

Dependent variable: Premium	(1) Model 1	(2) Model 2	(3) Model 3
ESG	-0.234	0.072	0.099
	(0.426)	(0.203)	(0.194)
PB	-0.097	-0.368	-0.321
	(0.246)	(0.230)	(0.246)
Capex	-0.054***	0.058***	0.066***
	(0.018)	(0.018)	(0.019)
LTG	0.194	0.621***	0.634***
	(0.233)	(0.145)	(0.148)
PM	0.641*	0.096	0.042
	(0.381)	(0.060)	(0.060)
Size	0.004	0.077*	0.062
	(0.061)	(0.040)	(0.040)
Lev	0.067	0.079	0.102
	(0.104)	(0.068)	(0.089)
Cash	0.180	0.442**	0.347*
	(0.239)	(0.214)	(0.209)
Friendly	0.181	0.172	0.164
	(0.187)	(0.174)	(0.181)
CB	0.372*	0.260*	0.293*
	(0.199)	(0.157)	(0.165)
Covid		0.570***	-0.189
		(0.077)	(0.288)

CovidxESG			0.012**
			(0.005)
_cons	-0.518	-2.639***	-2.194**
	(1.364)	(0.898)	(0.890)
Industry effect	Yes	Yes	Yes
Year effect	Yes	Yes	Yes
Observations	340	340	340
Pseudo R^2	.z	.z	.z
Standard errors	Clustered	Clustered	Clustered
Method	RE	RE	RE

The regression results presented in this table are based on the random effects-method.
Standard errors in parentheses
***p<.01, **p<.05, *p<.1

The regression results presented in Table 8 use the OLS method with robust standard errors, which are used to correct for heteroskedasticity. Across the models, the coefficients for ESG scores are negative, with a marginal significance in Model 2 and statistical significance in Model 3 at the 5% level. This consistent negative trend suggests that higher ESG scores may be perceived as a slight detractor from value in acquisition premiums. Capex shows a consistent negative impact across all models but is not statistically significant in any model, indicating that higher capital expenditures by the target firm do not play a significant role in determining acquisition premiums. The COVID-dummy variable is negative and not significant in Models 2 and 3, suggesting that the COVID-19 period does not significantly impact acquisition premiums. However, the interaction term between COVID and ESG in Model 3 is positive and marginally significant, implying that the relationship between ESG scores and acquisition premiums may be positively influenced during the COVID-19 pandemic. Other variables exhibit varied impacts across the models. The PB ratio shows negative coefficients across all models, none of which are significant, indicating no meaningful impact on acquisition premiums. Similarly, profit margin (PM) coefficients are negative and not significant, suggesting no substantial impact on premiums. Firm size and leverage display positive coefficients but are not significant, indicating no significant effects on premiums. Cash payments exhibit a positive relation that is significant in all models, indicating that cash payments significantly increase acquisition premiums. Friendly takeovers also show positive coefficients that are marginally significant across all models, suggesting that friendly takeovers may slightly increase the premium. Cross-border

deals have negative coefficients across all models, none of which are significant, indicating no impact on acquisition premiums.

In summary, the regression results across all three models indicate that ESG scores generally have a negative impact on acquisition premiums, with statistical significance observed in Model 3. Capex does not show a significant impact on premiums. The COVID-dummy variable does not significantly impact premiums, but the interaction term between COVID and ESG suggests a marginally positive influence during the pandemic. Other variables, such as the PB ratio, profit margin, firm size, and leverage, show no substantial impact on acquisition premiums. Cash payments consistently show a significant positive impact, and friendly takeovers are marginally significant, suggesting they may slightly increase the premium. These results highlight the complex dynamics of acquisition premiums and the potential influence of ESG scores, especially during uncertain times like the COVID-19 pandemic.

