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Navn:	Åke Johannes Sundvall og Axel Carl Eric Åström

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The Price of Virtuous Mergers and Acquisitions

An investigation of different ESG scores' effect on M&A deal premium

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Abstract

By using ESG scores from three different data providers (Bloomberg, Refinitiv and Sustainalytics) this thesis aims to investigate their respective impacts on deal premia in M&A activities. The sample construction is based on individual samples for each provider, as well as a common sample. The thesis is able to prove that multiple ESG score providers are statistically significant on a 10% level in relation to M&A deal premia. However, these results are not consistent across data providers, where Bloomberg was the only provider showing significant results across regressions. It also manages to show that different data providers offer supplementary information. As such, we see statistically significant coefficients for the interaction terms involving Bloomberg, potentially displaying Bloomberg's ability to offer supplementing information prior to target valuation.

Contents

1 Introduction

Environmental, social, and governance aspects, also known as "ESG", have long been significant factors for retail and institutional investors in making investment decisions. Against the background of heightened scrutiny from both regulatory bodies and the general public with respect to corporate responsibility, investors are becoming increasingly aware of the risks associated with poor ESG management, including reputational, financial and regulatory risks. Correspondingly, so-called ESG scores, i.e. ratings measuring a company's abilities to adhere to the three pillars of ESG, have come to play a more significant role as it allows investors to gain more information about an investment target. However, according to Berg, Kölbel, and Rigobon (2022), the ESG score of a target may differ significantly depending on which data provider has provided the score, resulting in uncertainties among investors about the true ESG performance of a the target (Christensen, George. Serafeim, and Sikochi 2022). Conflicting results may in turn disincentivize investors from including ESG aspects in their decision-making processes, and diminish the general usability of ESG scores among investor groups. Other scholars, such as G. Serafeim and Yoon (2022) however, argue that multiple ESG scores, despite their inconsistencies, may be used in tandem to create a consensus about the target's ESG performance. This thesis therefore seeks to examine the impact that ESG scores have on investment decisions and to determine whether the use of different data providers may result in disparate valuation of investment targets.

In order to fulfill the purpose of this thesis, we use corporate transaction premium as a proxy for investment valuation. Previous research suggests that M&A activities and ESG have a multi-level relationship, in which synergies may be created, information asymmetries mitigated and further corporate value enhanced (Aktas, De Bodt, and Cousin 2011; Porter and Kramer 2006; G. Serafeim and Yoon 2022). In addition, deal premia in M&A are the preferred proxy of underlying target value because of the extensive due diligence performed by potential bidders. The acquirer possesses more detailed information about the target, thus

classifying them as a more informed investor than any retail investor. This infers that bidders are more likely to correctly value the target and its existing assets, as well as the potential synergies.

We use OLS regression on each data provider separately to determine the significance of ESG scores on deal premia. The regressions include multiple factors related to ESG, so-called control variables, which might enhance or diminish the effect of the ESG scores. These control variables are based on theoretical foundation, gathered from previous literature within the field of M&A. The OLS analysis is supplemented with Two-Staged Least Square regressions, to mitigate the potential endogeneity issues affecting the results. OLS analysis is also used to investigate the effect of combining the ESG scores, creating interaction terms between the data providers to determine the consistency of impact when using multiple data providers.

The empirical results from the thesis point towards ESG scores having an impact on M&A premia, as both Bloomberg and Sustainalytics show significant coefficients on a 10% level. We do observe similar effects between Bloomberg's and Sustainalytic's individual samples, as increasing ESG performance is seemingly raising deal premia with 0.22 to 0.3 percentage points per ESG score point. However, the empirical findings also suggest that these effects vary across data providers, as each ESG score impacts the premium differently. While Bloomberg remains significant in the common sample, both Sustainalytics and Refinitiv are insignificant, meaning there exist general inconsistencies between ESG score providers. Furthermore, the findings show signs of ESG scores offering supplementing information, as the interaction terms between Bloomberg and Sustainalytics, as well as Bloomberg and Refinitiv, are statistically significant on a 10% level. However, even these results are inconsistent, as we cannot observe these effects between all data providers.

The thesis proceeds with a literature review of previous research covering M&A

incentives, how ESG relates to M&A, and the discrepancy of ESG scores. It continues with presenting the hypotheses to be tested and the data selection process, as well as the methodology to conduct the analysis, followed by robustness tests to determine the legitimacy of the results. Lastly, the empirical results are presented, succeeded by analysis and conclusions, along with recommendations for future research.

2 Literature Review

In recent years, there has been a significant amount of research dedicated to exploring the relationship between ESG factors and M&A activity. In order to understand the importance of ESG in relation to deal premia, a review of the basic features of M&A is necessary. The literature review will therefore include an overview of the traditional incentives for engagement in M&A activity, and how such activities relate to ESG. This section will also describe factors traditionally known to impact deal premia. Furthermore, the literature review aims to examine past research on whether investment decisions may be impacted by discrepancies in ESG scores, and in what ways ESG scores may be used in combination with each other.

2.1 Incentives for M&A activities

According to existing literature, corporations may have several motives for engaging in M&A activities. Typically, such motives may include the realization of value synergies or the improvement of organizational structures. These will be described in further detail below.

2.1.1 Realizing synergies

Jensen and Ruback (1983) describe the realization of synergies as the increased value that emerges when the operations of two corporations are combined. Examples of such synergies include economies of scale and economies of scope, which depicts how a corporation can decrease the costs of its operations by either scaling up its production or increasing its product offering (Motis 2007). Synergies may also be achieved by gaining market shares through the completion of either a merger or an acquisition. Seth (1990) further explains that reducing the number of key competitors and thereby improving its position towards customers and suppliers, may enable the acquirer of a target entity to increase its market power, and thus increase the entity's overall value.

2.1.2 Organizational improvements

The utilization of M&A activities may also be beneficial for entities that wish to take advantage of underperforming management. Manne (1965) for example concludes that the performance of management should be reflected in the company's stock price, suggesting that the financial performance of a corporation is connected to the competencies of its management. Further, according to Jensen and Ruback (1983), it is possible to increase the value of the corporation by replacing management that does not contribute to the organization's value creation. Damodaran (2005) elaborates this argument by claiming that the synergies created from replacing existing management account for the gains brought up by Jensen and Ruback (1983) such as increased corporate value.

2.1.3 Market imperfections

Although engagement in M&A activities may contribute to realizing synergies, it is important to note that while the selling party will possess extensive knowledge about their own operations, the buyer must simply rely on monitoring and estimates. This may subsequently create an imbalance of information ownership, leading to information asymmetries. The risk of adverse selection is therefore borne by the party submitting the bid of the target. Akerlof (1978) argues that the party possessing the lesser amount of information is forced to handle this situation by treating all deals as "bad", resulting in the bidder seeking to avoid overvaluing the target. Reuer and Ragozzino (2008) show that the value obtained by the acquirer is contingent on the level of information asymmetry between the seller. These findings support the fact that the submitted bid itself is affected by information imbalance and therefore impacts the deal premium.

2.1.4 ESG and M&A

As previously mentioned, ESG has increasingly become a significant factor to consider within the M&A process. Scholars have suggested that ESG can serve multiple purposes in M&A activities, extending from mitigating ESG risk by including environmental, social, and governance aspects in the due diligence process,

to alleviating information asymmetries and enhancing overall corporate value. Historically, two main theories have dominated existing scholarship on ESG and corporate value creation: the shareholder expense theory (Friedman 2007) and the stakeholder theory (Freeman 1984; Porter and Kramer 2006). Presented by Friedman (2007), the shareholder expense view argues that the sole focus of the corporation should be to maximize profits in order to increase the wealth of its shareholders. In other words, the corporation's ultimate social responsibility is towards its shareholders. Accordingly, in relation to deal premia in M&A transactions, any corporate engagement in ESG activities would thus seemingly reduce corporate value, and subsequently have a negative impact on the deal premium.

Conversely, according to the stakeholder theory (Freeman 1984; Porter and Kramer 2006) states that improving the corporation's ESG performance may create competitive advantages, which in turn may lead to improved finances. Such advantages may include improved reputation gains, and in turn enlarged customer bases, as well as efficient organizational culture or management, and refined knowledge transfers between new and existing employees (Porter and Kramer 2006). Pastor, Stambaugh, and Taylor (2021) argue in line with the stakeholder theory, concluding that investors are willing to pay more for what is referred to as "green assets". The authors suggest that investors may accept losing part of the expected return when investing in green assets, as the asset generates positive externalities. In turn, capital flow to ESG friendly corporations will increase, due to lower cost of capital (Pastor, Stambaugh, and Taylor 2021). In relation to M&A, it is thus reasonable to expect that a high ESG performance in this scenario would increase the deal premium of the transaction.

2.1.4.1 Synergy effects

As aforementioned, the concept of synergy realization is highly relevant in M&A activities and may be equally relevant in relation to ESG. In examining the relationship between abnormal returns, and target entities' level of social and environmental performance, Aktas, De Bodt, and Cousin (2011) conclude that deals

that involve target entities with better environmental management tend to result in a higher level of synergy realization, and thus increased value. Additionally, the authors find that acquiring a target with high ESG performance may lead to a positive revision of the acquirer's ESG rating (Aktas, De Bodt, and Cousin 2011). These findings suggest that M&A activities may allow the acquirer to create synergies and enhance their reputational assets. Important to note is however the significance of an accurate valuation of the target to ensure that the full potential of the synergies are realized, as emphasized by Diaz, Sanfilippo Azofra, and López Guitérrez (2013).

Closely related is also the relationship between M&A and a corporation's so-called Corporate Social Responsibility (CSR). Gomes and Marsat (2018) for example investigate whether a corporation's CSR performance affects the deal premium in M&A transactions, and note that the acquisition premium increases with the target entity's perceived CSR qualities. This accordingly indicates that the synergistic effects of an M&A deal will increase if the target entity holds high CSR qualities. Jost, Erben, Ottenstein, and Zülch (2022) however contradict this view by concluding that, from the target entity's perspective, CSR scores show no significant effects on acquisition premia.

2.1.4.2 Information asymmetry

In addition to playing a significant role in relation to synergy realization, ESG scores may also have a strong signaling power because it summarizes a corporation's overall societal, environmental, and governmental impacts. Because it provides investors with enhanced information about the target entity, Ioannou and G. Serafeim (2012) argue that reporting on company-related ESG activities may significantly reduce information asymmetry between the investor and the target entity. Hence, it is plausible to assume that a target entity carrying a high ESG score could utilize its signaling power to affect the premium associated with the deal, using it as a reputational asset. This reasoning is explored by Choi, Petra, and Guar (2015). The authors conclude that when CSR is used as a reputational

asset, the acquirer's concern regarding adverse selection can be mitigated, as a high CSR rating signals a lower overall risk connected to the target entity, and because the target entity would be more absorbent of negative shocks in terms of organizational and reputational risks (A. Nguyen and P. Nguyen 2015). Malik (2014) further argues that buyers bear the costs of reducing the aforementioned risks, why such risks should be reflected in their submitted bid. Moreover, Cormier and Magnan (2014) explains that potential remedies would be direct analyses conducted by professionals, uncovering relevant information and reducing the level of information asymmetry in relation to ESG (Cormier and Magnan 2014).

