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THE INFLUENCE OF THE ENVIRONMENTAL, SOCIAL AND GOVERNANCE SCORES ON BID PREMIA IN MERGERS AND ACQUISITIONS

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Abstract

This paper aims to investigate the influence of ESG scores on bid premia. Using data from mergers and acquisitions transactions in the United States from 2002 until 2022, this research shows a non-linear relationship between ESG score and bid premium (stock price). However, the paper finds no supporting evidence for the impact of the ESG score on the bid premium (book value). Furthermore, the results indicate an insignificant influence of the Paris Agreement on the ESG score and bid premium. These findings shed new light on the relationship between ESG scores and bid premia.

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1. Introduction

The Paris Climate Accords, a breakthrough in 2015, represent an international agreement on tackling climate change. In the treaty, all countries commit to decreasing emissions and accommodating climate change to achieve net-zero emissions. Each country establishes its Nationally Determined Contributions (NDCs), describing the actions it will undertake to reach the goal of the Paris Agreement. These NDCs are reviewed and revised every five years to incorporate more ambitious goals (United Nations, n.d.). The Paris Agreement and the Sustainable Development Goals (SDGs), set up by the United Nations to improve the world, emphasize the importance of sustainability for countries. Consequently, businesses should include sustainability in their strategy by enhancing their environmental, social and governance (ESG) scores or joining forces with firms who excel in this rating.

The importance of ESG factors in every stage of mergers and acquisitions (M&A) transactions has gained increased awareness. A survey from the Financial Times in 2020 reveals that "a staggering 83 per cent of the business leaders say that ESG will become critical in M&A decision-making in the next 12-24 months". ESG brings both risks and fuels value. Therefore, its growing importance will bring opportunities and challenges in the future (Financial Times, 2020). A more recent global survey comprising 281 respondents, conducted by Bain & Company, shows that 65% expect an increase in ESG focus. Even more, half of the respondents foresee enhanced ESG will result in higher deal valuations or could lead to this in the future. Nonetheless, only 11% of the respondents currently evaluate ESG regularly in its deal-making process (Branden et al., 2022).

Whether to invest in corporate social responsibility (CSR) is a subject of interest in the literature that has been scrutinized often. However, its influence on value creation is controversial. Most research relies on one of the two opposing views: the stakeholder theory and the shareholder theory. The stakeholder theory by Freeman (1984) states that CSR creates value, as a firm has a responsibility towards every person or entity it affects and vice versa. Accordingly, CSR engagement is deemed beneficial. On the other hand, the shareholder theory by Friedman (1970) indicates that CSR is an inefficient use of resources which destroys shareholders' value. These opposing views lead to different conclusions regarding the influence of CSR on firm valuation (Gomes & Marsat, 2018).

ESG within the M&A context is still an under-researched topic. It has been studied by a limited number of researchers, mainly focusing on the E&S component. Moreover, there has yet to be an agreement on the nature of the relationship. For example, Krishnamurti et al. (2019)

found a negative relationship between an acquirer's CSR score and bid premium. In contrast, the results from Gomes and Marsat (2018), Hussaini et al. (2021) and Ozdemir et al. (2021) indicate a positive relationship. The most recent research by Jost et al. (2022) examined this relationship from both acquirer and target perspectives. Their results show no significant association between ESG score and bid premium.

The results in the literature oppose on the influence of CSR on both firm value and bid premium. Furthermore, integrating sustainability into a firm's corporate strategy has gained prominence as a result of the Paris Climate Accords, the SDGs and surveys indicating the importance of ESG in M&A decision-making. Therefore, the following research question is constructed:

"What is the effect of a target's ESG rating on the bid premium in mergers and acquisitions transactions? Furthermore, how does the Paris Climate Accords influence this relationship?"

As mentioned previously, the literature finds inconclusive findings on this relationship. Jost et al. (2022) suggest that future research should investigate a non-linear relationship. Therefore, this paper aims to investigate a non-linear relation between a target's ESG score and the bid premium in an M&A transaction. Besides, it is explored if the relationship changed after the Paris Climate Accords.

This paper complements the existing literature on CSR and bid premia by investigating the relationship from a target's perspective, whereas most literature focuses on the acquirer's perspective (e.g., Hussaini et al., 2018; Krishnamurti et al., 2019). Even more, it is the first study to include both private and public firms. Additionally, each component of ESG is investigated individually to assess the separate influence.

This empirical research uses data from four databases: Zephyr for public and private M&A transactions, Orbis to get financial data on these firms, Eikon Refinitiv for information on stock prices, and Thomson Reuters ASSET4 to collect the ESG scores. The sample consists of deals in the United States (U.S.) from January 2002 – October 2022. This results in a sample set of 2,889 deals. The U.S. is selected as a country since it is the second biggest emitter globally, accounting for 11% of the total (Newburger, 2021).

The results indicate a non-linear relationship between ESG score and bid premium based on the stock price. Additionally, the analyses show evidence of the non-linear relationship between the relative ESG score and bid premium (stock price). However, the findings of Paris

Agreement are inconclusive. Considering the bid premium measured using the book value of assets, the regressions fail to reject the null hypotheses.

The paper continues as follows. Section 2 reviews the relevant literature. In section 3, the data and methodology are discussed. Section 4 presents and evaluates the results. In section 5, the limitations are reviewed. Lastly, section 6 concludes the study.

2. Literature review

In this section, relevant literature is discussed. First, theory of CSR and ESG is discussed. Then, studies considering the relationship between ESG, and bid premium are explained.

2.1 Corporate social responsibility and environmental, social and governance

Within the literature, research on corporate social responsibility and the related environmental, social, and governance scores are salient topics of interest (Nirino et al., 2021). CSR refers to the actions and policies undertaken by a corporation which show their accountability towards environmental and social issues (Sinding et al., 2018). ESG score measures a firm's engagement in CSR (Barros et al., 2022). Its association with firm value can be viewed from two opposing perspectives: the stakeholder theory (Freeman, 1984) and the shareholder theory (Friedman, 1970).

2.1.1 The stakeholder theory

As articulated by Freeman (1984), the stakeholder theory posits that a corporation's responsibility extends beyond maximizing profits for shareholders. Instead, a company has an obligation to all stakeholders, including any group, individual, or entity that can impact or is impacted by the firm. It should strive to balance the interests of all stakeholders to create long-term value. Besides, the theory advocates for adopting CSR practices, as the company has a responsibility towards all parties influenced by its actions (Freeman, 1984; Freeman & McVea, 2001; Freeman et al., 2004). Empirical research finds a positive relation between ESG and financial performance (e.g., Fatemi et al., 2015; Gao & Zhang, 2015). Additionally, ESG is established as having a risk-reducing effect (e.g., Kim et al., 2014).

2.1.2 The shareholder theory

In contrast, the shareholder theory by Friedman (1970), a neoclassical economic theory, argues that a firm's sole purpose is to maximize profit and shareholders' returns. As such, corporations are only responsible to shareholders, not to the public or society. From this perspective, CSR expenditures are considered a waste of valuable resources. Managers only engage in CSR actions for their reputation and private benefits (Hussaini et al., 2018) at the expense of shareholder wealth.

2.1.3 Inverse U relationship

Next to that, some researchers found an inverse U relationship between CSR and firm performance. In other words, the performance improves up to a certain level of CSR, but deteriorates beyond that point (Fatemi et al., 2015). For example, Barnea and Rubin (2010) identified a positive influence of CSR on firm valuation for low levels of CSR but a negative relation when CSR expenditures exceeded an optimum level.

Despite the extensive research on this topic, it is still debatable whether CSR is value enhancing (Gomes & Marsat, 2018).

2.2 ESG and mergers & acquisitions market

This section reviews the literature on the relationship between environmental, social and governance scores and the mergers & acquisitions market. Even though ESG and M&A transactions are individually interesting and widely discussed topics in the literature, their relationship remains under-investigated.

2.2.1 The effect of mergers & acquisitions on ESG

Several studies examined the influence of M&A on the ESG performance of the acquirer. Tampakoudis and Anagnostopoulou (2020) researched this with a sample of European mergers & acquisitions. Their results indicated that acquirers who purchased targets with better pre-acquisition ESG performance improved ESG scores after the acquisition. Additionally, Barros et al. (2022) find that M&A deals positively influence ESG the first year after the deal is completed. Furthermore, they established similar results when examining each component of ESG separately.

2.2.2   The influence of ESG on the bid premium

PWC (2012) conducted survey interviews with corporate buyers to evaluate opportunities and ESG risks in M&A activities. The results indicate that ESG factors are gaining prominence in M&A activities. In addition, half of the companies expect a discount for companies that perform poorly on ESG factors. However, these companies are not willing to pay a premium for strong ESG performance. Nonetheless, good performance on ESG factors is considered in the valuation of a company. In a more recent survey conducted by Bain & Company (2022), half of the 281 respondents answered that enhanced ESG justifies higher deal valuations or could lead to this in the future. However, only 11% currently take ESG into consideration in the deal process because of challenges in including ESG impacts in their M&A strategy (Branden et al., 2022).

Chen and Gavious (2015) examined the relationship between CSR and the sale price of a firm using a small sample of Israelian transactions. Their findings suggest that CSR has an insignificant influence on the valuation of a target. Gomes and Marsat (2018) were the first to academically investigate the impact of CSR performance on the firm value by bidders (rather than the sale price) in an international setting. In other words, they explored whether bidders paid a premium for target firms with higher CSR levels. The bid premium, as defined by Simonyan (2014), captures the difference between the market's target valuation and the acquirer's valuation of the target. In essence, it represents the acquirer's willingness to pay above the market price for the target firm. The results of Gomes and Marsat (2018) indicated that M&A bidders positively value the CSR performance of target firms. Examining the components separately, they found that the environmental aspect always has a positive impact. In contrast, the social dimension only demands a premium in an international deal, as this mitigates risk and information asymmetry in such transactions.

Contrary to this, Hussaini et al. (2021) investigated the influence of an acquirer's CSR performance on the bid premium with domestic transactions from 1992 – 2014 in the United States. They established a positive relationship between the acquirer's CSR performance on the bid premium, supporting the shareholder theory. Krishnamurti et al. (2019) conducted a study examining the influence of the acquirer's CSR score on the bid premium using an Australian dataset. Their results indicate that targets with superior CSR performance are acquired more frequently by bidders who prioritize CSR. Furthermore, the study shows that CSR-oriented firms are more likely to acquire domestic targets, make single bids, and pay for acquisitions with cash to minimize agency costs and reduce risk. Additionally, the authors unveiled that bidding firms that are CSR-oriented encounter a significant increase in abnormal returns upon

the announcement of an acquisition. Lastly, a negative association between the acquirer's CSR score and the bid premium is identified, suggesting that lower premiums are paid.

To the best of the author's knowledge, Jost et al. (2021) were the first to research CSR performance's influence on premia in M&A transactions for the acquirer's and target's perspectives. Their findings demonstrate no significant relationship from either of the perspectives. The authors suggest that the relationship between CSR and M&A premia might be non-linear and cannot entirely be explained by the traditional shareholder or stakeholder theory.

2.3 The Paris Climate Accords

The Paris Climate Accords, adopted by 196 parties in Paris in 2015, has the goal to constrain the rise of the global temperature to below 2 or 1.5 degrees Celsius compared to pre-industry levels. The aim is to arrive at a climate-neutral world in 2050. To achieve this target, countries have committed to reducing greenhouse gas emissions through Nationally Determined Contributions (NDCs). These commitments are reviewed and updated every five years (UNFCC, n.d.). Despite widespread support for the agreement, President Trump announced the United States' withdrawal in June 2017, which was effective in November 2020 due to complicated United Nations regulations (BBC, 2020). However, with President Biden in charge, the United States rejoined the agreement after 107 days (The Guardian, 2021). The President stresses that dealing with the climate crisis is a top priority (Peltier & Sengupta, 2021).