Table 8 Multivariate analysis (OLS-robust standard errors)

Regression results

Dependent variable: Premium	(1) Model 1	(2) Model 2	(3) Model 3
ESG	-0.004	-0.004*	-0.007**
	(0.003)	(0.003)	(0.004)
PB	-0.646	-0.644	-0.636
	(0.688)	(0.691)	(0.688)
Capex	-0.204	-0.209	-0.177
	(0.191)	(0.197)	(0.174)
LTG	0.018	0.018	0.019
	(0.017)	(0.017)	(0.017)
PM	-0.146	-0.169	-0.215
	(0.157)	(0.178)	(0.217)
Size	0.012	0.011	0.001
	(0.049)	(0.047)	(0.048)
Lev	0.213	0.210	0.323
	(0.335)	(0.337)	(0.403)
Cash	0.412**	0.371**	0.323**
	(0.189)	(0.154)	(0.139)
Friendly	0.247*	0.252*	0.220*

	(0.136)	(0.132)	(0.142)
CB	-0.242	-0.230	-0.269
	(0.274)	(0.273)	(0.299)
Covid		-0.207	-0.987
		(0.337)	(0.985)
CovidxESG			0.020*
			(0.018)
_cons	-1.051	-0.935	-0.566
	(1.152)	(1.079)	(1.095)
Industry effect	Yes	Yes	Yes
Year effect	Yes	Yes	Yes
Observations	340	340	340
R-squared	0.204	0.208	0.266
Standard errors	ROBUST	ROBUST	ROBUST
Method	OLS	OLS	OLS

The regression results presented in this table are based on the OLS-method with robust standard errors.
Standard errors in parentheses
***p<.01, **p<.05, *p<.1

5.1.2 Model 2 – ESG Pillar Score

The regression results presented in Table 9 use the random effects method to analyze the impact of various factors, including individual ESG pillar scores and interaction terms with COVID-19, on acquisition premiums. Each model incorporates different combinations of the Environmental, Social and Governance pillar scores, along with other control variables, while controlling for industry and year effects. Clustered standard errors account for potential correlations within groups. The analysis across models reveals several key observations. The Environmental score has a negative and marginally significant impact at the 10% level on acquisition premiums in Model 1, but this significance disappears in the presence of COVID-19 interaction terms. The Social and Governance scores are not significant in isolation but show significant positive impacts when interacting with COVID-19 at the 1% and 5% level, respectively. This indicates that the pandemic enhances the positive relationship between these scores and acquisition premiums. Capex consistently shows a significant impact across all models, with negative coefficients in models without COVID interaction and positive coefficients in models with COVID interaction, highlighting a context-dependent influence. Long-term growth is significant

in models with COVID interaction, suggesting that firms with higher growth prospects command higher premiums during the pandemic. Cash payments and cross-border deals consistently exhibit significant positive impacts on acquisition premiums across models, indicating their importance in determining acquisition premiums. Leverage shows a significant positive impact only in Model 6, highlighting its occasional influence.The results indicate that while individual ESG pillar scores may not significantly impact acquisition premiums in isolation, their interaction with the COVID-19 pandemic reveals nuanced dynamics which underscore the complex nature of factors influencing acquisition premiums during uncertain times.

Table 9 Multivariate analysis (Random effects)- Individual pillar scores

RE regression Premium	(1) RE	(2) RE	(3) RE	(4) RE	(5) RE	(6) RE
E	-0.009* (0.006)			-0.005 (0.005)		
S		-0.002 (0.002)			-0.001 (0.001)	
G			0.001 (0.005)			0.005*** (0.001)
CovidxE				0.010* (0.006)		
CovidxS					0.014*** (0.005)	
CovidxG						0.010** (0.005)
PB	0.002 (0.005)	-0.001 (0.004)	-0.004 (0.004)	0.001 (0.003)	-0.002 (0.003)	-0.007*** (0.002)
Capex	-0.050*** (0.018)	-0.060*** (0.019)	-0.055** (0.025)	0.061*** (0.019)	0.060*** (0.020)	0.059*** (0.012)
LTG	0.256 (0.243)	0.169 (0.241)	0.113 (0.231)	0.680*** (0.161)	0.660*** (0.151)	0.509*** (0.078)
PM	0.617* (0348)	0.667 (0.418)	0.582 (0.362)	0.080 (0.068)	0.122** (0.060)	-0.002 (0.070)
Size	0.072 (0.087)	0.001 (0.049)	-0.044 (0.088)	0.125* (0.067)	0.085** (0.035)	0.011 (0.025)
Lev	-0.009 (0.162)	0.091 (0.145)	0.167* (0.101)	0.008 (0.104)	0.068 (0.085)	0.265*** (0.061)
Cash	0.255 (0.262)	0.161 (0.238)	0.172 (0.241)	0.382* (0.222)	0.344* (0.198)	0.342 (0.218)
Friendly	0.102 (0.176)	0.181 (0.192)	0.181 (0.200)	0.125 (0.183)	0.175 (0.166)	0.127 (0.199)
CB	0.452*	0.392*	0.199	0.442**	0.389**	0.075