2.2 Factors of deal premium

In order to determine the effect of ESG scores in relation to M&A activities, it is important to consider other factors that previous research has suggested affects the deal premium. Such factors have been included in the regression analysis as control variables, which will isolate the impact of ESG scores on deal premia. As discussed in previous sections, one such factor is the potential of synergy realization. Dionne, La Haye, and Bergerès (2015) for instance, state that companies with low growth may be more attractive due to the potentially larger gains obtained through the replacement of existing management. In this scenario, ESG could enlarge this effect, as Aktas, De Bodt, and Cousin (2011) find that synergy effects are larger when the target entity has a higher level of CSR performance. Additionally, Gomes and Marsat (2018) further find that higher capital expenditures influence synergy effects. These expenditures could reduce costs and enable synergies to be more easily realized. Moreover, the authors find that synergy effects are easier to realize when they are linked to a certain industry, as there is a lower level of information asymmetry (Gomes and Marsat 2018).

Also related to realizing synergies, Lorderer and Martin (1990) find that acquisitions of large underperforming firms are positively related to the deal premium due to the valuation of potential synergies from improving the operation. Harford and Li (2007) also argue that the size of the firm is positively related to deal pre-

mia because of the potential synergy effects. The authors explain that managers that perform acquisitions are interested in the possible personal gains connected to the M&A activities. Because the size of the personal gains is positively related to the overall size of the target entity, managers are likely to increase the price for a larger target entity.

With respect to information asymmetry, Mantecon (2009) for example asserts that cross-border deals typically possess a higher level of information asymmetry due to cultural and regulatory differences. Similarly, deals that are made between industries, typically referred to as cross-industry deals, are also subject to increased information asymmetry, as they possess less knowledge of the target's operations (Gomes and Marsat 2018). Dionne, La Haye, and Bergerès (2015) further argue that because they possess greater insight into the target's operations, block-holders of the target entity, i.e. shareholders that hold at least 5 percent of a corporation's stock, may significantly mitigate adverse selection, and thus reduce information asymmetry. In addition, information asymmetries may also be related to the size of the target entity. According to Alexandridis, Fuller, Terhaar, and Travlos (2013), the size of the target entity could entail an increased level of complexity, which may increase the level of information asymmetry and, in turn, lower the potential of fully realizing synergies.

In addition, there is an aspect of payment methods with regards to mitigating information asymmetry and reducing counter-party risk. According to Klitzka, He, and Schiereck (2022), cash payments are used more frequently when there is high uncertainty regarding the valuation of the target, to avoid overvaluation of future performance of the target. However, Bruslerie (2013) present an opposing view, as they find that a higher target valuation leads to a higher percentage of cash used in the payment.

Another example of information asymmetry in connection with deal premia is ownership dispersion. Zhang (2019) argues that because the acquirer has better

insight into the target's operations, the acquirer's concentration of ownership will affect the bargaining power of the target entity. Megginson (1990) however, states that the deal premium is rather positively related to the amount of control of the target that the transaction subsequently results in, meaning that a higher percentage of acquired shares would increase the overall price of the target entity.

In addition to the aforementioned control variables, we also include variables that measure the financial performance of the corporation. Dionne, La Haye, and Bergerès (2015) find that highly levered corporations are considered less attractive due to a higher amount of risk, inferring a higher premium paid in the transaction. The authors also include the book-to-market ratio as a relevant variable, as it effectively identifies mispriced targets (Dionne, La Haye, and Bergerès 2015). Research also suggests that the presence of more than one bidder is a driver of the premium that the acquirer ultimately pays. Datta, Pinches, and Narayanan (1992) argue that in the presence of more than one bidder, competition among acquirers will arise. This is then reflected in the deal premium, because it positively impacts the target entity's shareholders due to the increase in price adhering from the competition (Flanagan and O'Shaughnessy 2003).

2.3 Discrepancy of ESG scores

In combination with the growing user area of ESG, an increasing amount of available data enables investors to utilize a large number of ESG score providers. As previously mentioned, Berg, Kölbel, and Rigobon (2022) suggests that there is a great divergence in published scores between different providers. The authors point to the fact that the available score providers differ significantly in terms of included parameters, weights, and how certain metrics are measured, which results in low correlation between different ESG scores. As a consequence, corporations that are rated by multiple ESG data providers will potentially perceive different ratings from each data source. For investors, this fact is troubling, as they may face severe difficulties in prioritizing the information received.

In fact, Christensen, George. Serafeim, and Sikochi (2022) found that greater disclosure regarding ESG scores increases the amount of information asymmetry for investors, because it leads to heightened disagreement about the individual target entity's true ESG rating. These results correspond with the conclusions set forth by Berg, Kölbel, and Rigobon (2022). Because information asymmetry is a proven factor to be considered in relation to deal premia, this could potentially indicate that the fundamental analysis of a target entity could severely differ depending on which information is used, ultimately leading to divergent valuations. G. Serafeim and Yoon (2022) on the other hand argue that differing ESG scores may in fact be used to obtain a consensus view of the performance of a target entity. By averaging the available scores from different providers, the investor will receive a comprehensive view of the target (Harai and Brady 2021). By conducting interviews with large institutional investors, Harai and Brady (2021) conclude that 76 percent of the interviewed investors utilize more than one provider when determining how well a potential target performs.

In an article by SustainAbility (2020), based on a questionnaire with institutional investors about their usage of ESG scores, Sustainalytics and Refinitiv are the most used providers. However, even though Bloomberg is not the mainly used provider, it is still used as a supplement to alternative ESG scores (SustainAbility 2020). As most investors rely on the financial data delivered by Bloomberg, they also use ESG scores provided by Bloomberg, to look for consistency between other providers and to flag for bad performance.

2.4 Providers of ESG scores

As suggested in the work by Berg, Kölbel, and Rigobon (2022), each data provider include different information in their respective ESG scores. This section will thus act as a background on how the different providers included in this thesis evaluate companies and create their respective ESG scores.

2.4.1 Refinitiv

Refinitiv is one of the most in-depth ESG-score providers, with a database covering 630 different metrics and almost 85% of the global market. Refinitiv initiated its collection of data in 2002 intending to provide an objective and transparent overall assessment of a company's relative ESG performance (Refinitiv 2022).

The overall scores that a company receives from Refinitiv (2022) can be broken down into smaller subcategories, or pillars, namely Environmental, Social, and Governance. Assessment of a company's performance according to each pillar is based on a selection of metrics that cohere to the sector in which the company operates, in combination with standard metrics. In order to present the scores in relative terms, Refinitiv weighs the scores in the first two subcategories, Environmental and Social, according to how peers perform in the same industry. In terms of the third and last pillar, Governance, performance is evaluated based on the country of incorporation rather than on industry peers, as governance practices are more homogeneous at country level. Following this approach, an overall score for the company is presented.

2.4.2 Bloomberg

Bloomberg ESG scores give investors access to transparent and consistent data with coverage of 88% of the global market and 100 different countries. They have been providing and refining their ESG data on companies since 2006 (Bloomberg 2023).

To determine a score, Bloomberg (2022) captures ESG data from the information that the company provides as well as publicly available documents. Similarly to Refinitiv, Bloomberg applies metrics that are related to the sector that the company operates in to evaluate the overall score of the company. Which metrics used to conduct the evaluation related to the industry are not disclosed to the public. Bloomberg evaluates companies based on their ability to provide disclosure of their ESG-related work, rather than how they perform, which is left to

the investor to decide. Their scoring ranges from 0.1 for companies that have lower disclosure, up to 100 for companies that disclose all of the data points that Bloomberg collects.

As a result, Bloomberg's method of evaluating companies differs from Refinitiv's, which uses an alternative approach for penalizing non-disclosure of information. Refinitiv takes into account how the peers within the industry disclose information, which is not done by Bloomberg.

2.4.3 Sustainalytics

For more than 30 years, Sustainalytics has provided investors with data related to ESG risks. Today, Sustainalytics covers more than 20 000 companies in 172 countries (Sustainalytics 2023).

The methodology and how to interpret the scores used by Sustainalytics differ from previously mentioned ESG score providers. Rather than ranking companies from 0 to 100, such as Bloomberg and Refinitiv, Sustainalytics (2022) ranks the companies reversely, where a score of 0 indicates top performance. The score is based on how well companies respond to and manage their exposure to industry-specific material risks that could affect the company's enterprise value. Starting with the total exposure to ESG issues based on the company's industry, Sustainalytics then divides the risk into parts manageable by the company and risks that are unmanageable due to the industry they operate in. Company performance is then consolidated through the policies, practices, and quantitative performance measures that relate to manageable risks. As such, a company's overall ESG score can be increased if the manageable risks lack sufficient remedies which reflect poorly back on its overall risks.

The part of the manageable risk combined with the unmanageable risk constitutes the basis on which Sustainalytics sets companies' ESG score. Ratings are divided into 5 categories with scores set from 0-100 and are benchmarked against peers

and the total universe (Sustainalytics 2022).

3 Hypotheses

Before conducting our research, we formulate three hypotheses in order to test our position based on previous literature.

3.1 Hypothesis 1: ESG scores have a significant impact on deal premium

As concluded in the literature review, numerous authors argue that there is a positive relationship between CSR and deal premia. While Jost, Erben, Ottenstein, and Zülch (2022) argue that no statistically significant relationship can be found between CSR performance and deal premium, Gomes and Marsat (2018) suggest the opposite, that CSR performance decreases information asymmetry and increases bid premia. As these arguments have been presented in recent times, it is still of high relevance to determine whether ESG-related activities may be seen to favor either the stakeholder theory, (Freeman 1984; Porter and Kramer 2006) or the shareholder theory (Friedman 2007).

Although previous literature mainly covers CSR, it is reasonable to assume that ESG would follow a similar pattern. We, therefore, believe that ESG scores will have a significant effect on deal premia, due to the ability of ESG scores to create synergies and reduce the risks of adverse selection.

3.2 Hypothesis 2: Significance levels will vary depending on sources of data

Berg, Kölbel, and Rigobon (2022) illustrate that ESG scores set forth by different providers contain different information content, such as included metrics, scope, and weighting schemes. While G. Serafeim and Yoon (2022) argue that different ESG scores can be used to create a consensus view of the target valuation, Christensen, George. Serafeim, and Sikochi (2022) present a more problematic scenario, claiming that a larger number of ESG scores will increase the level of information

asymmetry for investors. Consequently, it is of high importance to investigate how ESG scores derived from different providers may affect the deal premium, in order to map their true impact and usage for investors.

Ultimately, as previous literature suggests there is a significant discrepancy between ESG score providers, which may in turn stimulate information asymmetry, we believe that the effect of the score on the deal premium will vary depending on which ESG score is used for the target valuation.

3.3 Hypothesis 3: Different ESG score providers offer supplementing information

Elaborating on the findings of Berg, Kölbel, and Rigobon (2022), the various ESG scores should offer different information content which, when used in tandem as opposed to individually, may create consensus views (G. Serafeim and Yoon 2022). The article written by SustainAbility (2020) further concludes that because analysts tend to not only use one single score as a basis, but rather a combination of data providers, also supported by the research of Harai and Brady (2021). It is therefore reasonable to believe that a single ESG score will not fully capture the relationship between the score and the deal premium. We will therefore examine how multiple ESG scores can be used together to obtain a more comprehensive view of the target, and in turn arrive closer to the target's true valuation.

In order to investigate how multiple ESG scores can be used to create information synergies, we introduce interaction terms between ESG score providers. Supporting the arguments of Gomes and Marsat (2018), we believe that the interaction terms between the various providers will prove to have a significant effect on deal premia, as they would further decrease the information asymmetry.