2.4 Hypotheses development

The literature reviewed implies that the relationship between ESG activities and firm performance can be viewed from two perspectives. On the one hand, the stakeholder theory posits that ESG has a positive economic impact (Freeman, 1984). On the other hand, the shareholder theory argues that investing in ESG is an inefficient use of resources and diminishes value (Friedman, 1970). Additionally, the studies reviewed in section 2.2.2 unveil a lack of agreement on the influence of ESG on bid premia. Furthermore, Jost et al. (2021) suggest future research should investigate whether this relationship is non-linear. Therefore, the hypothesis below is constructed.

H1: There is a non-linear relationship between the target's pre-acquisition ESG score and the premium paid by the acquirer.

H1a: There is a non-linear relationship between the target's pre-acquisition environmental score and the premium paid by the acquirer.

H1b: There is a non-linear relationship between the target's pre-acquisition social score and the premium paid by the acquirer.

H1c: There is a non-linear relationship between the target's pre-acquisition governance score and the premium paid by the acquirer.

The literature on the Paris Agreement in section 2.3 underscores the importance for firms to incorporate sustainability into their strategy. The withdrawal of the United States under the administration of President Trump, followed by the rejoining under President Biden, makes it interesting to investigate the influence of this agreement. Based on this literature, the following hypothesis is formulated:

H2: The relationship between the target's ESG (or environmental) score and the premium paid by the acquirer became stronger after the Paris Climate Accords.

H2a: President Trump's withdrawal from the Paris Climate Accords weakened the relationship.

H2b: The rejoining of the Paris Climate Accords under President Biden strengthened the relationship.

Much research uses either cross-sectional or within-company data on CSR scores, making it difficult to establish a causal relationship since changes in the scores are small and could potentially be influenced by other factors (Wang & Xie, 2009). Cho et al. (2021) address this issue by using a CSR difference variable as proxy for the target CSR score to assess the impact of CSR on the valuation effect in M&A transactions. They show that better CSR performance of the target company relative to the acquirer leads to higher gains for the target shareholders. Combining these findings with results from section 2.2, the following hypothesis is developed:

H3: There is a non-linear relationship between the pre-acquisition relative ESG score and the premium paid by the acquirer.

H3a: There is a non-linear relationship between the pre-acquisition relative environmental score and the premium paid by the acquirer.

H3b: There is a non-linear relationship between the pre-acquisition relative social score and the premium paid by the acquirer.

H3c: There is a non-linear relationship between the pre-acquisition relative governance score and the premium paid by the acquirer.

3. Data and methodology

This chapter provides a description of the data and methodology employed in this study. First, the sample selection process is outlined. Subsequently, the measurements of the variables utilized in this research are described. After that, the summary statistics and correlation matrix are discussed. Finally, the econometric methodology used to analyze the data is explained.

3.1 Sample selection

This research employs data from four databases: 1) Zephyr for public and private M&A transactions, 2) Orbis for financial information on these firms, 3) Eikon Refinitiv for information on stock prices, and 4) Thomson Reuters ASSET4 to collect the ESG scores. The dataset construction is based on several criteria. Firstly, the announcement date of the transactions in the United States is set between January 1st, 2002, and October 1st, 2022. Secondly, like previous research (e.g., Gomes & Marsat, 2018), the deal status must be completed (confirmed or assumed). Thirdly, the acquirer owns less than 50% of the target shares and seeks to acquire more than 50%. A majority in the shares, and hence a change of control, is crucial. Fourthly, the deal size must be greater than $1m. Lastly, following the literature, financial firms with SIC code 60-67 are excluded from the sample set (Gomes & Marsat, 2018).[1] After that, the data is merged with the financial data from Orbis, ESG data from Thomson Reuters ASSET4 and stock price data from Eikon Refinitiv. Observations with missing information on the premium or ESG score are dropped. This results in a panel sample

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[1] Financial firms have different business models and risk profiles compared to non-financial firms. Besides, these M&A transactions are more complex.

set of 2,889 deals containing private and public firms.[2] The number of deals per year is shown in figure 1. Table 1 exhibits the distribution of companies (acquirer and target) per 2-digit industry code.
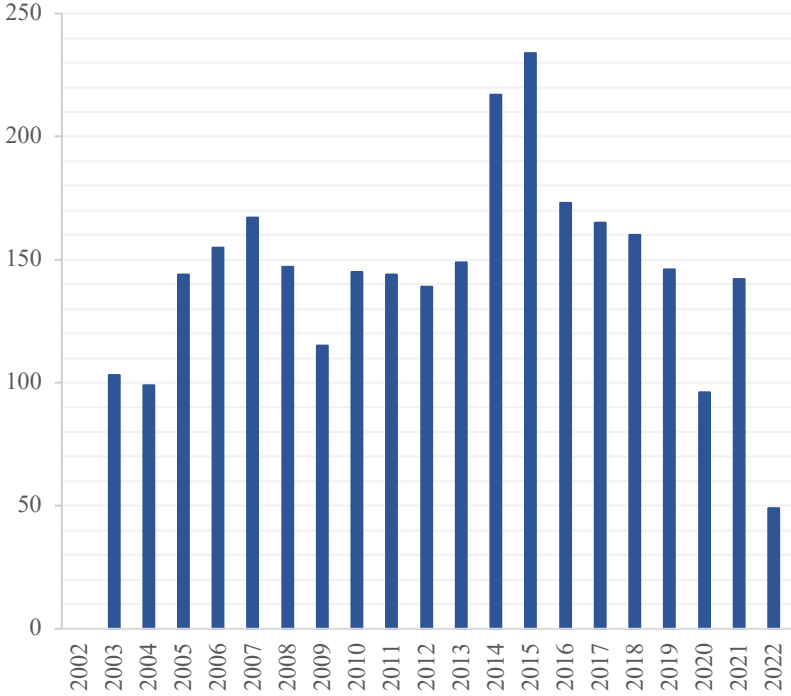
Figure 1. The number of deals per year.

Table 1. Sample per industry code.

This table shows the sample by industry codes for the target and acquirer companies. #Acquirer refers to the number of acquirer companies per industry code, and #Target to the number of target companies per industry code.

Industry (2-digit SIC code)	#Acquirer	Proportion (%)	#Target	Proportion (%)
Agriculture, forestry & fishing	3	0.10	2	0.07
Mining & construction	209	7.23	210	7.27
Manufacturing	1,271	43.99	1,094	37.87
Transportation & public utilities	252	8.72	247	8.55
Wholesale Trade & Retail Trade	167	5.78	170	5.88
Services	983	34.03	1,166	40.36
Public Administration	4	0.14	0	0
Total	2,889	100	2,889	100

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[2] See appendix A.

3.2 Environmental, social and governance score

For data on ESG scores, the Thomson Reuters ASSET4 database is utilized. It collected over 750 data points for over 6,000 public companies. Thomson Reuters ESG scores represent an improvement of the equally weighted ASSET4 ratings. As a considerable number of studies have used this database (e.g., Krishnamurti et al., 2019; Gomes & Marsat, 2018), it is used in this paper as well. The ESG score comprises of ten categories with different weights *(*see appendix B*)*. These weights are used to calculate the individual and the total ESG score. The scores range from 0 to 100. In line with Gomes and Marsat (2018), this study uses the last available ESG score before the announcement date of the deal.

As ESG scores are only available for public firms, a selection bias could exist in the data. To overcome this bias, the study employs a proxy measure in the form of the average 4-digit industry Standard Industrial Classification (SIC) code for private companies.

Additionally, a relative measure for the target ESG score is utilized compared to the acquirer ESG score. A larger difference indicates that the target performs better on the ESG level than the acquirer (Cho et al., 2020). Figure 2 represents the number of positive relative ESG scores, negative ESG scores, and identical ESG scores.

$$Relative\ ESG\ score = Target\ ESG\ score - Acquirer\ ESG\ score \qquad (1)$$
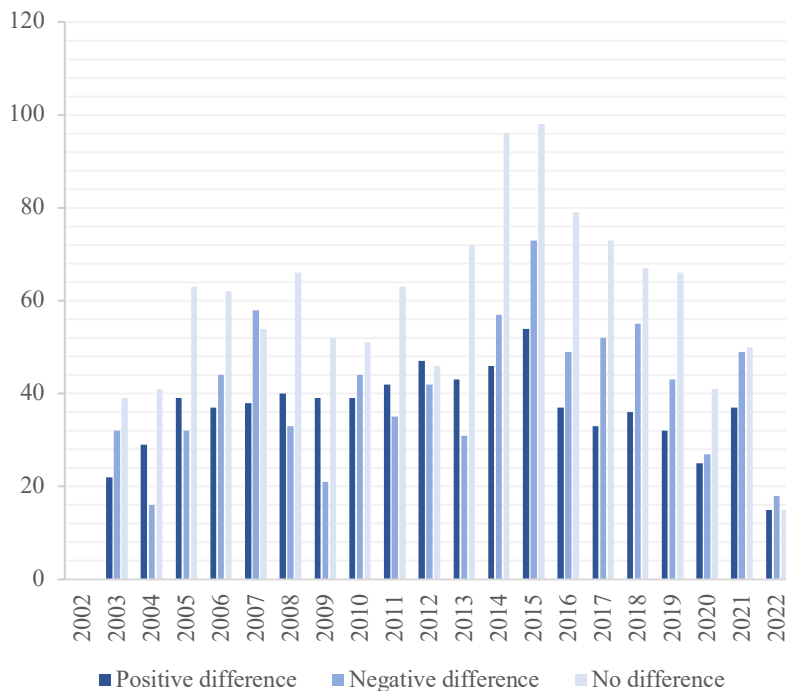
Figure 2. Relative ESG score per year.

3.3 Bid premium

For the bid premium, two measurements are used. Following previous literature (e.g., Gomes & Marsat, 2018), the premium for public firms is based on the target's stock price 42 days before the announcement to ensure that the bid price is unaffected by takeover rumors. This results in the bid premium measured by the following formula:

$$Bid\ premium\ (stock\ price) = \frac{Acquisition\ price\ per\ share\ offered - Target\ stock\ price\ 42\ days\ prior\ to\ the\ announcement}{Target\ stock\ price\ 42\ days\ prior\ to\ the\ announcement} \qquad (2)$$

As the stock price is unavailable for private firms, a proxy is used for its bid premium. It is defined as the difference between deal value and the book value of assets, deflated by the book value of assets.

$$Bid\ premium\ (book\ value) = \frac{Deal\ value - Book\ value\ of\ assets}{Book\ value\ of\ assets} \qquad (3)$$

3.4 Control variables

Following relevant studies in this area, several control variables influencing the bid premium are included in the regression. Previous literature finds a negative influence of target leverage on the bid premium. A plausible explanation is that targets with higher debt levels are considered less attractive and therefore receive a lower bid premium (Dionne et al., 2015).

Additionally, sales growth can influence the bid premium both positively and negatively. For example, Schwert (2000) shows an insignificant negative influence of growth on the bid premium. An explanation for this is that poorly performing targets could experience gains if managers are fired. The positive relationship is justified by the poor ability of targets to negotiate.

Furthermore, according to Ayers et al. (2003), liquidity has a positive but insignificant influence on the bid premium, which confirms the statement from Comment and Schwert (1995) that liquidity of a target is not the primary driver of the bid premium. Nonetheless, the literature includes it as a control variable.

Besides, previous literature identified a positive relationship between the runup period and the bid premium (e.g., Dionne et al., 2015).

Next to that, capital expenditures and R&D expenses influence the bid premium (Gomes & Marsat, 2018). Laamanen's research (2007) indicates a positive relationship between R&D expenses and the premium an acquirer pays.