	(0.305)	(0.268)	(0.226)	(0.176)	(0.187)	(0.139)
Covid				0.057	-0.484*	0.072
				(0.291)	(0.325)	(0.231)
_cons	-1.936	-0.432	0.472	-3.473**	-2.642***	-1.136*
	(1.863)	(1.169)	(1.963)	(1.380)	(0.785)	(0.608)
Industry effect	Yes	Yes	Yes	Yes	Yes	Yes
Year effect	Yes	Yes	Yes	Yes	Yes	Yes
Observations	340	340	340	340	340	340
Pseudo R^2	.z	.z	.z	.z	.z	.z
Standard errors	Clustered	Clustered	Clustered	Clustered	Clustered	Clustered
Method	RE	RE	RE	RE	RE	RE

The regression results presented in this table are based on the random effects-method.
Standard errors are in parentheses
*** p<.01, ** p<.05, *p<.1

5.2 Empirical Analysis

Our first hypothesis posits a positive relationship between the target firm's ESG score and the bid premium paid in M&A transactions. This hypothesis is in line with the stakeholder theory, as articulated by Freeman (1984), which underscores that firms with higher ESG scores enjoy benefits such as enhanced reputation, lower risk, and competitive advantages. These advantages make such firms more attractive acquisition targets, justifying higher bid premiums. Empirical studies by Godfrey et al. and Aurori (2009) support this view, demonstrating that companies with strong CSR initiatives typically command higher M&A deal premiums. Further evidence comes from Gomes and Marsat (2018), Ma (2023), and Nguyen et al. (2024), who all studied the relationship between ESG and acquisition premium and found a positive correlation between ESG initiatives and higher M&A bids. These studies collectively suggest that acquirers value CSR engagement in their targets. Contrary to our hypothesis and the supporting theoretical background, the empirical findings of our study indicate that the combined ESG scores do not significantly impact acquisition premiums across most models. This aligns with Jost's findings that CSR performance does not significantly affect M&A premiums. Even when incorporating the COVID-dummy in Model 2 and the interaction term between COVID and ESG in Model 3, the ESG scores remain insignificant, presenting a marginally significant negative effect at best. These results suggest that in our dataset, ESG scores do not play a substantial role in determining

acquisition premiums. This finding diverges from much of the previous literature, highlighting the complexity and variability of the ESG-premium relationship across different contexts and datasets. Several potential reasons could account for the lack of significant findings. Firstly, model specification issues might mean that the current set of variables does not fully capture the determinants of acquisition premiums. Secondly, data limitations, such as sample size or the variability in the data, might not be sufficient to detect significant effects. Our sample of 340 deals is deemed adequate given the relatively limited availability of ESG data across many countries over recent decades. Although interest in ESG metrics has grown over time, there remains a significant shortfall in comprehensive data across various businesses and industries. This scarcity makes it challenging to obtain larger samples, even when extending our search across several years. Thirdly, measurement error, or potential inaccuracies in the measurement of variables, could lead to non-significant results.

Our second hypothesis explores whether the relationship between ESG scores and acquisition premiums is bolstered during times of uncertainty, such as the COVID-19 pandemic. The theory of information asymmetry emphasizes support for this hypothesis, suggesting that during uncertain times, firms with higher ESG scores yield higher premiums. The presence of ESG score naturally implies greater transparency and may reveal hidden value, making targets engaging in sustainability efforts more attractive, hence justifying higher acquisition premiums amidst heightened uncertainty. Previous studies made in this field draw similar conclusions. Gatti and Chiarella (2013) and Magnanelli, Nasta, and Ramazio (2022) found that during crises, companies with robust ESG profiles are seen as more resilient, justifying higher acquisition premiums. Our empirical analysis provides mixed support for this hypothesis. While the standalone effect of the COVID-dummy variable is not consistently significant across all models, the interaction term shows positive and marginally significant to significant results in some models. Specifically, in Model 3 (random effects model) the interaction term between COVID and ESG is positive and significant at the 5 %-level. This indicates that the relationship between ESG scores and acquisition premiums is positively influenced during the pandemic, aligning with the theory of information asymmetry which suggests that ESG scores enhance the perceived value of acquisition targets during times of heightened uncertainty. As for the COVID variable's isolated effect on the premium, Model 2 returned a positive and highly significant value, implying that uncertain times do lead to higher premiums.