4 Data and Sample Construction

Data linked to the deals has been gathered from inside the Refinitiv umbrella. More specifically, we have extracted data from SDC Platinum, containing financial transaction data from as far back as the 1970s. Utilizing databases provided by Refinitiv to collect M&A data has the advantage of providing deal- as well as company-specific information both for the acquirer and target. The data may subsequently be used to evaluate if the premium paid is related to a company's ESG score. Finally, the data is matched with ESG scores gathered from Refinitiv, Sustainalytics, and Bloomberg respectively.

4.1 Construction of Sample

ESG scores are a relatively new phenomenon, limiting the overall sample length of the data. As a result, the sample includes few data points prior to the 21st century. For instance, Refinitiv and Bloomberg began their evaluation of companies' ESG performance in the early 2000s (Bloomberg 2022; Refinitiv 2023a). To mitigate limitations related to the time frame of ESG scores, the sample starting point is therefore set to 2006. The choice of ESG providers to include in the thesis relies on the most recent questionnaire conducted by SustainAbility (2023). The article illustrates that institutional investors use all of the data providers subject to this thesis, and incorporate the providers' ESG scores into their investment decisions. The results from the article also suggest a growing usage of Bloomberg's ESG offering.

Using SDC, we are able to screen for deals done globally between 2006-2023. Including deals done within a wider geographic area yields the largest amount of observations, which will generate more reliable empirical results. Further, we also screen for deals where the acquirer increases its ownership percentage from a minority shareholder status ($< 50\%$) to a majority shareholder status ($> 50\%$). In addition, deals with no registered premia are excluded from the sample as deal premia act as the dependent variable in all of the regression analyses. Adding

these constraints creates a sample of 4060 observations before financial variables and ESG scores are added. In order to match financial factors and ESG scores to create an individual sample for each data provider, the tickers and ISIN codes for each company are subsequently collected. For deals where the ESG scores or the financial factors are not provided, the transactions are removed from the specific sample.

This methodology leaves us with one individual sample for each data provider (Bloomberg, Sustainalytics, and Refinitiv), as well as one common sample containing the same deals. Tables 1 and 2 display the number of observations in each sample across industries and over time.

Table 1: Number of Observations per Year

Year	Bloomberg	Refinitiv	Sustainalytics	Common sample
2006	7	5	0	0
2007	15	17	0	0
2008	22	13	0	0
2009	16	10	0	0
2010	28	17	5	4
2011	36	26	6	6
2012	40	26	10	11
2013	29	15	0	0
2014	29	23	0	0
2015	49	22	1	1
2016	45	25	1	0
2017	22	15	7	2
2018	52	33	39	14
2019	46	27	38	17
2020	45	40	44	21
2021	50	45	37	22
2022	27	46	53	6
2023	0	6	13	0
Total observations	558	368	254	105

Table 1 presents the distribution of the sample over time. It consists of each of the individual samples as well as the common one. The table illustrates the growth in ESG reporting over time.

Table 1 presents the dispersion of the sample over time. Unsurprisingly, the number of scores from the first years are somewhat limited, due to the starting

point for the data providers' ESG offering. Similarly, Sustainalytics offers no observations in the first couple of years. However, for the remaining time frame the number of observations grows, becoming more evenly distributed.

Table 2: Number of Observations per Industry

Industry	Bloomberg	Refinitiv	Sustainalytics	Common sample
Retail	87	29	40	20
Industrials	95	50	38	16
Consumer P&S	28	19	12	5
M&E	32	26	14	6
High Technology	48	36	28	6
Telecommunications	15	14	5	3
Energy and Power	54	46	25	9
Real Estate	54	50	40	18
Materials	72	51	17	8
Consumer Staples	48	21	20	6
Healthcare	25	26	15	8
Total observations	558	368	254	105

Table 2 presents the distribution of the sample over industry. It consists of each of the individual samples as well as the common one. 'Consumer P&S' represents 'Consumer Products & Services' while 'M&E' stands for 'Media & Entertainment'

As can be seen in Table 2, the samples have a relatively even distribution across industries with minor deviations. For instance, we notice that Telecommunications has the lowest amount of observations across samples, while Industrials has the highest amount except in the common sample.

4.2 Included variables

This section presents the overall variables included in this thesis, the background for their inclusion, and their expected effect in relation to deal premia identified in previous research.

4.2.1 Dependent variable

This thesis aims to determine the impact that ESG scores have on M&A activities. As such, the dependent variable in the regression analyses will take the form as the overall premium paid by the acquirer. Refinitiv (2023b) provides deal-related premia with a variety of maturities defined by the specification below:

$$Premium = \frac{Stockprice_t - Stockprice_{(t-n)}}{Stockprice_{(t-n)}} * 100$$

Previous research by Jarell and Poulsen (1989), and subsequently by Mulherin and Simsir (2015), indicate that there is an abnormal price effect related to deal rumors, with a large portion of the premium already reflected in the price before the deal is announced. Given these results, using deal premium in close relation to the announcement date could therefore introduce possible bias. According to research in the field of M&A conducted by Schwert (1996), Rossi and Volpin (2004), and Jory, Ngo, and Wang (2016), a premium based on the stock price a month prior to the announcement date is widely accepted, in order to limit the effect of abnormal price increases.

4.2.2 Independent and control variables

The ESG scores from the three chosen data providers act as the independent variables in each of the respective regression specifications. Furthermore, control variables are also utilized to enhance the internal validity of the result, isolating the effect of the ESG scores. The control variables can be divided into two different groups, one relating to the transaction itself, while the other is related to the financial performance of the target company. Similarly for both groups, the inclusion of a certain variable is motivated by what prior research has concluded to affect the deal premium. The table presented in Appendix 4 contains the variable names, a brief variable description, and the sign they are expected to take in the regressions.

4.3 Descriptive Statistics

The following section presents the descriptive statistics for each individual sample generated by the data providers included in the thesis, as well as for the common sample, prior to being standardized for the regressions. Tables 3, 4, and 5 contain statistics for the individual samples generated by the included data providers, while Table 6 contains statistics for the common sample. The tables display the mean, standard deviation, maximum values, and minimum values for all the variables included in the regressions.

As may be observed in Tables 3-5, there is variability in the ESG scores in the individual samples. Table 5 illustrates that Sustainalytics generates the highest mean score of the included data providers, as well as the second-highest standard deviation after Refinitiv, shown in Table 3. Meanwhile, Table 4 shows that Bloomberg has the lowest mean and the lowest standard deviation. In other words, the ESG scores for Refinitiv and Sustainalytics in their respective samples, vary to a higher extent than Bloomberg. There is however a more homogenous distribution in the common sample shown in Table 6, where Bloomberg has the lowest mean ESG score and standard deviation, while Refinitiv has the largest mean and standard deviation.

Regarding the included control variables, we note that Book-to-market has the largest standard deviation across the individual samples, and also in the common sample. The difference in statistics compared to the other control variables is large, which may be explained by the way each variable is being measured (e.g. percentage, dummy variable etc.). The same argument could be made for the 3-year growth rate and the investment rate. Both of these variables show higher standard deviation compared with other variables in each sample. However, this could be explained by the non-existent cap on company growth or capital expenditures for an individual corporation. Lastly, we note differences in the mean values for the variable Leverage, with larger values shown in Tables 3 & 4 compared to Tables 5 & 6.

Table 3: Descriptive Statistics for Refinitiv

Variable	Mean	SD	Max	Min
Shares after Transaction (%)	93.59	14.92	100.00	50.00
EBITDA 3-Year Growth Rate (%)	8.92	36.44	309,422.00	-81.99
Industry Relatedness	0.44	0.50	1.00	0.00
Ln Size	7.17	1.64	11.15	2.04
Book-to-market	47.27	538.14	9970.70	-551.91
Block Purchase	0.02	0.14	1.00	0.00
Cash only	0.51	0.50	1.00	0.00
Multiple Bidders	0.15	0.50	1.00	0.00
Cross Border	0.45	0.50	1.00	0.00
Leverage (%)	115.86	19.93	87.69	0.00
Investment rate (%)	11.44	33.34	456.74	0.00
Premium (%)	31.85	68.46	1163.16	-98.56
ESG Refinitiv	40.67	19.93	87.69	1.49

Table 3 presents statistics of the sample generated with the available ESG scores of Refinitiv, producing 368 rows of data. It includes statistics for the explanatory variables, as well as the dependent variable. Measurements used are mean, standard deviation (SD), as well as maximum and minimum values.

Table 4: Descriptive Statistics for Bloomberg

Variable	Mean	SD	Max	Min
Shares after Transaction (%)	84.54	20.22	100.00	50.00
EBITDA 3-Year Growth Rate (%)	9.80	34.99	309,422.00	-74.32
Industry Relatedness	0.42	0.49	1.00	0.00
Ln Size	6.47	1.70	11.15	-0.97
Book-to-market	100.82	749.27	12272.65	-293.08
Block Purchase	0.03	0.17	1.00	0.00
Cash only	0.62	0.48	1.00	0.00
Multiple Bidders	0.10	0.30	1.00	0.00
Cross Border	0.32	0.47	1.00	0.00
Leverage (%)	93.20	15.37	363.37	0.00
Investment rate (%)	13.63	39.88	632.88	0.00
Premium (%)	26.90	67.05	1163.16	-95.97
ESG Bloomberg	30.29	12.46	65.80	4.74

Table 4 presents statistics of the sample generated with the available ESG scores of Bloomberg, producing 558 rows of data. It includes statistics for the explanatory variables, as well as the dependent variable. Measurements used are mean, standard deviation (SD), as well as maximum and minimum values.

Table 5: Descriptive Statistics for Sustainalytics

Variable	Mean	SD	Max	Min
Shares after Transaction (%)	92.26	16.61	100.00	50.03
EBITDA 3-Year Growth Rate (%)	5.77	24.41	130,275.00	-50.54
Industry Relatedness	0.46	0.50	1.00	0.00
Ln Size	8.01	1.08	10.35	4.65
Book-to-market	102.33	972.91	9970.70	-3.93
Block Purchase	0.02	0.14	1.00	0.00
Cash only	0.49	0.50	1.00	0.00
Multiple Bidders	0.12	0.33	1.00	0.00
Cross Border	0.40	0.49	1.00	0.00
Leverage (%)	32.84	19.28	100	0.00
Investment rate (%)	10.68	30.17	0.95	0.00
Premium (%)	22.01	29.84	2.85	-89.47
ESG Sustainalytics	42.09	19.11	87	11.16

Table 5 presents statistics of the sample generated with the ESG scores of Sustainalytics, producing 254 rows of data. It includes statistics for the explanatory variables, as well as the dependent variable. Measurements used are mean, standard deviation (SD), as well as maximum and minimum values.

Table 6: Descriptive Statistics for the common sample

Variable	Mean	SD	Max	Min
Shares after Transaction (%)	92.07	16.77	100	50.05
EBITDA 3-Year Growth Rate (%)	12.66	52.10	309,422	-50.54
Industry Relatedness	0.50	0.50	1	0
Ln Size	7.69	1.30	10.27	2.87
Book-to-market	101.61	977.73	9970.70	-67.87
Block Purchase	0.03	0.17	1	0
Cash only	0.51	0.50	1	0
Multiple Bidders	0.37	0.50	1	0
Cross Border	0.42	0.50	1	0
Leverage (%)	30.76	20.78	94.97	0
Investment rate (%)	10.87	29.6	284.80	0
Premium (%)	25.99	35.68	158.95	-95.97
ESG Refinitiv	47.75	19.59	83.30	2.07
ESG Bloomberg	41.56	12.92	65.80	11.57
ESG Sustainalytics	42.68	17.92	87	9.85

Table 6 contains statistics for the common sample, using the same variables and statistical measurements as for the previous samples.