Comment and Schwert (1995) find that cash positively influences the bid premium as it can lead to significant tax benefits.

Literature indicates that toehold affects the premium negatively (Dionne et al., 2015). Besides, Comment and Schwert (1995) find that larger firms are less likely to be acquired since a larger sized target results in higher integration costs, which influences the bid premium negatively (Gomes & Marsat, 2018).

Lastly, according to Jost et al. (2021), deal value influences the bid premium positively. Appendix C provides a description and measurement of each of these control variables. The data for these variables is extracted from Orbis.

Cho et al. (2020) show that the relative target-acquirer CSR score positively influences the target shareholders' premium. Additionally, they find that a stronger governance mechanism results in a greater positive valuation effect for the target shareholders.

3.5 Descriptive statistics

The descriptive statistics of the dependent, independent, and relevant control variables are shown in table 2. Based on the stock price, the bid premium is 39.9%, which is higher than the findings from Jost et al. (2021) and Gomes and Marsat (2018), who found an average of 31.7% and 32.1%, respectively. The bid premium (book value) is significantly higher compared to the bid premium (stock price), namely 893.3%. One plausible explanation is that the book value of assets is a more conservative measure to estimate the value of a company. It does not account for intangible capital, such as R&D expenses, resulting in an understatement of the value of the firm. Considering the independent variables, the mean of the ESG score equals 38.480. The average for the environmental, social, and governance scores equal 26.991, 43.849 and 46.515, respectively. This is higher than the findings from Jost et al. (2021). The utilization of industry average ESG scores for private companies justifies this difference.

Table 2. Summary statistics.

This table provides the descriptive statistics of the dependent, independent and control variables. The bid premia are winsorized at the 1st and 99th percentile. The data is derived from Zephyr, Eikon Refinitiv, Thomson Reuters ASSET4 and Orbis.

Variable	Observations	Mean	SD	Min	Max
Bid premium (stock price)	1,850	0.399	0.545	-0.985	2.930
Bid premium (book value)	2,571	8.393	40.257	-0.946	370.110
ESG	2,889	38.480	10.933	2.634	90.702
Environmental	2,708	26.991	15.483	0.521	94.501
Social	2,889	43.849	11.389	1.440	89.750
Governance	2,889	46.515	10.916	1.323	98.123
Relative ESG	2,735	-0.466	11.102	-52.37	75.913
Relative environmental	2,545	-0.665	13.841	-81.682	80.835
Relative social	2,735	-0.147	12.187	-50.818	69.667
Relative governance	2,735	-0.462	11.829	-58.781	77.924
Leverage	1,608	0.244	2.055	0	81.761
Growth	1,741	5.367	100.596	-29.992	3833.143
Runup	1,985	0.049	0.236	-1.887	3.481
Liquidity	2,548	3.964	24.153	0	1058.589
R&D expenses	1,116	0.162	0.290	0	4.942
Capital expenditures	1,488	-0.05	0.064	-0.733	0
Toehold	2,889	0.030	0.171	0	1
Deal size	2,889	1.839	6.087	0	108.700
Size	2,571	18.405	2.517	4.545	24.900
Cash	2,889	0.323	0.468	0	1
Paris Climate Accords	2,889	0.403	0.491	0	1
Acquirer ESG	2,735	39.003	10.498	2.634	88.300
Acquirer Governance	2,735	46.959	10.560	2.923	92.556

3.6 Correlation matrix

Appendix D presents the results of the correlation matrix. Correlation coefficients with a correlation higher than 0.7 are considered highly correlated. Both ESG and ESG^2 report a negative relationship with the proxies of the bid premium. The individual components and their squared variable also display a negative relationship with the proxies of bid premium. Next to that, there is a high correlation between ESG and ESG^2, environmental score and environmental^2 (E^2), social score and social^2 (S^2), and governance and governance^2 (G^2). Since this paper investigates a non-linear relationship both variables in the model are added. Besides, runup and the bid premium report a moderate correlation. Lastly, deal size and size show a

relatively high correlation. Nonetheless, since the literature (e.g., Jost et al., 2021) uses these variables as control variables, they are included in this research.

3.7 Econometric methodology

To investigate the influence of the ESG, environmental, social and governance scores on the bid premia, the following OLS regressions are used:

$$PremiumS_i = \beta_0 + \beta_1 * \frac{1}{ESGT_{i,t-1}|ET_{i,t-1}|ST_{i,t-1}|GT_{i,t-1}} + \beta_2 * \frac{1}{ESGT_{i,t-1}^2|ET_{i,t-1}^2|ST_{i,t-1}^2|GT_{i,t-1}^2} + \beta_3 * X_i$$
$$+ IndustryFE + YearFE + \varepsilon_i \qquad (4)$$

$$PremiumB_i = \beta_0 + \beta_1 * \frac{1}{ESGT_{i,t-1}|ET_{i,t-1}|ST_{i,t-1}|GT_{i,t-1}} + \beta_2 * \frac{1}{ESGT_{i,t-1}^2|ET_{i,t-1}^2|ST_{i,t-1}^2|GT_{i,t-1}^2} + \beta_3 * Z_i$$
$$+ IndustryRE + YearRE + \varepsilon_i \qquad (5)$$

$PremiumS_i$ and $PremiumB_i$ denote the premium (stock price) and premium (book value), respectively. $ESGT$ represents the target's ESG score, ET the target's environmental score, ST the target's social score, and GT the target's governance score. In order to capture the non-linearity impact, the square of the independent variable is also included.[3] Besides, X_i denotes the vector of control variables, which are mentioned in section 3.5.[4] Z_i is the vector of control variables for the premium (book value). In this regression, the runup variable is excluded as a control variable since private firms are added to the regression. To address heterogeneity issues, fixed effects are incorporated in the regression on the premium (stock price) (Gomes & Marsat, 2018).[5] The industry fixed effects are based on the first 2 digits of the SIC code and help to control for unobserved industry-specific factors. Time fixed effects aid in controlling for time-invariant changes. Random effects are incorporated for the regression on the premium (book value).[6]

To examine the impact of the Paris Climate Accords (PCA_i), a dummy variable is added to the regression. The variable equals 1 if a deal occurred after 2015 and 0 otherwise. PAT_i and

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[3] The squared variables are scaled by 1,000 such that their coefficients are of the same size as the rest of the model.
[4] The deal size is scaled by 1,000,000,000 for the same reason as mentioned above.
[5] See the Hausman test in appendix E.1.
[6] See the Hausman test in appendix E.2.

PAB_i represent indicator variables for when the United States withdrew under President Trump and rejoined the Agreement under President Biden. Solely industry effects are included in the analysis to prevent multicollinearity issues.

$$PremiumS_i = \beta_0 + \beta_1 * \frac{1}{ESGT_{i,t-1}|ET_{i,t-1}} + \beta_2 * \frac{1}{ESGT_{i,t-1}^2|ET_{i,t-1}^2} + \beta_3 * \frac{1}{ESGT_{i,t-1}|ET_{i,t-1}}$$
$$* \frac{1}{PCA_i|PAT_i|PAB_i} + \beta_4 \frac{1}{ESGT_{i,t-1}^2|ET_{i,t-1}^2} * \frac{1}{PCA_i|PAT_i|PAB_i} + \beta_5 * \frac{1}{PCA_i|PAT_i|PAB_i} + \beta_6$$
$$* X_i + IndustryFE + \varepsilon_i \tag{6}$$

$$PremiumB_i = \beta_0 + \beta_1 * \frac{1}{ESGT_{i,t-1}|ET_{i,t-1}} + \beta_2 * \frac{1}{ESGT_{i,t-1}^2|ET_{i,t-1}^2} + \beta_3 * \frac{1}{ESGT_{i,t-1}|ET_{i,t-1}}$$
$$* \frac{1}{PCA_i|PAT_i|PAB_i} + \beta_4 \frac{1}{ESGT_{i,t-1}^2|ET_{i,t-1}^2} * \frac{1}{PCA_i|PAT_i|PAB_i} + \beta_5 * \frac{1}{PCA_i|PAT_i|PAB_i} + \beta_6$$
$$* Z_i + IndustryRE + \varepsilon_i \tag{7}$$

Lastly, to capture the effect of the relative ESG score, the difference between the target's ESG and the acquirer's ESG score is included in the regression. Following Cho et al. (2021), the influence of the governance score and acquirer ESG score is added as control variables:

$$PremiumS_i = \beta_0 + \beta_1 * ESGR_{i,t-1} + \beta_2 * ESGR_{i,t-1}^2 + \beta_3 * ESGA_{i,t-1} + \beta_4 * GA_{i,t-1} + \beta_5 * X_i + IndustryFE$$
$$+ YearFE + \varepsilon_i \tag{8}$$

$$PremiumB_i = \beta_0 + \beta_1 * ESGR_{i,t-1} + \beta_2 * ESGR_{i,t-1}^2 + \beta_3 * ESGA_{i,t-1} + \beta_4 * GA_{i,t-1} + \beta_5 * Z_i$$
$$+ IndustryRE + YearRE + \varepsilon_i \tag{9}$$

Where $ESGR_{i,t-1}$ refers to the relative ESG score, $ESGA_{i,t-1}$ indicates the ESG score of the acquirer, and $GA_{i,t-1}$ denotes the governance score of the acquirer.

4. Results

In this section, the results of the regression analyses are investigated. First, the results of the OLS regression of the ESG, environmental, social and governance scores on both proxies of the bid premium are discussed. After that, the second hypothesis on the influence of the Paris Agreement on the ESG score and the bid premium is analyzed. Lastly, the effect of the relative ESG score on the bid premium is evaluated.

4.1 The effect of ESG scores on the bid premium (stock price)

This section investigates the first hypothesis, the non-linear relationship between the ESG score and the bid premium. As mentioned before, it is divided into three sub-hypotheses, each assessing the individual influence of the environmental score, social score, and governance score on the bid premium.

The hypotheses are tested in three ways: 1) a regression including only the independent variables, 2) a regression with independent and control variables 3) a regression containing independent variables, control variables, and fixed effects. Fixed effects are used in the regression since the Hausman test result displays a probability of $X^2 = 0.0000$, indicating that the null hypothesis is rejected at 0.05 (see appendix E.1). Besides, the regressions are checked for multicollinearity through a variance inflation factor (VIF) test. The rule of thumb states that there are no multicollinearity issues if the VIF is lower than 5. Since squared variables are included to capture the non-linearity in the regressions, higher VIFS are reported. However, when excluding the squared variable from the regression (see column 2), it can be concluded that the VIF is fairly below the rule of thumb, and the model contains no multicollinearity issues.

Table 3 displays the regression results of the OLS regression of the ESG score on the bid premium (stock price). The first column provides the result of the independent variables on the bid premium. ESG and ESG[2] report opposite signs at a significance level of 5% and 10%, respectively. Column 3 presents the regression results, including control variables. ESG has a significant negative influence, whereas ESG[2] has a significant positive effect on the bid premium. From the reported R-squared, it is be concluded that adding the control variables increases the model's fit. This is also confirmed by the Wald test (see appendix E.3). In column 4, fixed effects are included. The ESG score and ESG[2] are statistically significant at p=0.001, and their signs are opposite. Hence, a one unit increase in ESG score decreases the bid premium by 0.022 and increases the bid premium – ESG slope by 0.472.

Regarding the control variables, leverage has a significant positive effect on the bid premium. This contradicts the findings from Dionne et al. (2015). However, Gomes & Marsat (2018) also find a positive but insignificant influence of leverage on the bid premium. Confirming the results from Dionne et al. (2015), sales growth reports a significant positive effect. Nonetheless, its coefficient is much smaller than Gomes & Marsat (2018) found. The runup positively affects the bid premium. Hence, a 1% increase in the runup period increases the bid premium by 0.00917. This aligns with what the literature has found (e.g., Gomes & Marsat, 2018). Liquidity has a positive influence on the bid premium, with the coefficient being

almost equal to the results from Gomes and Marsat (2018). R&D expenses report a positive coefficient, confirming the findings from Laamanen (2007). Lastly, size affects the bid premium negatively, affirming previous literature findings.