While the impact of ESG as a combined score on acquisition premiums is generally negative and not significant, the individual pillars scores, E, S and G show somewhat more varying results. The governance score presents a significant positive impact, while the other components remain pointing in a negative direction. The interaction terms between the individual pillar scores and the COVID-19 period, range from marginally to highly significant across the models, indicating that evidence is found that the relationship is enhanced during uncertain periods. The positive coefficient implies that during the COVID-19 period, the premium increases with E, S and G respectively. This is in line with the emphasis from information asymmetry theory, suggesting that during the pandemic, ESG scores naturally enhance the perceived value of acquisition targets. These findings align with our hypothesis that ESG scores have a bolstered impact on acquisition premiums during times of uncertainty, as firms with higher ESG scores are perceived as more valuable amidst heightened risk and uncertainty.

Although the primary focus was on ESG scores, our study found interesting observations connected to the control variables as well. Capex significantly impacts acquisition premiums. In Table 7, Capex shows a negative impact in Model 1 and positive impacts in Models 2 and 3, indicating context dependency. Table 8 shows positive impacts, while Table 9 indicates a negative impact, suggesting higher Capex can lower premiums due to increased financial burden and risk. Long-term growth prospects show a significant positive relationship with acquisition premiums in models including COVID-19 interaction terms. In Table 7, Model 2, and Table 9, Models 4, 5, and 6, LTG coefficients are positive and highly significant. This suggests that firms with higher growth expectations command higher premiums, especially during uncertain periods like the pandemic.

5.4 Further Research/Limitations of the study

This study's reliance on ESG scores provided by Refinitiv presents a critical challenge in the reliability and comparability of sustainability assessments. The potential lack of convergence in ESG scores underscores concerns regarding the consistency and accuracy of these evaluations. This study focused solely on the aggregated ESG score effect on M&A deal premium. For a more extensive approach, division between high and low ESG scores could be further explored.

Future analysis could also focus on incorporating additional variables that were not included in the current model. For instance, industry relatedness, which was not considered in this study due to the wide range of different industries in our sample, could provide valuable insights. While we sorted the data by macro-industry, further research could select micro-industry classifications for even more nuanced findings. Exploring different modeling approaches, such as interaction effects or non-linear forms, could help capture more complex dynamics and provide a more comprehensive understanding of the factors influencing ESG performance. These additional analyses would enhance the robustness and depth of the findings, contributing to a more nuanced understanding of the role of ESG in corporate performance.

Lastly, the study's analysis of the impact of COVID-19 is limited by the duration of the pandemic and the availability of relevant data. Due to the relatively short period and the insufficient number of transactions captured during this time, the results concerning the pandemic's effect on ESG performance may lack robustness and statistical significance. Future research should aim to include a larger sample size to generate more reliable insight, possibly examining a bigger geographical area.

6. Conclusion

This study aims to explore the relationship between ESG scores and acquisition premiums in M&A transactions, with a particular focus on the potential enhancement of this relationship during uncertain times such as the COVID-19 pandemic. Two primary hypotheses were tested: whether ESG scores positively influence the bid premium and whether this relationship is strengthened during periods of heightened uncertainty. The empirical analysis was conducted using three different regression methods: OLS with clustered standard errors, OLS with robust standard errors, and the random effects method.

The findings reveal that ESG scores, in general, do not significantly impact acquisition premiums, contradicting Hypothesis 1. Across most models, ESG scores displayed negative but statistically insignificant effects on premiums. This outcome aligns closest with Jost et al.'s findings, suggesting that CSR performance alone does not significantly affect M&A premiums. However, during the COVID-19 pandemic, the relationship between ESG scores and acquisition

premiums showed a positive influence, supporting Hypothesis 2. The interaction term between COVID and ESG was found to be significant when using the random effects method, indicating that ESG components, particularly social and governance pillars, are valued more during uncertain times. This highlights the potential for ESG scores to enhance the perceived value of acquisition targets during periods of distress.