5 Methodology

In order to investigate the effect that ESG scores have on the deal premia, regression analyses using Ordinary Least Squares (OLS) are used. The regression models consist of the variables presented in the previous section. Which sample used in the respective regression analysis varies depending on which hypothesis is being tested. A more elaborate explanation of the regression specifications can be found in section 5.1. Section 5.2 provides a review of the tests utilized to confirm that OLS is the best linear and unbiased estimator, as well as to validate the robustness of the results.

5.1 Regression Specification

This section will provide a walk through of the various regression specifications used to examine the previously defined hypotheses under section 3.

5.1.1 Hypothesis 1: ESG scores have a significant effect on deal premium

To determine the impact of ESG scores on deal premia, we use standard OLS regressions. The deal premium collected through Refinitiv will act as the dependent variable, with the various ESG scores serving as an independent variable. Both financial and deal-related variables will be used as controls, for which their inclusion is based on what previous research has concluded have an impact on the premium paid. As the objective of this hypothesis is to determine whether ESG scores may affect the deal premium, a sample based on each provider's score availability is used to obtain more observations and more consistent results.

There is a possibility that sample characteristics may vary, either over time or over the industry. To achieve more robust results, both industry-fixed effects and year-fixed effects are added to the regression specification. Industry-fixed effects should control for the individual characteristics between industries, while at the same time control for the differences in the premium paid depending on the sector

the firm operates in. Further, year-fixed effects control for the impact of time, which is relevant as ESG score methodologies might have changed since the start of the sample. Another reason for adding year-fixed effects is to control for the changing characteristics of the firm over time. This leads to the overall regression specification which may be found below.

$$Premium = \beta_0 + \beta_1 ESGRefinitiv + \beta_2 Deal + \beta_3 Fin + \gamma_t + \theta_t + \epsilon$$

$$Premium = \beta_0 + \beta_1 ESGBloomberg + \beta_2 Deal + \beta_3 Fin + \gamma_t + \theta_t + \epsilon$$

$$Premium = \beta_0 + \beta_1 ESGSustainalytics + \beta_2 Deal + \beta_3 Fin + \gamma_t + \theta_t + \epsilon$$

The variable "ESG" represents the ESG scores for each data provider, "Deal" represents the variables related to the specific deal, and "Fin" represents the financial variables. The variable "gamma" represents the time-fixed effect and "theta" the industry-fixed effects. The reasoning behind using separate regressions for each ESG score provider derives from the fact that each provider has a varying amount of data available. This allows us to investigate their separate significance levels, as well as the consistency of the results obtained.

5.1.2 Hypothesis 2: Significance levels will vary depending on the sources of data

The second hypothesis presented is used to test each ESG score provider's impact on deal premia. Because of the ambiguity in scoring between different ESG score providers discussed in section 2.4, the methodology is altered compared to hypothesis 1. To be able to differentiate between the data providers' effect on the deal premia, we use a common sample where all of the providers have scores available. This would yield the same overall variables related to a specific deal, with the difference between regressions only being the ESG scores from the three data providers. The resulting regression specifications, to determine if the choice of data provider yields different results, can be found below:

$$Premium = \beta_0 + \beta_1 ESG_i + \beta_2 Deal + \beta_3 Fin + \gamma_t + \theta_t + \epsilon$$

Once again, we are using three separate regressions in order to investigate hypothesis 2, only changing the ESG score provider. This is mainly due to the fact we would like to be able to compare the results under hypotheses 1 and 2. An additional justification for using separate models is the potential correlation between ESG score providers. Appendix 5 shows the overall correlation matrix, which displays that there is a significant amount of correlation between Bloomberg and Refinitiv (0.72). This fact further supports the choice of separating the data providers, in order to avoid the risk of biased estimates (Brooks 2008). Therefore, to obtain reliable results, we separate the ESG score providers into individual regressions and compare their respective significance levels.

5.1.3 Hypothesis 3: Different ESG score providers offer supplementing information

To test the third hypothesis, a similar methodology as under hypotheses 1 and 2 is used. The sample used is still the common sample as under hypothesis 2, using the same control variables, with the only difference being the combination of ESG score providers instead of their individual scores. What differentiates the two hypotheses is the creation of an interaction term between the different providers, formed by multiplying the scores of each ESG score provider in pairs. Including these interaction terms provides an opportunity to determine if the effect of one ESG score depends on the effect of an additional explanatory variable. With the aim of this hypothesis being able to determine if one data provider offers supplementary information to another, this methodology should be appropriate to capture this relationship. The overall regression specification can be found below:

$$Premium = \beta_0 + \beta_1 ESG_B * ESG_R + \beta_2 Deal + \beta_3 Fin + \gamma_t + \theta_t + \epsilon$$

$$Premium = \beta_0 + \beta_1 ESG_B * ESG_M + \beta_2 Deal + \beta_3 Fin + \gamma_t + \theta_t + \epsilon$$

$$Premium = \beta_0 + \beta_1 ESG_R * ESG_M + \beta_2 Deal + \beta_3 Fin + \gamma_t + \theta_t + \epsilon$$

As can be seen, we continue to use separate regressions for our interaction terms. This approach ensures comparability between the results obtained from our prior hypotheses. Additionally, we focus exclusively on the interaction term between ESG score providers, without including the main effect of the ESG scores themselves. Our primary interest lies in investigating how multiple scores are utilized as a unified ESG score. We therefore make the assumption that no score is being used individually, rendering individual effects irrelevant on their own.

To justify our approach, we draw on insights from Loftus (1978) regarding the interpretability of cross-over interaction terms. According to Loftus (1978), these interaction terms are significant when one or both main effects exhibit a slope of zero. This aligns with our research objective, which seeks to examine how the impact of one independent variable (an ESG score provider) varies based on the level of another independent variable (another ESG score provider). This would justify to only include the interaction term, as we are assuming that no main effects are present.

By focusing exclusively on the interaction term and excluding the main effects, we also attempt to address the potential issue of high correlation between the ESG score providers. This enables us to direct our attention to the combined influence of the ESG scores rather than their individual effects.

5.2 Tests for Validity

Using OLS requires the underlying data to fulfill certain assumptions in order for the estimates of the regression analyses to be valid (Wooldridge 2001). As a consequence, we conduct several tests on our individual samples to ensure that the results obtained from this thesis are robust.

5.2.1 Heteroscedasticity

One assumption when using OLS is that errors have the same variance across the data set, or in other words, that errors are homoscedastic. Brooks (2008) states that if errors are non-constant, or heteroscedastic, OLS would still yield unbiased and consistent results, but the coefficients would no longer have the lowest variance among the unbiased estimators. Hence, if OLS is used in the presence of heteroscedasticity, this would imply that the standard errors are wrongly estimated, leading to incorrect significance levels of the regression coefficients.

To test for heteroscedasticity, a Breusch-Pagan test, put forward by Breusch and Pagan (1979), is utilized. The choice of test derives from the underlying assumptions made to create the auxiliary regression, in order to test for heteroscedasticity. The auxiliary regression can be defined as follows:

$$\hat{u}_i^2 = \alpha_0 + \alpha_1 X_{1i} + \alpha_2 X_{2i} + \ldots + \alpha_n X_{ni} + \epsilon_i$$

The variables included in the original regression models are here regressed on the estimated residuals (u) squared. Brooks (2008) argues that if heteroscedasticity is present, one of the remedies would be to use heteroscedasticity-consistent standard errors, making hypothesis testing more conservative. Should the test indicate heteroscedasticity, meaning rejecting the null hypothesis of the Breusch-Pagan test, robust standard errors are used for that specific sample. The null hypothesis and the alternative hypothesis can be found below:

$$H_0 : \alpha_1 = \alpha_2 = ... = \alpha_n = 0$$

$$H_A : \alpha_1 \neq \alpha_2 \neq .... \neq \alpha_n \neq 0$$

The alphas in the above hypotheses represent the estimated coefficients generated by the auxiliary regression under the Breusch-Pagan test. If all coefficients in the auxiliary regression are equal to zero, thereby not rejecting the null hypothesis, the entire auxiliary regression would be equal to zero and no heteroscedasticity

could statistically be proven.

5.2.2 Multicollinearity

Another prevalent assumption that is made when using OLS is that the independent variables are uncorrelated. Brooks (2008) explains that if correlation is present between variables, or that the variables are multicollinear, the significance of the model will be inflated while the individual coefficients will have a low overall impact. In other words, the regression is seemingly a good fit of the data, while the estimates are insignificant. Furthermore, multicollinearity leads to high model specification sensitivity, which describes how the significance of certain variables changes when altering other variables included in the regression (Wooldridge 2001). Thus, when statistical tests are run, the model will be sensitive to a certain specification, rendering the outcome of the regression unreliable. Furthermore, Brooks (2008) argues that there is no easy way to distinguish if there is a problem with multicollinearity and suggests that a correlation matrix is one step to control for its presence.

Another option to see if multicollinearity is present, which according to Gómeza, Pérez, López Martín, and García (2016) is widely adopted in scientific literature, is the use of a Variance Inflation Factor test. The test is created by regressing each of the independent variables on the total number of independent variables, leading to a factor for each of the variables included in the regression. It is generally accepted that a factor above 10 would indicate severe multicollinearity, while a value above 5 is cause for concern. The factor used to determine these values is specified below.

$$VIF(i) = \frac{1}{1 - R_i^2} i = 1, ..., n$$

5.2.3 Endogeneity

Endogeneity can be defined broadly as the correlation between an explanatory variable and the error term of a regression (Wooldridge 2001). According to Ab-

dallah, Goergen, and O'Sullivan (2015), endogeneity may arise if an explanatory variable is omitted from the regression. The seemingly missing variable will thus be correlated with the error term in the regression and as such, the endogeneity assumption of OLS will be violated. In addition, the authors also argue that endogeneity can be caused by the dependent variable being affected by one or several of the explanatory variables impacted by the dependent variable, so-called reversed causality.

To control for endogeneity issues, an Instrumental Variable Regression Two Stage Least Square approach is employed. This entails adding a variable that is correlated with the endogenous explanatory variable but not directly with the dependent variable (Brooks 2008). Ioannou and G. Serafeim (2012) explains how the mean values of the country, as well as the industry, that the corporation operates in are drivers of the variance in explaining the difference in the outcome of CSR. To relate these findings to the instrumental variables used to control for ESG scores, industry-year and country-year means are used to proxy for a certain data provider's ESG score.

Another form of endogeneity stems from the creation of the sample, namely selection bias. Heckman (1979) states that this type of bias can stem from two sources: one source being the way of creating the sample, while the other being self-selection by the individuals or data in the investigation. As firms historically choose their level of disclosure, this could be a cause of impact on the results, as certain firms show low disclosure frequency. However, as providers take measures to punish firms for not disclosing, as well as seek to utilize factors not provided by the corporation itself, this problem should inflict the result to a small extent. The other source of selection bias comes from the sample construction. As we seek to determine ESG score's impact on the deal premium, firms that do not have a score are exempt from the sample which could lead to endogeneity issues.