All in all, the results verify the non-linear relationship between the ESG score and the bid premium.

Table 3. OLS regression results of ESG score on bid premium (stock price).

This table provides OLS regression results that examine the effect of the target ESG score on the bid premium (stock price). To correct for heteroskedasticity, robust standard errors are used. They are shown in parentheses. The significance is represented by *** p<0.01 ** p<0.05 and * p<0.1.

Bid premium	(1)	(2)	(3)	(4)
ESG	-0.012**	-0.000	-0.015**	-0.022***
	(0.005)	(0.013)	(0.006)	(0.007)
ESG^2	0.112*		0.196***	0.236***
	(0.066)		(0.075)	(0.084)
Leverage		0.194	0.197**	0.155*
		(0.92)	(0.091)	(0.093)
Growth		0.000**	0.000*	0.000***
		(0.000)	(0.000)	(0.000)
Runup		0.940***	0.941***	0.917***
		(0.125)	(0.124)	(0.119)
Liquidity		0.011***	0.011***	0.011***
		(0.004)	(0.004)	(0.004)
R&D expenses		0.495**	0.499***	0.454***
		(0.167)	(0.167)	(0.166)
Capital expenditures		0.088	0.078	-0.009
		(0.245)	(0.245)	(0.312)
Cash		0.009	0.010	0.021
		(0.320)	(0.032)	(0.032)
Toehold		-0.156	-0.167	-0.199*
		(0.103)	(0.102)	(0.106)
Size		-0.033**	-0.032**	-0.041***
		(0.013)	(0.013)	(0.012)
Deal size		0.001	0.001	0.002
		(0.002)	(0.002)	(0.002)
Constant	0.675	0.925**	1.165***	1.526***
	(0.109)	(0.269)	(0.292)	(0.279)
VIF	19.78	1.23	5.72	-
Year fixed effects	No	No	No	Yes
Industry fixed effects	No	No	No	Yes
R-squared	0.006	0.233	0.238	0.286
Observations	1,850	807	807	807

In table 4, the results of the individual components on the bid premium can be found. Columns 1 until 3 provide the results of the independent variables on the bid premium. It shows that both environmental score and E^2, governance score and G^2 have an insignificant influence on the bid premium. As expected, the signs of these variables are opposites. The social score reports a significant negative impact, whereas its squared shows an insignificant influence.

However, the R-squared for all models is low, entailing that the model is not a good fit for explaining the difference in bid premium.

Columns 4 until 6 represent the model, including the individual components and control variables. Interestingly, E^2 now becomes significant, whereas the environmental score remains insignificant. The social score is insignificantly and negatively related to the bid premium, whereas S^2 reports an insignificant positive sign. The influence of the governance score and G^2 is insignificant, and their signs are opposite.

Columns 7 until 9 present the results after adding fixed effects. The R-squared is higher for all models, including fixed effects, compared to no fixed effects. Environmental score and E^2 report opposite signs and are significant at 1%. Again, the social score and governance score and their squared variables show opposite signs but an insignificant influence. Gomes and Marsat (2018) find that social score only positively affects bid premia in cross-border transactions, which could explain this insignificant effect.

From this analysis, it can be concluded that the environmental score is non-linearly related to the bid premium. However, there is no statistical evidence for a relationship between governance or social score and the bid premium.

Table 4. OLS regression results of environmental, social, and governance score on bid premium (stock price).

This table provides the OLS regression results that examine the effect of the target environmental, social and governance score on the bid premium (stock price). Excluding the squared terms from the regression results in a VIF well below the threshold. As such, it can be concluded that there are no multicollinearity issues in the model. To correct for heteroskedasticity, robust standard errors are used. They are shown in parentheses. The significance is represented by *** $p<0.01$ ** $p<0.05$ and * $p<0.1$.

Bid premium	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Environmental	-0.004			-0.004			-0.012***		
	(0.003)			(0.003)			(0.004)		
E^2	0.041			0.102**			0.174***		
	(0.037)			(0.051)			(0.060)		
Social		-0.009*			-0.004			-0.006	
		(0.004)			(0.005)			(0.005)	
S^2		0.072			0.032			0.039	
		(0.051)			(0.053)			(0.060)	
Governance			-0.006			0.002			-0.004
			(0.005)			(0.006)			(0.006)
G^2			0.030			-0.047			0.009
			(0.054)			(0.076)			(0.074)
Constant	0.450***	0.624***	-0.633***	0.857**	1.003***	0.990***	1.123***	1.263***	1.201***
	(0.040)	(0.114)	(0.115)	(0.284)	(0.279)	(0.309)	(0.267)	(0.272)	(0.288)
Control variables	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	No	No	No	No	No	No	Yes	Yes	Yes
Industry fixed effects	No	No	No	No	No	No	Yes	Yes	Yes
R-squared	0.002	0.004	0.006	0.236	0.234	0.236	0.293	0.279	0.288
Observations	1,699	1,850	1,850	741	807	807	741	807	807

4.2 The effect of ESG scores on the bid premium (book value)

Like the previous section, the hypotheses will undergo three analysis methods. Initially, a regression analysis is conducted with only the independent variables. Subsequently, the regression is re-evaluated by incorporating independent variables and control variables. Finally, the hypothesis is tested, including independent variables, control variables and random effects. Random effects are used, as the results from the Hausman test failed to reject the null hypothesis at a significance level of 0.05 (see appendix E.2*).* Additionally, the model is tested for multicollinearity issues by calculating the VIF. Since the VIF falls well below the threshold, it can be concluded that the model exhibits no multicollinearity issues.

The results of the relation between ESG and the bid premium (book value) are presented in table 5. Column 1 shows that ESG has a significant negative influence on the bid premium, while ESG^2 has an insignificant positive sign. From the Wald Test results, it is derived that including the control improves the model fit (see appendix E.4*).* Column 3 shows the results, including control variables, and column 4 displays the results, incorporating controls and random effects. In both regressions, the independent variables exhibit opposite signs but an insignificant influence. This contradicts the results from the previous section. The difference in results may be attributed to using the book value as a proxy for the premium. Since this measurement does not consider intangible assets, such as R&D expenses, resulting in an overestimation of the premium. Besides, the incorporated control variables were sourced from literature considering the bid premium (stock price). This is further supported by the relatively low R-squared for this model, indicating that the model may not be an adequate fit to explain the premium (book value).

Considering the control variables, growth and liquidity have a positive effect on the bid premium. In accordance with the literature, the toehold coefficient is negative and statistically significant. Lastly, the size coefficient is negative, and the deal size coefficient is positive, which also complies with previous research (e.g., Jost et al., 2021; Gomes & Marsat, 2018). The coefficients from the other control variables report no statistical significance. The discrepancy can be explained by similar reasoning as above.

After evaluating the results, it can be concluded that the regression fails to reject the null hypothesis. This implies no relation between the ESG score and bid premium when private firms are included in the regression.

Table 5. OLS regression results of ESG score on bid premium (book value).

This table provides the OLS regression results that examine the effect of the target ESG score on the bid premium (book value). To correct for heteroskedasticity, robust standard errors are used. They are shown in parentheses. The significance is represented by *** $p<0.01$ ** $p<0.05$ and * $p<0.1$.

Bid premium	(1)	(2)	(3)	(4)
ESG	-0.640*	-0.018	0.019	-0.041
	(0.387)	(0.022)	(0.096)	(0.087)
ESG^2	5.671		-0.473	0.526
	(4.894)		(1.083)	(1.040)
Leverage		0.494	0.484	-0.833
		(0.706)	(0.703)	(0.888)
Growth		0.001**	0.001**	0.002***
		(0.000)	(0.000)	(0.000)
Liquidity		0.230***	0.231***	0.167**
		(0.081)	(0.082)	(0.070)
R&D expenses		3.528	3.518	3.330
		(2.492)	(2.506)	(2.044)
Capital expenditures		4.804	4.834	17.512
		(3.091)	(3.104)	(16.405)
Cash		-0.231	-0.237	-0.285
		(0.706)	(0.708)	(0.502)
Toehold		-1.916**	-1.895**	-3.291**
		(0.789)	(0.801)	(1.659)
Size		-0.878	-0.883	-1.174**
		(0.540)	(0.545)	(0.579)
Deal size		0.226***	0.227***	0.192**
		(0.085)	(0.085)	(0.081)
Constant	23.957**	18.431*	17.895*	29.789*
	(7.673)	(10.294)	(9.934)	(17.831)
VIF	22.07	1.21	6.03	-
Year random effects	No	No	No	Yes
Industry random effects	No	No	No	Yes
R-squared	0.003	0.088	0.088	0.144
Observations	2,571	851	851	813

Table 6 provides the results of the individual components on the bid premium. Considering the regressions including only independent variables, the environmental score and E^2 report a significant influence and have opposite signs, consistent with expectations. Social score and S^2 are insignificant, and both exhibit a negative sign, contradicting what is hypothesized. Lastly, while governance score and G^2 have opposite signs, their coefficients were found to have an insignificant effect on bid premium.

Columns 4 until 6 display the results of the regression, including the independent variables and control variables. The independent variables remain statistically insignificant. When including the random effects in the regression, the independent variables, except for social score and S^2, report opposite signs but are statistically insignificant.

The analysis above shows that the regression fails to reject the null hypothesis that there is no relation between the individual components and premium (book value). Similar reasoning,

namely the failure to capture intangible assets into the bid premium (book value) and utilization of inadequate control variables to explain variation in the model, can justify this insignificant relation.

Table 6. OLS regression results of environmental, social, and governance score on bid premium (book value).

This table provides the OLS regression results that examine the effect of the target environmental, social and governance score on the bid premium (book value). Excluding the squared terms from the regression results in a VIF well below the threshold. As such, it can be concluded that there are no multicollinearity issues in the model. To correct for heteroskedasticity, robust standard errors are used. They are shown in parentheses. The significance is represented by *** $p<0.01$ ** $p<0.05$ and * $p<0.1$.

Bid premium	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Environmental	-0.594***			-0.061			-0.058		
	(0.227)			(0.054)			(0.061)		
E^2	6.446*			0.535			0.910		
	(3.719)			(0.693)			(0.716)		
Social		-0.132			0.051			0.009	
		(0.282)			(0.050)			(0.060)	
S^2		-0.046			-0.523			0.082	
		(3.193)			(0.546)			(0.631)	
Governance			0.145			0.083			0.082
			(0.323)			(0.106)			(0.109)
G^2			-2.968			-1.497			-1.222
			(3.428)			(1.215)			(1.268)
Constant	18.389***	14.296**	8.444	20.539*	16.787	17.93*	32.122	28.56	28.915
	(3.221)	(7.551)	(7.553)	(11.685)	(10.206)	(9.898)	(19.628)	(17.621)	(17.753)
Control variables	No	No	No				Yes	Yes	Yes
Year random effects	No	No	No	No	No	No	Yes	Yes	Yes
Industry random effects	No	No	No	No	No	No	Yes	Yes	Yes
R-squared	0.009	0.002	0.002	0.100	0.087	0.093	0.153	0.144	0.145
Observations	2,410	2,571	2,571	776	851	851	742	813	813

4.3 The effect of the Paris Agreement on ESG score and the bid premium (stock price)

The second hypothesis investigates whether the non-linear relationship between ESG score and the bid premium became stronger after the Paris Agreement. To capture the influence of the Paris Agreement, an interaction term with the ESG score is included in the regression. Table 7 provides the results of the Paris Agreement. Appendix F.1 shows the results of the influence of the withdrawal of the Paris Agreement under President Trump and the rejoining under President Biden.