Future research should address several areas to build on these findings. For example, incorporating additional variables such as industry relatedness could provide deeper insights into the dynamics of ESG performance and acquisition premiums. Additionally, expanding the sample size by changing geographic area and duration of study periods could help in detecting more subtle effects of ESG scores on acquisition premiums. The reliance on ESG scores from Refinitiv presents challenges regarding the consistency and comparability of sustainability assessments, suggesting the need for caution in interpreting these results. The study's analysis of the pandemic's impact is constrained by the short duration and limited transaction data available during this period, which may affect the robustness and statistical significance of the findings, and explain why the obtained results in this study differ from previous research.

In conclusion, while combined ESG scores do not significantly impact acquisition premiums under normal conditions, their importance becomes context-dependent, particularly during periods of heightened uncertainty like the COVID-19 pandemic. This study contributes to the understanding of the strategic importance of ESG investments in M&A activities and offers guidance on how companies can leverage ESG metrics to enhance their market positioning and resilience in the face of future uncertainties. Policymakers and corporate strategists should recognize the enhanced importance of ESG factors during periods of uncertainty. Companies with strong ESG practices, especially in social and governance aspects, may be perceived as more resilient and attractive during crises, potentially justifying higher acquisition premiums. Encouraging firms to bolster their ESG initiatives can be a strategic move to enhance their market positioning and resilience against future uncertainties.

Altogether, this indicates that while green deals may not universally attract higher premiums, they can be more attractive and command higher valuations in specific contexts, especially

during periods of heightened uncertainty when transparency and risk mitigation are shown to be highly valued.

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Appendices

Appendix 1: Pearson's Correlation Matrix of variables

Pairwise correlations

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
(1) Premium_win	1.000														
(2) ESG_win	-0.118**	1.000													
(3) Env_win	-0.151***	0.865***	1.000												
(4) Soc_win	-0.062	0.877***	0.694***	1.000											
(5) Gov_win	-0.088*	0.781***	0.566***	0.478***	1.000										
(6) PB_win	-0.121*	0.024	0.053	0.024	-0.007	1.000									
(7) Capex_win	-0.054	-0.013	0.088	-0.082	0.048	-0.033	1.000								
(8) LTG_win	0.242***	-0.045	-0.018	-0.067	-0.052	0.098	0.165*	1.000							
(9) PM_win	-0.179***	0.218***	0.175**	0.185***	0.214***	0.147***	-0.142***	0.076	1.000						
(10) logsize	-0.154***	0.455***	0.474***	0.426***	0.269***	0.162***	0.014	0.159	0.065	1.000					
(11) Ler_win	-0.005	-0.030	0.017	0.039	-0.123*	-0.077	0.058	-0.039	0.015	0.046	1.000				
(12) Cash	-0.016	0.160***	0.117**	0.094*	0.191***	0.040	0.070	0.139	0.152**	0.129*	-0.084	1.000			
(13) Friendly	0.200***	-0.309***	-0.302***	-0.214***	-0.237***	0.024	0.048	-0.205***	-0.245***	-0.355***	0.009	-0.457***	1.000		
(14) CB	0.006	-0.072	-0.036	-0.037	-0.063	0.046	0.170**	0.003	-0.232***	-0.051	-0.126*	-0.068	0.264***	1.000	
(15) Covid	-0.012	-0.007	-0.035	0.014	-0.015	-0.015	-0.082	-0.162*	0.071	-0.260***	0.036	-0.082	0.120***	-0.008	1.000

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

This table presents a pairwise correlation table.

All variables expect for the dummy variables and the size variable have been winsorized at the 1st and 99th percentile.

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Appendix 2: Hausman test

Hausman (1978) specification test

	Coef.
Chi-square test value	1.581
P-value	.954

Appendix 3: White test

White's test	df	p
H0: Homoskedasticity		
Ha: Unrestricted heteroskedasticity		
chi2(67) = 73.10		
Prob > chi2 = 0.2846		
Cameron & Trivedi's		
decomposition of IM-test		
chi2		
73.100	67	0.285
15.710	12	0.205
1.090	1	0.296
89.900	80	0.210