Heckman (1979) presents a model that can be used to test for selection bias within

a sample, although with certain drawbacks. Kennedy (2003) argues that one issue related to the use of the Heckman model is how it introduces measurement errors when controlling for omitted variable bias. Moreover, it is not yet clear if the results from the Heckman model are regarded as valid when working with a smaller sample size. Hartmann (1991) finds through Monte Carlo estimation that increasing the sample size is the most efficient way to increase the accuracy of the result from the Heckman model. As previously mentioned, the size of the samples are different with the overall sample containing 105 observations. This means that the results from the model could be inaccurate, impairing the conclusions that can be drawn.

Furthermore, the providers and their individual methodologies also present difficulties related to model specification. The first step of the Two-step Heckman approach is to construct a probit model to determine the likelihood of receiving a score (Heckman 1979). The model is estimated using instrumental variables, where at least one instrument should be omitted from the second stage in order to generate reliable results (Wooldridge 2001). As the scoring methodology varies between providers, this would limit the alternatives of common instrumental variables to include in the model. Managing this issue by employing different instruments for different samples would make the results from each model less comparable. In summary, we believe that the results from this test would be difficult to interpret, detering us from employing it.

6 Robustness analysis

This section will cover the results from the various robustness tests described under section 5 in order to verify the validity of our results. It will cover the results from the Two-Stage Least Squares (2SLS) regressions, the Variance Inflation Factor (VIF) test for multicollinearity, as well as the Breusch-Pagan test for heteroscedasticity.

6.1 Two-Stage Least Squares

As described in the methodology section, we conduct Two-Stage Least Squares (2SLS) in order to control for endogeneity, such as omitted variable bias or reversed causality. This is done by creating instrumental variables to estimate ESG scores for each provider, which are later used as an explanatory variable in the original regression model. The first-stage regression can be specified as follows:

$$ESG_i = \beta_0 + Z_1 Year/country_i + Z_2 Year/industry_i + \beta_1 Deal + \beta_2 Fin + \gamma_t + \theta_t + \epsilon$$

The first-stage regression includes two instruments, year/country and year/industry averages, to proxy for a data provider's ESG score, which itself acts as the dependent variable. The obtained coefficients from the first-stage regression are now used to estimate the ESG scores for a certain data provider. The estimated ESG scores are then used in the second stage regression, which can be specified as follows:

$$Premium = \beta_0 + \beta_1 \widehat{ESG}_i + \beta_2 Deal + \beta_3 Fin + \gamma_t + \theta_t + \epsilon$$

The premium acts as the dependent variable, while the estimated ESG scores, derived from the first stage, are used as an explanatory variable. This is performed on each regression under each hypothesis, in order to further supplement the results from the OLS analyses under section 7. The results from the first stage regressions can be found in Appendix 1A - 1C.

6.1.1 Hypothesis 1

Under the first hypothesis, we investigate whether ESG scores from each provider have a significant effect on the deal premium. The instrumental variables are created by calculating year/country and year/industry averages according to previous research made by Ioannou and G. Serafeim (2012). Table 7 includes the results from the second stage of the Two-Staged Least Squares regression.

As can be seen from Table 7, the estimated ESG scores for Bloomberg and Sustainalytics both show significant impacts on deal premia. Furthermore, Bloomberg shows a positive coefficient, while Sustainalytics is negative, both in line with their expected signs according to their respective rating methodologies. As these variables show significance, it points towards that the estimates are efficiently accounting for potential endogeneity issues, satisfying the exogeneity conditions under OLS. However, the coefficient for Refinitiv is insignificant, meaning possible endogeneity concerns are not being addressed adequately in Refinitiv's individual sample.

6.1.2 Hypothesis 2

The second hypothesis investigates the difference in effect between each ESG score provider. Table 8 displays the estimated ESG scores' impact on the deal premium. As can be seen, none of the estimates are yielding significant coefficients for their estimated ESG scores, which points toward the models suffering from potential endogeneity concerns. While Appendix 1B shows how the year/country and year/industry averages are significant, strengthening their validity as instruments, they might not address issues such as reversed causality or omitted variable bias present in the original regression model. These results will supplement the later presented results from the OLS regressions, as to the original ESG scores' significance in relation to deal premia.

Table 7: 2SLS - Hypothesis 1

Dependent Variable	Deal Premium		
ESG Score Provider	Bloomberg	Refinitiv	Sustainalytics
Estimated ESG scores	0.229*	0.299	-0.168**
	(0.128)	(0.185)	(0.072)
Shares after Transaction	0.325**	-0.011	0.140**
	(0.161)	(0.008)	(0.068)
EBITDA 3-Year Growth Rate	0.148***	0.129***	0.138**
	(0.040)	(0.040)	(0.061)
Industry Relatedness	0.104	0.013	0.138
	(0.162)	(0.248)	(0.135)
Ln Size	-0.701***	-0.835***	-0.197***
	(0.002)	(0.179)	(0.066)
Block Purchase	-0.152	-0.347	-0.041
	(0.451)	(0.791)	(0.421)
Cash only	-0.277	-0.369	-0.265**
	(0.175)	(0.242)	(0.132)
Multiple Bidders	0.721***	0.316	0.282
	(0.266)	(0.343)	(0.208)
Cross Border	0.090	-0.080	0.138
	(0.170)	(0.203)	(0.137)
Leverage	-0.002	-0.004**	-0.130*
	(0.002)	(0.002)	(0.069)
Investment rate	0.026	-0.051	0.157**
	(0.021)	(0.037)	(0.066)
Book-to-market	-0.001	0.000	0.004
	(0.002)	(0.000)	(0.061)
Industry Fixed Effects	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes
Number of Observations	558	368	254
Adjusted R2	0.111	0.104	0.111
Regression significance (p-value)	***	***	***

Results for the second stage of the 2SLS. Note: *p < 0.1, **p < 0.05, ***p < 0.01. Regression significance indicates the level of the p-value of the F-statistic.

6.1.3 Hypothesis 3

For the final hypothesis, we investigate whether the ESG scores are offering supplementing information by creating an interaction term between the providers. The 2SLS is estimated by using the same methodology as under hypothesis 1 and 2; the instruments consist of multiplying the year/country and year/industry averages.

Table 8: 2SLS - Hypothesis 2

Dependent Variable	Deal Premium		
ESG Score Provider	Bloomberg	Refinitiv	Sustainalytics
Estimated ESG scores	0.186	0.169	0.168
	(0.127)	(0.112)	(0.112)
Shares after Transaction	-0.082	-0.098	-0.086
	(0.103)	(0.105)	(0.101)
EBITDA 3-Year Growth Rate	0.073	0.076	0.069
	(0.098)	(0.098)	(0.096)
Industry Relatedness	-0.084	-0.071	-0.023
	(0.210)	(0.211)	(0.208)
Ln Size	-0.344***	-0.338***	-0.284***
	(0.119)	(0.116)	(0.100)
Block Purchase	0.109	0.109	0.127
	(0.583)	(0.585)	(0.566)
Cash only	-0.259	-0.261	-0.237
	(0.198)	(0.199)	(0.192)
Multiple Bidders	0.712***	0.597**	0.716***
	(0.262)	(0.267)	(0.255)
Cross Border	-0.490**	-0.483**	-0.521**
	(0.203)	(0.205)	(0.199)
Leverage	-0.101	-0.092**	-0.071
	(0.098)	(0.099)	(0.097)
Investment rate	0.262**	0.259**	0.244**
	(0.121)	(0.122)	(0.119)
Book-to-market	0.197**	0.213**	0.192**
	(0.093)	(0.094)	(0.091)
Industry Fixed Effects	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes
Number of Observations	105	105	105
Adjusted R2	0.300	0.293	0.335
Regression significance (p-value)	***	***	***

Results for the second stage of the 2SLS. Note: *p < 0.1, **p < 0.05, ***p < 0.01. Regression significance indicates the level of the p-value of the F-statistic.

As can be seen from Table 9, we notice significant coefficients for both interaction terms including Bloomberg, being significant on a 5% - significance level. This suggests that the estimates of the interaction terms including Bloomberg as an ESG score provider potentially address possible endogeneity concerns. Furthermore, we compare these results with Table 8, showing insignificant coefficients for

estimated ESG scores across all providers. In other words, the interaction terms are capturing a relationship with the deal premium which is not being captured by analyzing the individual ESG scores alone. This means that the interaction term might be addressing the potential omitted variable bias found under hypothesis 2. However, even though the estimated ESG scores show significance, the model could still suffer from endogeneity concerns, considering the interaction term between Refinitiv and Sustainalytics is insignificant.

Table 9: 2SLS - Hypothesis 3

Dependent Variable	Deal Premium		
ESG Score Provider	Bloom*Ref	Bloom*Sust	Ref*Sust
Estimated ESG scores	0.254**	0.260**	0.153
	(0.114)	(0.118)	(0.114)
Shares after Transaction	-0.109	-0.102	-0.099
	(0.102)	(0.102)	(0.106)
EBITDA 3-Year Growth Rate	0.064	0.055	0.068
	(0.096)	(0.097)	(0.098)
Industry Relatedness	-0.066	-0.005	-0.049
	(0.206)	(0.209)	(0.212)
Ln Size	-0.391***	-0.359***	-0.322***
	(0.213)	(0.105)	(0.114)
Block Purchase	0.015	-0.052	0.079
	(0.574)	(0.581)	(0.591)
Cash only	-0.272	-0.269	-0.254
	(0.194)	(0.194)	(0.198)
Multiple Bidders	0.629**	0.725***	0.656**
	(0.257)	(0.257)	(0.262)
Cross Border	-0.468**	-0.501**	-0.504**
	(0.200)	(0.200)	(0.204)
Leverage	-0.091	-0.077	-0.082
	(0.096)	(0.097)	(0.099)
Investment rate	0.262**	0.239**	0.248**
	(0.119)	(0.120)	(0.122)
Book-to-market	0.213**	0.186**	0.203**
	(0.092)	(0.092)	(0.094)
Industry Fixed Effects	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes
Number of Observations	105	105	105
Adjusted R2	0.325	0.324	0.297
Regression significance (p-value)	***	***	***

Results for the second stage of the 2SLS. Note: *p $<$ 0.1, **p $<$ 0.05, ***p $<$ 0.01. Regression significance indicates the level of the p-value of the F-statistic.

6.2 Further robustness analysis

In order to increase the validity of the results obtained, we investigate the presence of heteroscedasticity and potential multicollinearity between the variables. These aspects are essential for the OLS estimates to be derived correctly.

To investigate the presence of heteroscedasticity, which occurs if the variance of the residuals is non-constant over observations, we apply a Breusch-Pagan test. The effect of non-constant variance in the residuals is inconsistent coefficient estimation, yielding lower standard errors than what might be true for the sample. The Breusch-Pagan test controls for this occurrence by considering the linear form of heteroscedasticity. While there exist other tests for heteroscedasticity, such as the White test, which additionally considers non-linear forms of non-constant variance, we believe the Breusch-Pagan is more appropriate when using large models. This is due to the large number of variables used in the different regression analyses, requiring many additional cross-terms needed to be estimated for non-linear relationships under White's test (Brooks 2008).