Columns 1 and 2 present the regression results, including only the independent variables. ESG reports a significant adverse effect on the bid premium, but the interaction with the Paris Agreement and the individual influence of the Paris Agreement dummy are insignificant. This implies that the Paris Agreement may not influence the bid premium through the ESG score. The second column shows that the Paris Agreement interaction term with the environmental

score and its squared variable are statistically significant and have opposite signs. Additionally, the Paris Agreement variable has a positive effect. This suggests that the introduction of the Paris Agreement influences the bid premium environmental score relationship. However, considering the R-squared of the first two columns, it can be concluded that the model is not a good fit. Therefore, control variables are added to the regression (columns 4 and 5).

From column 4, it becomes evident that both ESG and ESG^2 report a significant effect with opposite signs. The moderating effect of the Paris Agreement, however, remains insignificant. After including control variables, the influence of the Paris Agreement on the environmental score and bid premium becomes insignificant.

When incorporating industry fixed effects into the regression, the influence of ESG^2 becomes insignificant. Next to that, the Paris Agreement's effect on bid premium remains insignificant. Considering column 6, only E^2 relates positively to the bid premium. However, the Paris Agreement coefficient still lacks significance. A possible explanation for these obtained results is that the Paris Agreement was effective as of the end of 2015. As a consequence, the time frame is relatively short, and this could obscure the effects. This is supported by the withdrawal under President Trump, followed by the re-entry of the Agreement under President Biden. Additionally, the United States is not on track to follow up on the promises it made to tackle climate change. Currently, it ranks 43rd among 180 countries that Yale and Columbia ranked in their Environmental Performance Index (EPI) (Environmental Performance Index, 2022). Interestingly, the dummy variable for the Paris Agreement displays a significant positive effect on the bid premium. Implying that a higher premium was paid for targets after the Paris Agreement.

From the previously discussed analysis, the regression fails to reject the null hypothesis that there is a more substantial relation between the ESG or environmental score and bid premium after joining the Paris Agreement. Nonetheless, deals after the Paris agreement influenced the deal premium positively.

Table 7. OLS regression of the Paris Agreement on ESG or environmental score and bid premium (stock price).

This table provides the OLS regression results that examine the effect of the Paris Agreement on the target ESG or environmental score on the bid premium (stock price). Excluding the squared terms from the regression results in a VIF well below the threshold. As such, it can be concluded that there are no multicollinearity issues in the model. To correct for heteroskedasticity, robust standard errors are used. They are shown in parentheses. The significance is represented by *** $p<0.01$ ** $p<0.05$ and * $p<0.1$.

Premium	(1)	(2)	(3)	(4)	(5)	(6)
ESG	-0.013*		-0.017***		-0.016***	
	(0.008)		(0.006)		(0.006)	
ESG * PA	-0.011		-0.006		-0.006	
	(0.012)		(0.018)		(0.018)	
ESG^2	0.148		0.218***		0.217	
	(0.104)		(0.078)		(0.079)	
ESG^2 * PA	0.051		0.047		0.052	
	(0.141)		(0.210)		(0.209)	
Environmental		0.001		-0.003		-0.003
		(0.004)		(0.004)		(0.004)
Environmental * PA		-0.017***		-0.007		-0.007
		(0.006)		(0.008)		(0.008)
E^2		-0.008		0.104*		0.103*
		(0.062)		(0.061)		(0.061)
E^2* PA		0.177**		0.052		0.054
		(0.084)		(0.119)		(0.118)
PA	0.364	0.320***	0.215	0.194*	0.229	0.198*
	(0.272)	(0.096)	(0.362)	(0.109)	(0.362)	(0.110)
Leverage			0.180*	0.175*	0.179*	0.177*
			(0.095)	(0.099)	(0.097)	(0.101)
Growth			0.000**	0.000***	0.000**	0.000***
			(0.000)	(0.000)	(0.000)	(0.000)
Runup			0.938***	0.917***	0.930***	0.902***
			(0.124)	(0.131)	(0.124)	(0.131)
Liquidity			0.011***	0.01**	0.011***	0.011**
			(.004)	(0.004)	(0.004)	(0.004)
R&D expenses			0.479***	0.540***	0.490***	0.556***
			(0.169)	(0.185)	(0.172)	(0.188)
Capital expenses			0.069	-0.074	0.082	-0.086
			(0.247)	(0.253)	(0.288)	(0.295)
Cash			0.016	0.017	0.016	0.018
			(0.032)	(0.035)	(0.032)	(0.035)
Toehold			-0.166	-0.156	-0.166	-0.157
			(0.103)	(0.109)	(0.106)	(0.111)
Size			-0.036***	-0.033**	-0.036***	-0.032**
			(0.013)	(0.014)	(0.013)	(0.013)
Deal size			0.001	0.001	0.001	0.001
			(0.002)	(0.002)	(0.002)	(0.002)
Constant	0.659***	0.366***	1.244***	0.873***	1.227***	0.846***
	(0.143)	(0.046)	(0.291)	(0.281)	(0.285)	(0.273)
Industry fixed effects	No	No	No	No	Yes	Yes
Observations	1,850	1,699	807	741	807	741
R-squared	0.009	0.011	0.242	0.242	0.243	0.245

4.4 The effect of the Paris Agreement on ESG score and the bid premium (book value)

Table 8 provides the regression results of how the Paris Agreement influenced the relationship between the target ESG score and the bid premium (book value). Appendix F.2

displays the impact of leaving the Paris Agreement under President Trump and rejoining it under the Biden Administration on this relationship.

The results show that the Paris Agreement has no significant influence on the relationship between the ESG score or environmental score and the bid premium. As such, the regression fails to reject the null hypothesis that the relationship between the ESG score and the bid premium became stronger after the Paris Agreement. This can be explained by the previously discussed reasoning, namely the short time frame and failure of the United States to achieve its commitments. The Paris Agreement dummy is statistically significant and positive in columns 2, 4 and 6.

Table 8. OLS regression of the Paris Agreement on ESG or environmental score and bid premium (book value).

This table provides the OLS regression results that examine the effect of the Paris Agreement on the target ESG score or environmental score and the bid premium (book value). Excluding the squared terms from the regression results in a VIF well below the threshold. As such, it can be concluded that there are no multicollinearity issues in the model. To correct for heteroskedasticity, robust standard errors are used. They are shown in parentheses. The significance is represented by *** $p<0.01$ ** $p<0.05$ and * $p<0.1$.

Premium	(1)	(2)	(3)	(4)	(5)	(6)
ESG	-0.824		-0.023		0.038	
	(0.547)		(0.107)		(0.114)	
ESG * PA	-0.269		-0.138		-0.383	
	(0.768)		(0.200)		(0.287)	
ESG^2	9.96		0.350		-0.060	
	(7.368)		(1.229)		(1.304)	
ESG^2 * PA	-2.743		0.456		3.351	
	(9.124)		(2.213)		(3.093)	
Environmental		-0.477		-0.042		0.011
		(0.346)		(0.063)		(0.060)
Environmental * PA		-0.383		-0.119		-0.203
		(0.432)		(0.097)		(0.129)
E^2		6.678		0.604		0.134
		(6.174)		(0.806)		(0.754)
E^2 * PA		1.04		0.825		2.146
		(6.864)		(1.297)		(1.824)
PA	17.601	10.864*	5.569	3.167*	10.757	4.568**
	(16.376)	(6.453)	(4.44)	(1.637)	(6.544)	(2.142)
Leverage			0.231	0.177	-0.699	-0.773
			(0.651)	(0.681)	(0.919)	(0.946)
Growth			0.001***	0.001**	0.002***	0.002***
			(0.000)	(0.001)	(0.000)	(0.000)
Liquidity			0.218***	0.227***	0.155**	0.162**
			(0.079)	(0.086)	(0.064)	(0.074)
R&D expenses			3.253	3.236	3.332	3.418
			(2.549)	(2.721)	(2.2)	(2.347)
Capital expenditures			4.879	4.672	17.86	19.142
			(3.140)	(3.238)	(16.199)	(17.079)
Cash			-0.133	-0.250	-0.148	-0.138
			(0.699)	(0.751)	(0.429)	(0.454)
Blockholder			-1.886**	-2.427***	-2.834**	-3.613**
			(0.830)	(.926)	(1.393)	(1.605)

Size			-0.927*	-0.999	-1.099*	-1.171*
			(0.546)	(.607)	(.578)	(.637)
Deal size			0.221***	0.233***	0.185**	0.197**
			(0.085)	(0.09)	(0.079)	(0.085)
Constant	22.972**	14.255***	18.835*	20.594*	27.934	31.017
	(9.95)	(4.194)	(9.989)	(11.69)	(17.329)	(19.21)
Industry random effects	No	No	No	No	Yes	Yes
R-Squared	0.008	0.013	0.090	0.100	0.115	0.128
Observations	2,571	2,410	859	784	813	742

4.5 The effect of the relative ESG score on the bid premium (stock price)

The third hypothesis investigates the impact of the relative ESG score (see formula 1) on the bid premium. Table 9 shows the results of the relative ESG score on bid premium (stock price), and in appendix G.1 until G.3, the results from each component are shown.

Considering table 9, column 1 provides the regression results, including only the independent variables. Column 2 shows the outcomes of the independent variables and control variables. In columns 3 and 4, the ESG score of the acquirer, and the acquirer governance score, are added, respectively. Columns 5 until 7 display the same regressions as columns 2 until 4, including the year and industry fixed effects.

Analyzing the outcomes from columns 2 until 4, relative ESG^2 has a significant positive impact. Considering column 4 specifically, the acquirer's ESG score influences the bid premium positively, and the governance score affects the bid premium negatively. This entails that a one unit increase in acquirer's ESG, increases the bid premium by 0.006. Besides, acquirers considered to have a better governance mechanism pay a lower bid premium.

When adding the fixed effects to the regression, columns 6 and 7 show that both ESG and ESG^2 report significant coefficients with opposite signs. Additionally, the R-squared increases when incorporating fixed effects, entailing that the model's fit improves and the noise is reduced. This also explains the difference in significance levels of ESG scores.

Implications are that the acquirer is willing to pay a higher premium for targets with stronger ESG performance compared to acquiring firm up to a certain level. Beyond this threshold, further ESG improvements do not confer additional benefits.

Table 9. OLS regression of relative ESG score on bid premium (stock price).

This table provides the OLS regression results that examine the effect of the relative ESG score on the bid premium (stock price). Excluding the squared terms from the regression results in a VIF well below the threshold. As such, it can be concluded that there are no multicollinearity issues in the model. To correct for heteroskedasticity, robust standard errors are used. They are shown in parentheses. The significance is represented by *** p<0.01 ** p<0.05 and * p<0.1.