If the p-value for a certain model is lower than 0.05 under the Breusch-Pagan test, the model is likely to be influenced by heteroscedasticity (Brooks 2008). In such circumstances, robust standard errors are applied in order to ensure correct coefficient estimates. The results from the Breusch-Pagan tests can be found in Appendix 3. We notice that only Refinitiv's sample generates a p-value below 5%, while the rest of the samples indicate homoscedastic errors.

Regarding multicollinearity, which is the occurrence of correlation between the independent variables, we apply a Variance Inflation Factor - test (VIF). It measures the degree to which the independent variables are correlated with each other, which can potentially inflate the overall significance of the regression, as well as increase model specification sensitivity. For instance, the significance of the included independent variables might be sensitive to how the model is specified, and could change if the model is redefined (e.g. changing variables). As we are

investigating how ESG scores affect deal premia by re-running the same model, it is important to rule out potential multicollinearity issues. The results from the VIF test can be found in Appendix 2A-2C, which shows that no variable in the respective regression models generates a value above the threshold of 10.

Furthermore, we analyze the robustness of our regression analyses by comparing the various results from the different models. As we are utilizing different samples, we are prioritizing consistency in our regression results. For instance, if a certain variable would yield significant coefficient values in only one sample, it runs the risk of being non-consistent. Significant impact on the dependent variable, as well as direction of the coefficient, should therefore be shown consistently across sub-samples and model specifications in order to be considered valid.

7 Results

This section contains the empirical findings from the regression analyses. The section will be divided according to the previously defined hypotheses. First, the effect of ESG scores on deal premia will be reviewed, followed by the observed impact of each data provider. Finally, whether the different score providers offer supplementing information will be examined.

7.1 Hypothesis 1: ESG scores' effect on deal premium

For the first defined hypothesis, we sought to examine whether ESG scores have a significant impact on the deal premia. The analysis was conducted by running individual regressions for each data provider, to separate their effects on deal premium.

Table 10 suggests that ESG scores show a significant impact on deal premia. ESG scores provided by Bloomberg have a positive and significant coefficient on a 10% level. These results point toward ESG scores affecting the overall price of a certain merger or acquisition across the data set. Furthermore, we see that multiple control variables show high significance, such as Ln Size and Multiple Bidders. For instance, the coefficient for Multiple Bidders is 0.71, meaning that the premium increases with 0.71 standard deviations when multiple bidders are involved. Additionally, the variable Ln Size generates a negative coefficient of -0.67, suggesting that an increase of one standard deviation decreases the deal premium with 0.67 standard deviations. This interpretation can be extended to the significant coefficient of ESG scores provided by Bloomberg, amounting to 0.24. In the context of real numbers, an increase of one standard deviation in an ESG score, i.e. 12.46 (see Table 5), would generate a 2.8 percentage point increase in the deal premium.

We also notice that the ESG scores provided by Sustainalytics show a significant impact on the deal premium, albeit having a negative coefficient. This result is expected against the background of Sustainalytics' rating methodology. The

Table 10: Regression Results - Hypothesis 1

Dependent Variable	Deal Premium		
ESG Score Provider	Bloomberg	Refinitiv	Sustainalytics
ESG Bloomberg	0.242*		
	(0.140)		
ESG Refinitiv		0.166	
		(0.116)	
ESG Sustainalytics			-0.301*
			(0.154)
Shares After Transaction	0.323**	-0.084	0.144**
	(0.140)	(0.106)	(0.068)
EBITDA 3-Year Growth Rate	0.147	0.164	0.136**
	(0.118)	(0.139)	(0.061)
Industry Relatedness	0.096	0.004	0.139
	(0.145)	(0.106)	(0.135)
Ln Size	-0.686***	-0.336**	-0.199***
	(0.208)	(0.155)	(0.067)
Block Purchase	-0.143	-0.152	-0.046
	(0.168)	(0.225)	(0.422)
Cash only	-0.269	-0.176**	0.2**
	(0.127)	(0.068)	(0.06)
Multiple Bidders	0.718***	0.136*	0.289
	(0.216)	(0.082)	(0.208)
Cross Border	0.086	-0.012	0.132
	(0.099)	(0.072)	(0.137)
Leverage	-0.002***	-0.112***	-0.126*
	(0.000)	(0.032)	(0.069)
Investment rate	0.026	-0.084	0.153**
	(0.037)	(0.074)	(0.066)
Book-to-market	0.105**	0.009	0.002
	(0.003)	(0.042)	(0.061)
Industry Fixed Effects	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes
Number of Observations	558	368	254
Adjusted R2	0.111	0.103	0.102
Regression significance (p-value)	***	***	***

Note: *p < 0.1, **p < 0.05, ***p < 0.01. Regression significance indicates the level of the p-value of the F-statistic.

coefficient is equal to -0.31, and with a standard deviation of 15.93 (see Table 6), one standard deviation increase would equal a decrease in deal premium by 4.9 percentage points. These results point toward deal premia decreasing by 0.30 percentage points with every ESG score point. In comparison, looking at the coefficient for Bloomberg, deal premia increase by 0.22 with every ESG score

point.

7.2 Hypothesis 2: Effect of different ESG score providers

For the second hypothesis, we create a common sub-sample for which each provider has an available ESG score. This allows us to directly compare the effects of each data provider on the same deal premia. As with the previous section, we run separate regressions for each ESG score provider.

As illustrated in Table 11, we notice differences in the effects of each data provider. Contrary to the regression analysis under Hypothesis 1, Bloomberg is the only provider that shows a significant effect on deal premia, while Sustainalytics now has an insignificant coefficient. Similarly to the first hypothesis, the coefficient for Refinitiv remains insignificant. Table 11 further shows that the coefficient for the Bloomberg ESG score is similar to the previous regression analysis, which equals 0.20 compared to 0.24. Moreover, we see that variables such as Multiple Bidders and Ln Size once again in the smaller sample show significant effects.

Furthermore, variables such as Book-to-market, Investment Rate, and Cross Border show significant coefficients. However, these variables have not shown significant effects in previous regressions. Due to the relatively small sample size, these variables' significance should be analyzed with caution.

Table 11: Regression Results

Dependent Variable	Deal Premium		
ESG Score Provider	Bloomberg	Refinitiv	Sustainalytics
ESG Bloomberg	0.202*		
	(0.114)		
ESG Refinitiv		0.162	
		(0.106)	
ESG Sustainalytics			0.079
			(0.113)
Shares After Transaction	-0.082	-0.094	-0.074
	(0.102)	(0.106)	(0.104)
EBITDA 3-Year Growth Rate	0.073	0.077	0.078
	(0.097)	(0.097)	(0.099)
Industry Relatedness	-0.084	-0.071	-0.052
	(0.209)	(0.210)	(0.215)
Ln Size	-0.344***	-0.327***	-0.266**
	(0.113)	(0.112)	(0.104)
Block Purchase	0.105	0.127	0.200
	(0.576)	(0.580)	(0.586)
Cash only	-0.259	-0.258	-0.235
	(0.196)	(0.197)	(0.199)
Multiple Bidders	0.711***	0.606**	0.694**
	(0.260)	(0.264)	(0.265)
Cross Border	-0.490	-0.485	-0.509
	(0.202)	(0.203)	(0.206)
Leverage	-0.101	-0.092	-0.081
	(0.098)	(0.098)	(0.100)
Investment rate	0.262**	0.259**	0.254**
	(0.037)	(0.121)	(0.123)
Book-to-market	0.197**	0.211**	0.195**
	(0.093)	(0.094)	(0.095)
Industry Fixed Effects	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes
Number of Observations	105	105	105
Adjusted R2	0.309	0.302	0.284
Regression significance (p-value)	***	***	***

Note: *p < 0.1, **p < 0.05, ***p < 0.01. Regression significance indicates the level of the p-value of the F-statistic.

7.3 Hypothesis 3: Interaction between ESG score providers

For the third hypothesis, we apply the same methodology as the previous regressions, meaning that we perform three separate regressions for each interaction term. The regressions are conducted on the same sample as the regressions under

hypothesis 2, in order to directly compare their significance levels on the deal premium.

The results presented in Table 12 suggest differing levels of significance between the interaction terms. The first and second columns display the interaction terms involving Bloomberg's ESG scores, which both show positive and significant coefficients on a 10% level. Furthermore, the coefficients have values of 0.21 and 0.22 respectively, which are similar to the individual coefficient for Bloomberg's ESG scores under hypothesis 2. The interaction term for Refinitiv and Sustainalytics is insignificant, which is in line with both their significance levels under previous regression analyses under hypothesis 2. In addition, we see significant coefficients for Multiple Bidders and Ln Size, with similar values as previous regressions.

Additionally, we continue noticing significant coefficients for Book-to-market, Investment Rate, and Cross Border. As stated in the previous section, the smaller sample size should warrant additional caution when interpreting these newly significant variables.

Table 12: Interacting ESG scores

Dependent Variable	Deal Premium		
ESG Score Provider	Bloom*Ref	Bloom*Sust	Ref*Sus
Bloomberg*Refinitiv	0.212*		
	(0.109)		
Bloomberg*Sustainalytics		0.222*	
		(0.113)	
Refinitiv*Sustainalytics			0.135
			(0.105)
Shares after Transaction	-0.099	-0.094	-0.093
	(0.102)	(0.102)	(0.105)
EBITDA 3-Year Growth Rate	0.069	0.061	0.071
	(0.097)	(0.097)	(0.099)
Industry Relatedness	-0.069	-0.019	-0.053
	(0.208)	(0.210)	(0.212)
Ln Size	-0.359***	-0.338***	-0.309***
	(0.114)	(0.109)	(0.112)
Block Purchase	0.069	0.009	0.105
	(0.576)	(0.582)	(0.589)
Cash only	-0.264	-0.263	-0.250
	(0.195)	(0.195)	(0.198)
Multiple Bidders	0.639**	0.716***	0.659**
	(0.258)	(0.259)	(0.262)
Cross Border	-0.475**	-0.501**	-0.503**
	(0.202)	(0.203)	(0.204)
Leverage	-0.091	-0.079	-0.083
	(0.097)	(0.097)	(0.099)
Investment rate	0.263**	0.244**	0.251**
	(0.120)	(0.120)	(0.122)
Book-to-market	0.209**	0.188**	0.202**
	(0.093)	(0.093)	(0.094)
Industry Fixed Effects	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes
Number of Observations	105	105	105
Adjusted R2	0.315	0.315	0.294
Regression significance (p-value)	***	***	***

Note: *p < 0.1, **p < 0.05, ***p < 0.01. Regression significance indicates the level of the p-value of the F-statistic.

8 Analysis

In this section, we will outline an analysis of the previously presented results. In addition, the limitations of the thesis will be presented, as well as suggested avenues for further research.

8.1 Empirical analysis

Across all hypotheses tested, commonality can be found in the statistical significance for the variables Size and Multiple Bidders. On average, Multiple Bidders carry the largest effect of the two which is not unlikely, as the presence of more bidders should result in a higher premium. This is supported by the arguments and the findings by Datta, Pinches, and Narayanan (1992) and Flanagan and O'Shaughnessy (2003), which state that competition is a driver of higher deal premia. Contrary to the impact of Multiple Bidders, Size carries a negative sign in all of the regressions. This result is supported by the findings of Alexandridis, Fuller, Terhaar, and Travlos (2013), indicating that there is complexity in the valuation of the synergy effects that could be reaped by the acquirers, which would consequently impact their willingness to pay.

The results are also in line with the conclusions of Akerlof (1978). He argues that in the presence of asymmetric information, which in this case would stem from the large size of the target, the bid does not reach its maximum value as the firm hedges itself from overpaying. Contrary, Lorderer and Martin (1990) found that size would be positively related to premium, which is also true for Harford and Li (2007), arguing that managers are likely to overpay for larger firms. This is not supported by the results and seemingly, it is likely that the size of the firm introduces an information asymmetry problem. The asymmetry deters firms from paying more, consequently making the realized premium smaller.

Regarding the effect of ESG scores, our first hypothesis sought to investigate whether there is any connection between the deal premium and ESG scores from

different score providers. The results presented in table 10 point towards the fact that there is a significant relationship between multiple ESG score providers and the price paid in the corporate transaction. These findings are in line with the results of Gomes and Marsat (2018), which found that higher CSR performance increases the deal premium. As pointed out in the results section, an increase in Bloomberg's ESG scores of 12.5 represents an increase in deal premium of 2.8%. Put into context, an acquisition premium of 100 million dollars could be further amplified by 2.8 million dollars with enhanced ESG performance. With similar results generated by Sustainalytics, it would be reasonable to assume that the empirical findings are in line with the theory of Porter and Kramer (2006), who presented the idea of corporations benefiting from investing in CSR activities, which would increase their overall market value.

However, the results were not completely consistent, as the findings under hypothesis 2 suggest a difference in effect between the data providers. While Bloomberg remains significant, both Refinitiv and Sustainalytics are insignificant. These results are in support of the findings of Jost, Erben, Ottenstein, and Zülch (2022) who also found that these company characteristics do not increase the price in M&A activities. Thus, the results are suggesting that different providers offer varying usability and information content in relation to investment decisions. However, although providers differ in terms of the effect on deal premia, we see no evidence that investing in ESG-related activities would have a negative effect on the company's valuation. While Friedman (2007) argues that CSR-related actions initiated by the corporation itself are value destructive, the results rather suggest that acquirers either place a positive premium on high ESG performance, or do not include these aspects in the valuation at all.

Furthermore, these findings serve as a supplement to the findings of Berg, Kölbel, and Rigobon (2022), which shed light on the vast divergence between ESG scores provided by different score providers. As each provider uses varying rating methodologies, i.e. which metrics to include, how to measure them, and the weight placed

on them, the information content is significantly different. The regression results under hypothesis 2 strengthen this position, as the different ESG score providers show various levels of significance. As under hypothesis 1, Bloomberg shows a significant effect also in the common sample, while Refinitiv and Sustainalytics do not. Therefore, the divergence between ESG scores seems to have a material effect, as they offer various levels of information value for investment decisions.

As described by Christensen, George. Serafeim, and Sikochi (2022), the increasing amount of ESG score providers amplifies the amount of information asymmetry, potentially affecting the overall risk impression of a corporation. In the same sense, the use of different ESG score providers seems to result in a different valuation of the target itself, as they affect the premium paid in different magnitudes. As an example, depending on the ESG score provider used, the acquirer could potentially oversee certain risks or overvalue particular target characteristics, ultimately resulting in different valuations between bidders. This could potentially affect the future value creation between the acquirer and the target entity, as Diaz, Sanfilippo Azofra, and López Guitérrez (2013) find that risks for inaccurate target valuation can aggravate synergy realization.

This reasoning leads to the analysis of the third hypothesis, which investigates whether multiple sources of ESG scores can create consensus among investors. As previously stated, the interacting terms involving Bloomberg show significant effects on the deal premia. These results are encouraging, as it further supports the article written by SustainAbility (2020), which outlines the usage of a combination of ESG score providers. However, the results are not entirely consistent, as the combination of Refinitiv and Sustainalytics does not show any statistical significance, even though Refinitiv is classified as one of the most used data sources (SustainAbility 2020). Nevertheless, the outcome of the regression analysis under hypothesis 3 might suggest that ESG scores provided by Bloomberg may facilitate in the creation of consensus among investors, which would be in line with the findings of G. Serafeim and Yoon (2022).

The results generated under hypothesis 3 are further strengthened by the 2SLS regression results under section 6.1. As previously discussed, the regressions under hypothesis 2 were possibly affected by endogeneity issues, as the estimated ESG scores derived from the first stage in the 2SLS did not show any statistical significance. However, these endogeneity concerns were potentially mitigated by creating the interaction term under hypothesis 3, as the estimated combinations of ESG scores were mostly significant. The potentially missing variable, representing the endogeneity issues, from the regression models under hypothesis 2 could be in the form of a supplementary ESG score. This would follow the conclusions of Harai and Brady (2021) and G. Serafeim and Yoon (2022), who argue that more than one score is typically used to create consensus among investors. As Choi, Petra, and Guar (2015) argues that CSR could function as a reputational asset which could potentially increase the deal premium, receiving high ESG scores from multiple providers would further enhance the perception of the target's ESG performance. This would also be in line with the research of Ioannou and G. Serafeim (2012), as the similarity in ESG score levels between two data providers would enable a further reduction of any information asymmetry between the target and the acquirer by approaching the target entity's true ESG performance.

An alternative explanation could be that the use of ESG scores has changed over time, evolving into an instrument used to flag bad performance. According to the article by (Harai and Brady 2021), institutional investors often utilize ESG scores in other capacities than purely for investment reasons. Rather than including ESG scores in the valuation analysis of a corporation, they are used as screening tools to decide whether to include the target in their investment universe. As the score provided by Bloomberg contains information regarding how frequently companies report on ESG topics, this could be viewed as the required data needed to perform M&A due diligence. This fact, combined with Bloomberg functioning as a screening tool for companies unwilling to disclose certain information, would be in line with what is stated in the article by (SustainAbility 2020), namely that investors use Bloomberg to flag bad performance.

8.2 Limitations

This section aims to list some of the limitations of this thesis, as well as provide suggestions to future researchers on how to overcome these obstacles.

As previously stated, ESG issues have gained significant traction in recent years, and an increasing number of investors choose to incorporate ESG in their investment decisions. This has however not always been the case, why samples become rather limited when comparing the availability of ESG scores and financial/deal-related data. Israel (1992) argues that a sample size of 150-500 observations is generally sufficient, which is true for all of the individual samples, but not for the combined sample in this study. This is illustrated in Table 1, which shows that Sustainalytics did not start to regularly publish ESG scores until 2015. Consequently, this constrained the common sample of this thesis.

Another limitation of this thesis is the use of our constructed interaction term, which attempts to investigate how ESG scores are used to create consensus among investors as supplementary items. However, the methodology applied in this thesis, i.e. to only include the interaction term, is seemingly rare in academia. Although we believe that a cross-over interaction is well-suited for our research purpose, there is little previous research available to support our methodology.

Moreover, the results from the Heckman Correction Model become more accurate with a larger sample. Because of the sample sizes, as well as the limited choice of instrumental variables to incorporate into the two-staged probit model, the original regression model runs the risk of potential selection bias. However, with a larger sample size, this could easily be controlled for by using the Heckman Correction model.

8.3 Suggestions for future research

Due to the uncharted nature of this area of research, i.e. using data from three different ESG score providers, the analysis is limited in terms of statistical inference. However, due to the consistency of the results, our comparative analysis provides an interesting area for further research. As ESG scores are becoming increasingly used, the sample will continue to increase, which will strengthen the ability to investigate the true difference between ESG score providers and their impact on investment decisions.

In fact, an article by ESMA (2021) examines the use of different ESG scores over time. The article illustrates that each provider that is included in this thesis has increased their company scope by 10-20% in only 2 years. In our opinion, this should indicate that ESG score providers will continue to increase the overlap of rated corporations, which would grow the common sample size. As of January 2023, large and listed companies in the European Union are obliged to follow the EU Taxonomy, which states that companies have to report on their environmental engagements (EU 2023). However, the Taxonomy has some drawbacks, as it has not yet been fully implemented and only takes into account certain industries, and is limited to corporations of certain sizes. In addition, it only requires companies to report on environmental activities, which of course only covers a third of the full ESG score. With more stringent requirements surrounding ESG disclosure, and ESG scores not converging in the near future, performing more in-depth research on the ambiguity surrounding ESG score providers, and its impact on asset valuation, presents an exciting and important avenue for future research.

We also suggest that future researchers examine the difference between each pillar of ESG, and their respective effects on investment decisions. Performing such an in-depth and individual examination currently poses difficulties, as it even further reduces the common sample size. However, we do believe that the analysis can be conducted in separate samples, which would provide an indication of whether there is consistency in pillar relevance between ESG score providers.

As a last suggestion, an interesting contribution to the field would be to further broaden the comparative analysis to include other ESG score providers. Except for the ones included in this analysis, there are other sources such as Morgan Stanley Capital International (MSCI) that could further extend the analysis.

9 Conclusions

This thesis investigates the effect of ESG scores on investment decisions. More specifically, we examine how ESG score providers differ in their rating methodology, and the impact that this may have on deal premia within M&A transactions. In addition, this thesis has reviewed to what extent such ESG scores may provide supplementary information with regard to company characteristics, and whether this could have an effect on the deal premia. In order to investigate these relationships, we have employed OLS regressions, as well as Two-Stage Least Squares, along with various robustness checks to strengthen the validity of the results.

The results obtained suggest that different ESG score providers have different effects on deal premia. We observe that all three examined providers have different statistical impacts, where Bloomberg showed positive significance on a 10% level, Sustainalytics negative significance on a 10% level, and Refinitiv insignificance. While the differing results between Bloomberg and Sustainalytics may be explained by the true nature of their scores, Refinitiv has no statistical relationship with deal premia in their own sample, nor in the common sample. In other words, these results are inconsistent, as it illustrates that ESG scores have a dispersed relevance in investment decisions. Furthermore, it could prove that, depending on which ESG score provider is being used, the valuation of the target entity may vary.

The thesis did however find reasons to believe that the regressions in the common sample did suffer from endogeneity issues such as omitted variable bias. These concerns could be the result of one single score not being able to explain the fluctuations in the deal premia. By introducing an interaction term between the ESG score providers, with the reasoning being that acquirers are using multiple data sources to gain a comprehensive view of the target, the thesis did manage to not only prove statistical significance, but potentially mitigating the previous endogeneity issues. These results could suggest that the combination of ESG

scores offers a more accurate view of the acquisition target, creating information synergies. However, the results suggest that these synergy effects are only created when combined with Bloomberg's ESG scores. This may be explained by the fact that Bloomberg differs in terms of the measures that they include in their ESG scores, compared to Refinitiv and Sustainalytics. The significant effect of their interaction terms could also be due to their screening usage among investors, which further strengthens the combination with other ESG scores.

However, as previously stated, these results must be deemed inconsistent, similar to the results under Hypothesis 1 and 2. Although there are reasons to believe that there are statistically significant relationships between ESG scores and the deal premium in M&A activity, illustrated by the consistent results of Bloomberg, there is a difference between each provider and sample. Because of these differences, it can not be accurately argued that ESG scores have an undisputed impact on investment decisions. It should also be noted that the significance of the interaction terms between Bloomberg and the remaining data providers could be driven by the significance of Bloomberg itself. Although there is a strong theoretical foundation to support the analysis of the empirical results under hypothesis 3, this thesis covers areas not previously researched, which should warrant for caution when interpreting the results.