Bid premium	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Relative ESG	0.000	0.001	0.001	0.000	0.000	-0.003*	-0.003*
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)
Relative ESG^2	0.071**	0.120**	0.12**	0.103**	0.122**	0.126**	0.118**
	(0.035)	(0.052)	(0.052)	(0.049)	(0.053)	(0.053)	(0.052)
ESG acquirer			0.000	0.006**		-0.005**	-0.002
			(0.002)	(0.002)		(0.002)	(0.003)
Governance acquirer				-0.008***			-0.004*
				(0.002)			(0.002)
Growth		0.000***	0.000***	0.000**	0.000***	0.000***	0.000***
		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Runup		0.938***	0.938***	0.935***	0.910***	0.911***	0.910***
		(0.127)	(0.127)	(0.125)	(0.123)	(0.123)	(0.123)
Liquidity		0.012***	0.012***	0.012***	0.013***	0.012***	0.012***
		(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
R&D expenses		0.504***	0.505***	0.512***	0.497***	0.474***	0.484***
		(0.169)	(0.169)	(0.168)	(0.171)	(0.169)	(0.169)
Capital expenditures		0.083	0.080	-0.023	-0.018	0.024	0.019
		(0.255)	(0.254)	(0.253)	(0.338)	(0.333)	(0.335)
Cash		0.009	0.009	0.006	0.023	0.022	0.021
		(0.033)	(0.033)	(0.033)	(0.033)	(0.033)	(0.033)
Blockholder		-0.159	-0.159	-0.154	-0.174*	-0.181*	-0.182*
		(0.100)	(0.101)	(0.101)	(0.105)	(0.106)	(0.106)
Size		-0.028**	-0.028**	-0.029**	-0.034***	-0.034***	-0.033***
		(0.013)	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)
Deal size		0.001	0.001	0.001	0.001	0.001	0.001
		(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Constant	0.394***	0.792***	0.787***	0.976***	0.903***	1.108***	1.163***
	(0.014)	(0.275)	(0.278)	(0.284)	(0.265)	(0.268)	(0.269)
Year fixed effects	No	No	No	No	Yes	Yes	Yes
Industry fixed effects	No	No	No	No	Yes	Yes	Yes
Observations	1,755	773	773	773	773	773	773
R-squared	0.002	0.236	0.236	0.250	0.278	0.284	0.286

4.6 The effect of the relative ESG score on the bid premium (book value)

Table 10 provides the results of the regression analysis of the relative ESG score on the bid premium (book value). In appendix G.4 until G.6, the results from the individual relative components can be seen. The same methodology as in section 4.5 has been used to analyze the hypothesis. In columns 2 until 4, the relative ESG measure reports a significant negative influence on the bid premium. Additionally, the governance score negatively influences the bid premium. The results report no significant influence when the industry and year random effects are included in the regression. Additionally, including random effects in the regression does not

significantly improve the R-squared of the model.

From this analysis, it can be concluded that the regression fails to reject the null hypothesis that the relative ESG score influences the bid premium. This is in line with the findings in section 4.2, namely that there is no evidence for a relationship between the ESG score and the bid premium (book value). This can be explained by utilizing the book value premium, which ignores intangible assets.

Table 10. OLS regression of relative ESG score on bid premium (book value).

This table provides the OLS regression results that examine the effect of the relative ESG score on the bid premium (book value). Excluding the squared terms from the regression results in a VIF well below the threshold. As such, it can be concluded that there are no multicollinearity issues in the model. To correct for heteroskedasticity, robust standard errors are used. They are shown in parentheses. The significance is represented by *** $p<0.01$ ** $p<0.05$ and * $p<0.1$.

Bid premium	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Relative ESG	-0.025	-0.040**	-0.039**	-0.045**	-0.013	-0.009	-0.009
	(0.100)	(0.020)	(0.019)	(0.019)	(0.015)	(0.024)	(0.023)
Relative ESG^2	3.953	-0.762	-0.765	-0.909	-0.556	-0.577	-0.723
	(2.986)	(0.762)	(0.794)	(0.855)	(0.584)	(0.619)	(0.705)
ESG acquirer			0.003	0.056		0.011	0.067
			(0.037)	(0.060)		(0.054)	(0.103)
Governance acquirer				-0.077*			-0.066
				(0.043)			(0.066)
Leverage		0.463	0.460	0.382	-0.835	-0.823	-0.845
		(0.717)	(0.714)	(0.697)	(0.933)	(0.916)	(0.914)
Growth		0.001**	0.001**	0.001**	0.002***	0.002***	0.002***
		(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)
Liquidity		0.241***	0.241***	0.241***	0.178***	0.180**	0.181**
		(0.082)	(0.084)	(0.083)	(0.068)	(0.073)	(0.073)
R&D expenses		3.207	3.209	3.186	3.201	3.210	3.260
		(2.703)	(2.679)	(2.674)	(2.149)	(2.119)	(2.084)
Capital expenditures		4.841	4.799	3.814	18.652	18.585	18.477
		(3.273)	(3.000)	(2.819)	(17.562)	(17.625)	(17.076)
Cash		-0.181	-0.180	-0.190	-0.267	-0.259	-0.271
		(0.749)	(0.742)	(0.744)	(0.559)	(0.542)	(0.552)
Blockholder		-2.043**	-2.036**	-1.971**	-3.331*	-3.331*	-3.339*
		(0.813)	(0.807)	(0.814)	(1.774)	(1.773)	(1.757)
Size		-0.965*	-0.967	-0.978	-1.226**	-1.227**	-1.223**
		(0.582)	(0.602)	(0.604)	(0.618)	(0.623)	(0.616)
Deal size		0.231***	0.231***	0.230***	0.194**	0.194**	0.194**
		(0.086)	(0.087)	(0.086)	(0.084)	(0.084)	(0.084)
Constant	8.044***	19.522*	19.451*	21.228*	30.401	30.086*	31.774
	(0.801)	(11.755)	(10.942)	(11.758)	(19.564)	(18.257)	(19.700)
Year fixed effects	No	No	No	No	Yes	Yes	Yes
Industry fixed effects	No	No	No	No	Yes	Yes	Yes
Observations	2,437	824	824	824	779	779	779
R-squared	0.001	0.087	0.087	0.092	0.148	0.149	0.151

4.7 Robustness check

To ensure that the results are robust, additional analyses are conducted. First, the transactions in which a target or acquirer is a financial firm are added to the sample. Additionally, as financial crises may affect this relationship, deals during this period are excluded from the sample set (Hussaini et al., 2021). The results of hypotheses 1, 2 and 3 can be found in appendix H.1, H.2 and H.33, respectively.

Considering the findings on the first hypothesis, the results remain similar after the conducted robustness tests. In particular, the findings confirm the non-linear relationship between ESG score and bid premium (stock price). Additionally, no evidence is found for a non-linear relationship between ESG score and bid premium (book value).

Appendix H.2 exhibits the results of the robustness test for hypothesis 2. Similar to the previous regressions, the results report no significant influence of the Paris Agreement on the bid premium for both proxies of the bid premium. Interestingly, ESG^2 has a significant negative influence when including fixed effects in the regression.

Regarding the last hypothesis, the robustness tests find identical results as well. A non-linear relationship between the relative ESG score and bid premium (stock price) and an insignificant impact of the relative ESG score on the bid premium (book value) is found.

All in all, after conducting several robustness tests, none of the outcomes were altered. This indicates that the findings from the previous sections remain robust, thereby strengthening the reliability of the results.

5. Discussion

This paper contributes to the existing literature on ESG scores and acquisition premia. However, this study has some limitations, which in turn shed light on potential topics for future research.

First, as information on ESG scores and stock prices only exists for public firms, this paper is prone to self-selection bias. To overcome this issue, the author used a premium based on the book value and a 4-digit industry average as a proxy for ESG scores for private firms. As such, the ESG score does not represent the actual ESG score but an industry average.

Second, although ESG scores are highly used in the literature, they are not objective, as companies broadcast them (Duque-Grisales & Aguilera-Caracuel, 2019). Subsequently, it could reduce the validity of my research. Even more, Christensen et al. (2021) find that

publishing the ESG scores tend to increase the discrepancies among different ESG ratings rather than improve them.

Third, the sample consists of transactions in the United States, resulting in a relatively small sample set. Consequently, it is hard to generalize the results to other countries.

6. Conclusion

Given the inconclusive results in the literature on the impact of CSR on firm value and bid premium, examining how the target ESG score is related to the bid premium is interesting. Next to that, the increased importance of including sustainability in a firm's corporate strategy resulting from the Paris Agreement and Sustainable Development Goals makes understanding this relationship crucial for investors and policymakers.

Using a sample consisting of 2,889 transactions in the United States from 2002 until 2022, this paper provides novel evidence on the relationship between ESG score and bid premium for private and public firms. The findings report evidence for a non-linear influence of ESG score on the bid premium (stock price). This research finds no indication of a non-linear relationship between the ESG score and the bid premium (book value). One potential explanation for these disparate results may be attributed to the omission of intangible assets in calculating the bid premium (book value). Additionally, the Paris Climate Accords do not influence the relationship between the ESG score and both proxies of the bid premium. This can be justified by the relatively short time frame since the implementation of the Paris Climate Accords. All findings are robust to additional tests. My work implies that target shareholders of public firms can earn takeover gains by strengthening their ESG scores.

Future research could investigate this relationship further, especially considering the relationship for private firms. For example, ESG data from additional databases such as Sustainalytics and KLD or questionnaires and interviews could be examined. Besides, it is interesting to investigate this relation using an international sample to test whether these results are generalizable. In addition, as noted previously, the effects of the Paris Climate Accords might not be observable yet. Therefore, it is interesting to explore this relationship further in the future.

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Appendix

Appendix A. Sample refinement.

This table provides an overview of how the final number of deals is reached.	
Deals in the United States between January 1st, 2002, and 1st October 2022	30,113
Missing identification number	10,493
Missing information on premium	14,793
Missing SIC code	7
Missing information on ESG score	772
SIC code between 60 and 67	1,159
Remaining sample	**2,889**

Appendix B. ESG Weights.

Pillar	Category	Indicators in rating	Weights individual	Weights ESG
Environmental	Resource Use	19	31%	11%
	Emissions	22	36%	12%
	Innovation	20	33%	11%
Social	Workforce	29	46%	16%
	Human Rights	8	13%	4.5%
	Community	14	22%	8%
	Product Responsibility	12	19%	7%
Governance	Management	34	63%	19%
	Shareholders	12	22%	7%
	CSR Strategy	8	15%	4.5%

The weights are retrieved from Thomson Reuters Eikon (2018).

Appendix C. Control variable description and measurement.

This table provides an overview of the control variables and how they are measured.

Variable	Definition/Measure
Leverage	Leverage is calculated as the total long-term debt over the total assets (Dionne et al., 2015).
Growth	Sales growth is defined as sales at year t minus sales at year t-1 divided by sales at year t-1 (Dionne et al., 2015).
Runup	Runup period is measured as the natural logarithm of the target stock price 1 day before the announcement over the target's stock price 42 days before the announcement (Gomes & Marsat, 2018).
Liquidity	The current ratio is defined as the current assets divided by the current liabilities (Gomes & Marsat, 2018).
R&D expenses	R&D expenses is computed as the R&D expenses scaled by the total assets (Gomes & Marsat, 2018)
Capital expenditures	Capital expenditures are scaled by the total assets (Gomes & Marsat, 2018).
Cash	Cash is defined as an indicator variable equal to 1 if a deal is paid all in cash.
Toehold	Toehold is measured as a dummy variable equal to 1 if the acquirer held more than 5% of the target shares prior to the acquisition and 0 otherwise (Dionne et al., 2015).
Size	Size is calculating by taking the natural logarithm of total assets (Comment & Schwert, 1995).
Deal size	Deal size is quantified as the natural logarithm of the total deal size in USD (Jost et al., 2021).

Appendix D. Correlation matrix.

This table provides an overview of the correlation between the dependent, independent and control variables. Correlations higher than 0.3, which are considered as moderate, are bold.

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)
(1) Premium (stock price)	1.000																				
(2) Premium (book value)	0.079	1.000																			
(3) ESG	-0.062	-0.052	1.000																		
(4) ESG^2	-0.051	-0.045	**0.976**	1.000																	
(5) E	-0.031	-0.073	**0.883**	**0.874**	1.000																
(6) E^2	-0.020	-0.050	**0.828**	**0.874**	**0.939**	1.000															
(7) S	-0.053	-0.039	**0.850**	**0.818**	**0.623**	**0.594**	1.000														
(8) S^2	-0.043	-0.038	**0.844**	**0.850**	**0.637**	**0.634**	**0.970**	1.000													
(9) G	-0.075	-0.035	**0.713**	**0.686**	**0.481**	**0.439**	**0.432**	**0.430**	1.000												
(10) G^2	-0.070	-0.038	**0.699**	**0.705**	**0.487**	**0.469**	**0.417**	**0.435**	**0.974**	1.000											
(11) Leverage	-0.026	0.336	-0.017	-0.017	0.003	-0.005	-0.042	-0.036	-0.018	-0.018	1.000										
(12) Growth	0.025	0.012	-0.020	-0.018	-0.027	-0.022	-0.011	-0.014	-0.019	-0.017	-0.004	1.000									
(13) Runup	0.312	0.176	0.006	0.012	0.023	0.036	-0.003	0.000	-0.009	-0.008	0.141	-0.007	1.000								
(14) Liquidity	0.073	0.002	-0.009	-0.010	-0.011	-0.008	0.000	-0.004	-0.017	-0.018	-0.049	0.014	0.017	1.000							
(15) R&D expenses	0.071	0.186	-0.115	-0.104	-0.123	-0.092	-0.059	-0.063	-0.129	-0.124	0.159	0.029	-0.007	-0.034	1.000						
(16) Capex	0.081	0.035	-0.004	0.007	-0.010	0.028	0.042	0.040	-0.042	-0.033	-0.089	-0.044	-0.023	0.181	0.061	1.000					
(17) Toehold	-0.069	-0.028	-0.030	-0.026	-0.024	-0.021	-0.033	-0.027	-0.028	-0.031	0.000	-0.005	-0.040	-0.009	0.017	-0.013	1.000				
(18) Deal size	-0.038	-0.037	0.024	0.016	0.025	0.010	0.011	0.003	0.010	0.003	0.010	-0.012	0.046	-0.018	-0.081	-0.034	-0.027	1.000			
(19) Size	-0.160	**-0.416**	0.089	0.080	0.114	0.085	0.037	0.034	0.101	0.095	-0.102	-0.035	0.022	-0.037	**-0.329**	-0.095	0.043	**0.458**	1.000		
(20) Cash	0.044	-0.060	-0.003	-0.002	-0.024	-0.015	0.024	0.024	0.005	0.012	-0.048	-0.008	0.013	-0.024	-0.006	0.076	0.039	-0.123	-0.043	1.000	
(21) Paris Agreement	0.010	0.027	0.031	0.004	-0.019	-0.030	0.067	0.018	-0.059	-0.082	0.000	-0.024	-0.002	0.036	-0.035	0.023	-0.021	0.063	-0.022	-0.134	1.000

Appendix E.1. Hausman test (premium stock price).

This table shows that the null hypothesis is rejected at a significance level of 5%, indicating that fixed effect should be used in the regression with bid premium.

$Chi2(12) = (b - B)'[(V_b - V_B)^{-1}](b - B)$	41.39
$Prob > chi2$	0.0000

Appendix E.2. Hausman test (premium book value).

This table shows that the test fails to reject the null hypothesis at a significance level of 5%, indicating that random effect should be used in the regression with bid premium.

$Chi2(11) = (b - B)'[(V_b - V_B)^{-1}](b - B)$	9.56
$Prob > chi2$	0.5701

Appendix E.3. Wald test for an OLS regression (premium stock price).

This table shows that the null hypothesis is rejected at a significance level of 5%, indicating that the coefficients of the control variables are not simultaneously equal to 0. In other words, including control variables in the model improves the fit.

F (10, 795)	11.30
Prob > F	0.0000

Appendix E.4. Wald test for an OLS regression (premium book value).

This table shows that the null hypothesis is rejected at a significance level of 5%, indicating that the coefficients of the control variables are not simultaneously equal to 0. In other words, including control variables in the model improves the fit.

F (11, 847)	5.14
Prob > F	0.0000

Appendix F.1. OLS regression of the Trump and Biden effect on ESG score or environmental score and bid premium (stock price).

This table provides OLS regression results that examine the effect of the withdrawal of the Paris Agreement under President Trump and the rejoining under President Biden on the relationship between the target ESG or environmental score and the bid premium (stock price). Excluding the squared terms from the regression results in a VIF well below the threshold. As such, it can be concluded that there are no multicollinearity issues in the model. To correct for heteroskedasticity, robust standard errors are used. They are shown in parentheses. The significance is represented by *** p<0.01 ** p<0.05 and * p<0.01.

Bid premium	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
ESG	-0.017***		-0.016***		-0.016***		-0.016***	
	(0.006)		(0.006)		(0.006)		(0.006)	
ESG * PAT	0.003		0.002					
	(0.026)		(0.025)					
ESG * PAB					0.004		0.002	
					(0.031)		(0.031)	
ESG^2	0.214***		0.212***		0.211***		0.209***	
	(0.076)		(0.077)		(0.076)		(0.077)	
ESG^2 *PAT	-0.062		-0.059					
	(0.310)		(0.301)					
ESG^2 * PAB					-0.114		-0.098	
					(0.365)		(0.363)	
Environmental		-0.004		-0.004		-0.004		-0.004
		(0.003)		(0.003)		(0.003)		(0.003)
Environmental * PAT		-0.004		-0.004				
		(0.016)		(0.015				
Environmental * PAB						-0.010		-0.011
						(0.023)		(0.023)
E^2		0.107**		0.102*		0.108		0.102
		(0.052)		(0.053)		(0.052)		(0.053)
E^2 *PAT		-0.003		-0.003				
		(0.216)		(0.210)				
E^2 * PAB						0.043		0.059
						(0.301)		(0.302)
PAT	0.169	0.269	0.175	0.268				
	(0.522)	(0.219)	(0.509)	(0.218)				
PAB					0.264	0.441	0.293	0.453
					(0.626)	(0.318)	(0.625)	(0.318)
Constant	1.240***	0.905***	1.216***	0.874***	1.252***	0.922***	1.233***	0.895***
	(0.281)	(0.277)	(0.276)	(0.270)	(0.277)	(0.273)	(0.274)	(0.267)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	No	Yes	No	Yes	No	Yes	No	Yes
Observations	807	741	807	741	807	741	807	741
R-squared	0.247	0.246	0.248	0.249	0.248	0.249	0.249	0.251

Appendix F.2 OLS regression of the Trump and Biden effect on ESG score or environmental score and bid premium (book value).

This table provides OLS regression results that examine the effect of the withdrawal of the Paris Agreement under President Trump and the rejoining under President Biden on the relationship between the target ESG or environmental score and the bid premium (book value). Excluding the squared terms from the regression results in a VIF well below the threshold. As such, it can be concluded that there are no multicollinearity issues in the model. To correct for heteroskedasticity, robust standard errors are used. They are shown in parentheses. The significance is represented by *** $p<0.01$ ** $p<0.05$ and * $p<0.01$.

Bid premium	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
ESG	0.004		0.054		0.011		0.050	
	(0.099)		(0.100)		(0.099)		(0.100)	
ESG * PAT	0.008		-0.484					
	(0.331)		(0.446)					
ESG * PAB					0.161		-0.086	
					(0.154)		(0.242)	
ESG^2	-0.181		-0.424		-0.367		-0.439	
	(1.108)		(1.098)		(1.125)		(1.106)	
ESG^2 *PAT	-1.854		4.302					
	(3.792)		(5.041)					
ESG^2 * PAB					-2.109		1.290	
					(1.817)		(2.907)	
Environmental		-0.052		-0.002		-0.063		-0.016
		(0.056)		(0.056)		(0.055)		(0.054))
Environmental * PAT		-0.161		-0.291				
		(0.016)		(0.211)				
Environmental * PAB						0.068		0.081
						(0.091)		(0.128)
E^2		0.515		0.142		0.574		0.298
		(0.719)		(0.649)		(0.713)		(0.628)
E^2 *PAT		1.425		3.651				
		(2.151)		(2.842)				
E^2 * PAB						-0.945		-0.810
						(1.160)		(1.729)
PAT	4.481	4.633*	13.529	5.818*				
	(7.138)	(2.647)	(9.865)	(3.460)				
PAB					-2.464	-0.627	1.469	-1.259
					(3.290)	(1.529)	(5.038)	(1.992)
Constant	18.449*	20.867*	27.264	30.921	18.12*	20.674*	26.961	30.528
	(9.959)	(11.751)	(17.394)	(19.295)	(9.988)	(11.775)	(17.516)	(19.401)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry random effects	No	Yes	No	Yes	No	Yes	No	Yes
Observations	859	784	813	742	859	784	813	742
R-squared	0.090	0.010	0.113	0.127	0.083	0.094	0.107	0.120

Appendix G.1. OLS regression of relative environmental score on bid premium (stock price).

This table provides OLS regression results that examine the effect of the relative environmental score on the bid premium (stock price). Excluding the squared terms from the regression results in a VIF well below the threshold. As such, it can be concluded that there are no multicollinearity issues in the model. To correct for heteroskedasticity, robust standard errors are used. They are shown in parentheses. The significance is represented by *** $p<0.01$ ** $p<0.05$ and * $p<0.1$.

Bid premium	(1)	(2)	(3)	(4)	(5)	(6)
Relative	0.000	0.001	0.000	0.000	-0.001	-0.001
Environmental	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)
Relative E^2	0.060*	0.055*	0.044	0.053*	0.062*	0.057*
	(0.031)	(0.031)	(0.031)	(0.032)	(0.033)	(0.033)
E acquirer		0.001	0.004***		-0.003	-0.001
		(0.001)	(0.001)		(0.002)	(0.002)
G acquirer			-0.008***			-0.005***
			(0.002)			(0.002)
Constant	0.842***	0.819***	1.116***	0.907***	0.939***	1.107***
	(0.296)	(0.295)	(0.302)	(0.283)	(0.279)	(0.283)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	No	No	No	Yes	Yes	Yes
Industry fixed effects	No	No	No	Yes	Yes	Yes
Observations	702	702	702	702	702	702
R-squared	0.232	0.234	0.254	0.283	0.285	0.292

Appendix G.2. OLS regression of relative social score on bid premium (stock price).

This table provides OLS regression results that examine the effect of the relative social score on the bid premium (stock price). Excluding the squared terms from the regression results in a VIF well below the threshold. As such, it can be concluded that there are no multicollinearity issues in the model. To correct for heteroskedasticity, robust standard errors are used. They are shown in parentheses. The significance is represented by *** $p<0.01$ ** $p<0.05$ and * $p<0.1$.

Bid premium	(1)	(2)	(3)	(4)	(5)	(6)
Relative	-0.001	-0.001	-0.001	-0.002	-0.003**	-0.003**
Social	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Relative S^2	0.073*	0.073*	0.081**	0.080*	0.082*	0.085*
	(0.041)	(0.041)	(0.04)	(0.044)	(0.045)	(0.043)
S acquirer		0.001	0.003*		-0.003*	-0.001
		(0.002)	(0.002)		(0.002)	(0.002)
G acquirer			-0.006***			-0.004**
			(0.002)			(0.002)
Constant	0.845***	0.810***	0.915***	0.956***	1.106***	1.165***
	(0.276)	(0.285)	(0.288)	(0.263)	(0.274)	(0.274)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	No	No	No	Yes	Yes	Yes
Industry fixed effects	No	No	No	Yes	Yes	Yes
Observations	773	773	773	773	773	773
R-squared	0.235	0.236	0.247	0.279	0.281	0.287

Appendix G.3. OLS regression of relative governance score on bid premium (stock price).

This table provides OLS regression results that examine the effect of the relative governance score on the bid premium (stock price). Excluding the squared terms from the regression results in a VIF well below the threshold. As such, it can be concluded that there are no multicollinearity issues in the model. To correct for heteroskedasticity, robust standard errors are used. They are shown in parentheses. The significance is represented by *** p<0.01 ** p<0.05 and * p<0.1.

Bid premium	(1)	(2)	(3)	(4)	(5)	(6)
Relative governance	0.001	-0.001	-0.001	0.001	-0.001	-0.001
	(0.001)	(0.002)	(0.002)	(0.001)	(0.002)	(0.002)
Relative G^2	0.078*	0.058	0.058	0.109**	0.087**	0.087**
	(0.045)	(0.046)	(0.046)	(0.044)	(0.043)	(0.043)
G score acquirer		-0.004**	-0.004**		-0.004**	-0.004**
		(0.002)	(0.002)		(0.002)	(0.002)
Constant	0.764***	0.987***	0.987***	0.841***	1.080***	1.080***
	(0.278)	(.297)	(.297)	(0.267)	(0.279)	(0.279)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	No	No	No	Yes	Yes	Yes
Industry fixed effects	No	No	No	Yes	Yes	Yes
Observations	773	773	773	773	773	773
R-squared	0.235	0.240	0.240	0.279	0.283	0.283

Appendix G.4. OLS regression results of relative environmental score on bid premium (book value).

This table provides OLS regression results that examine the effect of the relative environmental score on the bid premium (book value). Excluding the squared terms from the regression results in a VIF well below the threshold. As such, it can be concluded that there are no multicollinearity issues in the model. To correct for heteroskedasticity, robust standard errors are used. They are shown in parentheses. The significance is represented by *** p<0.01 ** p<0.05 and * p<0.1.

Bid premium	(1)	(2)	(3)	(4)	(5)	(6)
Relative environmental	-0.035**	-0.043***	-0.045***	-0.005	-0.002	-0.003
	(0.016)	(0.017)	(0.017)	(0.011)	(0.024)	(0.024)
Relative E^2	-0.428	-0.347	-0.383	-0.273	-0.296	-0.314
	(0.460)	(0.526)	(0.541)	(0.354)	(0.408)	(0.420)
E acquirer		-0.023	-0.012		0.007	0.017
		(0.028)	(0.032)		(0.052)	(0.063)
G acquirer			-0.033			-0.026
			(0.030)			(0.042)
Constant	21.451*	21.573*	22.779*	33.667	33.647	34.733
	(12.845)	(12.772)	(13.325)	(21.378)	(21.238)	(22.267)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year random effects	No	No	No	Yes	Yes	Yes
Industry random effects	No	No	No	Yes	Yes	Yes
Observations	744	744	744	702	702	702
R-squared	0.094	0.095	0.096	0.154	0.154	0.154

Appendix G.5. OLS regression of relative social score on bid premium (book value).

This table provides OLS regression results that examine the effect of the relative social score on the bid premium (book value). Excluding the squared terms from the regression results in a VIF well below the threshold. As such, it can be concluded that there are no multicollinearity issues in the model. To correct for heteroskedasticity, robust standard errors are used. They are shown in parentheses. The significance is represented by *** $p<0.01$ ** $p<0.05$ and * $p<0.1$.

Bid premium	(1)	(2)	(3)	(4)	(5)	(6)
Relative social	-0.027*	-0.013	-0.014	-0.007	0.006	0.006
	(0.015)	(0.018)	(0.018)	(0.013)	(0.022)	(0.022)
Relative S^2	-0.935*	-0.926*	-0.861	-0.409	-0.460	-0.445
	(0.566)	(0.557)	(0.545)	(0.372)	(0.428)	(0.437)
S acquirer		0.034	0.055		0.033	0.049
		(0.043)	(0.049)		(0.061)	(0.072)
G acquirer			-0.046**			-0.037
			(0.023)			(0.034)
Constant	19.363*	17.907*	18.763*	30.267	29.152*	30.21*
	(11.645)	(10.057)	(10.314)	(19.522)	(17.572)	(18.319)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year random effects	No	No	No	Yes	Yes	Yes
Industry random effects	No	No	No	Yes	Yes	Yes
Observations	824	824	824	779	779	779
R-squared	0.087	0.089	0.092	0.148	0.150	0.151

Appendix G.6. OLS regression of relative governance score on bid premium (book value).

This table provides OLS regression results that examine the effect of the relative governance score on the bid premium (book value). Excluding the squared terms from the regression results in a VIF well below the threshold. As such, it can be concluded that there are no multicollinearity issues in the model. To correct for heteroskedasticity, robust standard errors are used. They are shown in parentheses. The significance is represented by *** $p<0.01$ ** $p<0.05$ and * $p<0.1$.

Bid premium	(1)	(2)	(3)	(4)	(5)	(6)
Relative G	-0.030*	-0.061***	-0.061***	-0.009	-0.031	-0.031
	(0.018)	(0.023)	(0.023)	(0.014)	(0.023)	(0.023)
Relative G^2	-0.689	-0.966	-0.966	-0.621	-0.781	-0.781
	(0.641)	(0.706)	(0.706)	(0.515)	(0.576)	(0.576)
G acquirer		-0.060**	-0.060**		-0.043	-0.043
		(0.024)	(0.024)		(0.03)	(0.03)
Constant	19.467*	22.339*	22.339*	30.567	33.052	33.052
	(11.787)	(12.129)	(12.129)	(19.687)	(20.485)	(20.485)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year random effects	No	No	No	Yes	Yes	Yes
Industry random effects	No	No	No	Yes	Yes	Yes
Observations	824	824	824	779	779	779
R-squared	0.086	0.091	0.091	0.148	0.149	0.149

Appendix H.1. Robustness check hypothesis 1.

This table provides the results of the robustness check. Columns 1 until 4 add financial firms to the sample. Columns 1 and 2 show the results of ESG score on the bid premium (stock price). Columns 3 and 4 display the results of the ESG score on the bid premium (book value). Columns 5 until 8 exclude the financial crises years from the sample set. Columns 5 and 6 exhibit the results of ESG score on the bid premium (stock price). Columns 7 and 8 present the results of the ESG score on the bid premium (book value). Excluding the squared terms from the regression results in a VIF well below the threshold. As such, it can be concluded that there are no multicollinearity issues in the model. To correct for heteroskedasticity, robust standard errors are used. They are shown in parentheses. The significance is represented by *** $p<0.01$ ** $p<0.05$ and * $p<0.1$.

Bid premium	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
ESG	-0.018***	-0.025***	0.035	-0.027	-0.011*	-0.020***	0.041	-0.009
	(0.006)	(0.006)	(0.088)	(0.088)	(0.006)	(0.007)	(0.076)	(0.083)
ESG^2	0.231***	0.275***	-0.649	0.282	0.149*	0.212**	-0.877	-0.204
	(0.071)	(0.078)	(0.992)	(1.043)	(0.082)	(0.090)	(0.964)	(0.984)
Constant	1.252***	1.607***	16.806*	28.061*	1.262***	1.726***	4.552	5.564*
	(0.290)	(0.277)	(9.544)	(16.922)	(0.320)	(0.308)	(2.783)	(3.223)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	No	Yes	No	Yes	No	Yes	No	Yes
Year effects	No	Yes	No	Yes	No	Yes	No	Yes
Observations	850	850	911	848	692	692	733	695
R-squared	0.236	0.290	0.085	0.140	0.265	0.311	0.110	0.193

Appendix H.2. Robustness check hypothesis 2.

This table provides the results of the robustness check. Columns 1 until 4 add financial firms to the sample. Columns 1 and 2 show the results of how the Paris Agreement influenced the ESG score and the bid premium (stock price) relationship. Columns 3 and 4 display the influence of the Paris Agreement on the ESG score and the bid premium (book value). Columns 5 until 8 exclude the financial crises years from the sample set. Columns 5 and 6 exhibit the results of the Paris Agreement on the ESG score and the bid premium (stock price). Columns 7 and 8 present how the Paris Agreement influenced the results of the ESG score on the bid premium (book value). Excluding the squared terms from the regression results in a VIF well below the threshold. As such, it can be concluded that there are no multicollinearity issues in the model. To correct for heteroskedasticity, robust standard errors are used. They are shown in parentheses. The significance is represented by *** $p<0.01$ ** $p<0.05$ and * $p<0.1$.

Bid premium	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
ESG	-0.019***	-0.018***	-0.006	0.054	-0.011*	-0.012*	0.027	0.076
	(0.006)	(0.006)	(0.097)	(0.118)	(0.006)	(0.006)	(0.087)	(0.087)
ESG * PA	-0.012	-0.012	-0.062	-0.377	-0.015	-0.016	-0.209	-0.211
	(0.018)	(0.018)	(0.188)	(0.284)	(0.018)	(0.018)	(0.194)	(0.192)
ESG^2	0.249***	0.246***	0.116	-0.351	0.150*	0.161**	-0.396	-0.765
	(0.074)	(0.075)	(1.120)	(1.371)	(0.080)	(0.081)	(1.147)	(1.134)
ESG^2 * PA	0.108	0.109	-0.252	3.395	0.154	0.163	1.427	1.496
	(0.206)	(0.206)	(2.085)	(3.079)	(0.213)	(0.212)	(2.203)	(2.068)
PA	0.361	0.366	3.601	10.403	0.406	0.436	6.710	6.771
	(0.384)	(0.386)	(4.15)	(6.448)	(0.364)	(0.364)	(4.204)	(4.464)
Constant	1.322***	1.297***	17.718*	26.225	1.317***	1.327***	5.08*	3.34
	(0.289)	(0.283)	(9.616)	(16.368)	(0.316)	(0.312)	(3.042)	(3.141)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	No	Yes	No	Yes	No	Yes	No	Yes
Observations	850	850	911	848	692	692	733	695
R-squared	0.242	0.243	0.09	0.112	0.271	0.273	0.123	0.136

Appendix H.3. Robustness check hypothesis 3.

This table provides the results of the robustness check. Columns 1 until 4 add financial firms to the sample. Columns 1 and 2 show the results of the relative ESG score on the bid premium (stock price). Columns 3 and 4 display the results of the relative ESG score on the bid premium (book value). Columns 5 until 8 exclude the financial crises years from the sample set. Columns 5 and 6 exhibit the results of the relative ESG score on the bid premium (stock price). Columns 7 and 8 present the results of the relative ESG score on the bid premium (book value). Excluding the squared terms from the regression results in a VIF well below the threshold. As such, it can be concluded that there are no multicollinearity issues in the model. To correct for heteroskedasticity, robust standard errors are used. They are shown in parentheses. The significance is represented by *** $p<0.01$ ** $p<0.05$ and * $p<0.1$.

Bid premium	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Relative ESG	-0.001	-0.003**	-0.036**	-0.015	0.000	-0.003*	-0.035*	-0.027
	(0.001)	(0.002)	(0.018)	(0.022)	(0.001)	(0.002)	(0.019)	(0.020)
Relative ESG^2	0.102**	0.107**	-0.664	-1.033	0.120**	0.134**	-0.292	0.125
	(0.043)	(0.044)	(0.699)	(0.785)	(0.053)	(0.057)	(0.529)	(0.508)
ESG acquirer	0.005**	-0.002	0.050	0.060	0.007***	0.000	0.001	-0.049*
	(0.002)	(0.003)	(0.053)	(0.094)	(0.002)	(0.003)	(0.016)	(0.026)
Governance	-0.008***	-0.003	-0.063*	-0.056	-0.009***	-0.005*	-0.030	0.029
acquirer	(0.002)	(0.002)	(0.037)	(0.060)	(0.002)	(0.003)	(0.019)	(0.020)
Constant	-0.001	-0.003**	-0.036**	-0.015	1.206***	1.431***	6.577**	4.649
	(0.001)	(0.002)	(0.018)	(0.022)	(0.310)	(0.288)	(2.801)	(2.996)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	No	Yes	No	Yes	No	Yes	No	Yes
Year effects	No	Yes	No	Yes	No	Yes	No	Yes
Observations	812	812	870	810	666	666	707	670
R-squared	0.239	0.279	0.092	0.147	0.284	0.279	0.114	0.198