Despite the fact that the thesis has its limitations, such as a smaller common sample, we believe that there is enough consistency in the results to support the conclusions that have been drawn. We further believe that this thesis contributes to existing research by conducting analyses across different ESG score providers and their impact on M&A activities.

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Appendix

Appendix 1A: 2SLS Hypothesis 1 - First stage regression

Dependent Variable	ESG Score		
ESG Score Provider	Bloomberg	Refinitiv	Sustainalytics
Year/country average	0.778***	0.789***	0.650***
	(0.039)	(0.043)	(0.058)
Year/industry	0.437***	0.361***	0.392***
	(0.049)	(0.057)	(0.062)
Shares after Transaction	-0.027	0.024	-0.021
	(0.016)	(0.040)	(0.024)
EBITDA 3 Year Growth Rate	-0.012	-0.002	0.005
	(0.008)	(0.015)	(0.010)
Industry Relatedness	0.203	-0.191	0.979
	(0.610)	(1.248)	(1.203)
Ln Size	1.24***	3.014***	0.44*
	(0.186)	(0.403)	(0.250)
Block Purchase	-2.187	-4.389	-1.178
	(1.705)	(3.968)	(2.539)
Cash only	0.401	-0.504	0.198
	(0.660)	(1.217)	(0.797)
Multiple Bidders	-1.409	2.283	-0.381
	(1.000)	(1.718)	(1.253)
Cross Border	0.506	0.644	-0.577
	(0.638)	(1.194)	(0.826)
Leverage	-0.029	0.001	-0.515
	(0.018)	(0.030)	(2.089)
Investment rate	0.623	4.176**	0.021
	(0.729)	(1.711)	(1.751)
Book-to-market	0.000	-0.000	0.000
	(0.000)	(0.001)	(0.000)
Industry Fixed Effects	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes
Number of Observations	558	368	254
Adjusted R2	0.719	0.728	0.872
Regression significance (p-value)	***	***	***

Results for the first stage of the 2SLS. Note: *p $<$ 0.1, **p $<$ 0.05, ***p $<$ 0.01. Regression significance indicates the level of the p-value of the F-statistic.

Appendix 1B: 2SLS Hypothesis 2 - First stage regression

Dependent Variable	ESG Score		
ESG Score Provider	Bloomberg	Refinitiv	Sustainalytics
Year/country average	0.651***	0.773***	0.333***
	(0.099)	(0.078)	(0.072)
Year/industry	0.486***	0.343***	0.768***
	(0.102)	(0.088)	(0.064)
Shares after Transaction	-0.032	-0.008	0.002
	(0.046)	(0.063)	(0.036)
EBITDA 3 Year Growth Rate	-0.003	-0.012	0.0140
	(0.014)	(0.019)	(0.011)
Industry Relatedness	-1.809	-4.232	1.038
	(1.593)	(2.159)	(1.276)
Ln Size	1.174*	2.572***	0.828*
	(0.655)	(0.855)	(0.477)
Block Purchase	3.982	8.213	2.438
	(4.337)	(5.916)	(3.540)
Cash only	-0.329	-0.155	-1.712
	(1.484)	(2.207)	(1.171)
Multiple Bidders	-0.388	6.889**	-0.676
	(1.960)	(2.680)	(1.554)
Cross Border	0.419	2.124	-0.134
	(1.561)	(2.115)	(1.208)
Leverage	3.902	6.337	2.196
	(3.664)	(4.992)	(3.038)
Investment rate	-2.768	-3.198	-1.160
	(3.067)	(4.197)	(2.437)
Book-to-market	0.001	-0.001	0.000
	(0.001)	(0.001)	(0.001)
Industry Fixed Effects	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes
Number of Observations	105	105	105
Adjusted R2	0.763	0.728	0.924
Regression significance (p-value)	***	***	***

Results for the first stage of the 2SLS. Note: *p < 0.1, **p < 0.05, ***p < 0.01. Regression significance indicates the level of the p-value of the F-statistic.

Appendix 1C: 2SLS Hypothesis 3 - First stage regression

Dependent Variable	ESG Score		
ESG Score Provider	Bloom*Ref	Bloom*Sust	Ref*Sust
Year/country average	0.753***	0.610***	0.741***
	(0.077)	(0.088)	(0.078)
Year/industry	0.354***	0.457***	0.325***
	(0.086)	(0.096)	(0.087)
Shares after Transaction	0.000	-0.000	0.000
	(0.000)	(0.000)	(0.000)
EBITDA 3 Year Growth Rate	-0.004	0.005	0.002
	(0.007)	(0.007)	(0.008)
Industry Relatedness	-0.119**	-0.034	-0.050
	(0.060)	(0.067)	(0.070)
Ln Size	0.113***	0.078*	0.116**
	(0.040)	(0.043)	(0.045)
Block Purchase	0.225	0.240	0.283
	(0.165)	(0.188)	(0.198)
Cash only	-0.006	0.009	0.006
	(0.057)	(0.063)	(0.066)
Multiple Bidders	0.088	-0.069	0.131
	(0.078)	(0.086)	(0.091)
Cross Border	0.055	-0.024	0.041
	(0.061)	(0.070)	(0.072)
Leverage	0.064	0.108	0.112
	(0.045)	(0.098)	(0.090)
Investment rate	-0.012	-0.012	-0.009
	(0.011)	(0.013)	(0.013)
Book-to-market	0.000	0.000	-0.000
	(0.000)	(0.000)	(0.000)
Industry Fixed Effects	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes
Number of Observations	105	105	105
Adjusted R2	0.763	0.856	0.924
Regression significance (p-value)	***	***	***

Results for the first stage of the 2SLS. Note: *p < 0.1, **p < 0.05, ***p < 0.01. Regression significance indicates the level of the p-value of the F-statistic.

Appendix 2A: VIF test for Multicollinearity - Hypothesis 1

Dependent Variable	Deal Premium		
ESG Score Provider	Bloomberg	Refinitiv	Sustainalytics
Bloomberg	1.502		
Refinitiv		1.500	
Sustainalytics			1.394
Shares after Transaction	1.354	1.134	1.294
EBITDA 3 Year Growth Rate	1.039	1.037	1.070
Industry Relatedness	1.156	1.161	1.260
Ln Size	1.137	1.395	1.255
Block Purchase	1.093	1.082	1.162
Cash only	1.307	1.316	1.210
Multiple Bidders	1.139	1.134	1.278
Cross Border	1.126	1.125	1.208
Leverage	1.031	1.027	1.338
Investment rate	1.078	1.071	1.234
Book-to-market	1.052	1.049	1.062
Year Fixed Effects	2.879	2.899	3.102
Industry Fixed Effects	2.765	2.657	2.843

Note: A value above 10 indicates strong multicollinearity

Appendix 2B: VIF test for Multicollinearity - Hypothesis 2

Dependent Variable	Deal Premium		
ESG Score Provider	Bloomberg	Refinitiv	Sustainalytics
Bloomberg	1.868		
Refinitiv		1.587	
Sustainalytics			1.770
Shares after Transaction	1.484	1.527	1.501
EBITDA 3 Year Growth Rate	1.349	1.346	1.357
Industry Relatedness	1.538	1.538	1.579
Ln Size	1.822	1.788	1.492
Block Purchase	1.384	1.386	1.385
Cash only	1.376	1.377	1.369
Multiple Bidders	1.364	1.398	1.369
Cross Border	1.425	1.428	1.431
Leverage	1.368	1.363	1.385
Investment rate	2.079	2.079	2.101
Book-to-market	1.234	1.245	1.236
Year Fixed Effects	2.418	2.647	2.510
Industry Fixed Effects	2.892	2.491	3.034

Note: A value above 10 indicates strong multicollinearity

Appendix 2C: VIF test for Multicollinearity - Hypothesis 3

Dependent Variable	Deal Premium		
ESG Score Provider	Bloomberg	Refinitiv	Sustainalytics
Bloomberg*Refinitiv	1.704		
Bloomberg*Sustainalytics		1.842	
Refinitiv*Sustainalytics			1.699
Shares after Transaction	1.518	1.505	1.557
EBITDA 3 Year Growth Rate	1.352	1.364	1.361
Industry Relatedness	1.538	1.568	1.549
Ln Size	1.878	1.712	1.759
Block Purchase	1.394	1.423	1.417
Cash only	1.377	1.367	1.375
Multiple Bidders	1.362	1.364	1.359
Cross Border	1.430	1.424	1.425
Leverage	1.363	1.367	1.367
Investment rate	2.079	2.093	2.093
Book-to-market	1.239	1.238	1.236
Year Fixed Effects	2.278	2.359	2.299
Industry Fixed Effects	2.921	3.020	2.976

Note: A value above 10 indicates strong multicollinearity

Appendix 3: p-values of Breusch - Pagan test for Heteroscedasticity

	Model		
	Hypothesis 1	Hypothesis 2	Hypothesis 3
Bloomberg	0.060	0.397	
Refinitiv	0.030	0.454	
Sustainalytics	0.542	0.649	
Bloomberg*Refinitiv			0.403
Bloomberg*Sustainalytics			0.791
Refinitiv*Sustainalytics			0.627

Note: A p-value below 0.05 indicates heteroscedasticity

Appendix 4: Data Variables

Variable	**Description**	**Expected Sign**
Independent		
ESG Score	Methodology of scoring depending on the provider, thorough explanation in Section 2.	?
Control Deal		
Number of bidders	More bidders drive up the premium, value is 1 for multiple bidders and 0 otherwise.	+
Cash Only	Cash payments reflect lower risk, value is 1 for Cash payment and 0 otherwise	+/−
Cross Border	Deals across borders suffer from higher information asymmetry. Value is 1 for Cross Border and 0 otherwise.	−
Block Purchase	Should reduce information asymmetry surrounding the purchase.	−
Shares after transaction	Desire for a larger ownership stake should be positively related to premium	+
Industry relatedness	Deals across industries result in higher premia due to information asymmetry	+
Control Financial		
Leverage	Higher leverage indicates more risk and lower premium	−
LN Size	Larger size increases deal complexity and introduces information asymmetry	+/−
EBITDA Growth	EBITDA growth rate for the past three years	+/−
Book-to-market	Metric measuring company size in terms of market value relative to book value	+/−
Investment rate	Metric measuring firm's investment relative to its assets	+/−

The table contains information on the included variables in all regressions, along with a brief description, as well as the sign their coefficients are expected to take

Appendix 5: Correlation Matrix

	Percent after Transaction	EBITDA Growth	Industry Relatedness	Ln Size	Book-to-market	Block Purchase	Cash only= 1	Multiple Bidders
Percent after Transaction	1	-0.00879177	-0.16145	-0.255996	-0.00162426	-0.229875	-0.230329	0.209945
EBITDA Growth	-0.00879177	1	-0.0852676	-0.132995	-0.0213091	-7.66422e-05	-0.0424459	0.105884
Industry Relatedness	-0.16145	-0.0852676	1	0.1326	0.112467	0.0743648	0.00185806	0.121073
Ln Size	-0.255996	-0.132995	0.1326	1	0.0461793	0.12823	0.167276	-0.0785772
Book-to-market	-0.00162426	-0.0213091	0.112467	0.0461793	1	-0.0179975	0.101297	-0.0451543
Block Purchase	-0.229875	-7.66422e-05	0.0743648	0.12823	-0.0179975	1	0.0541442	-0.0761842
Cash only= 1	-0.230329	-0.0424459	0.00185806	0.167276	0.101297	0.0541442	1	-0.242569
Multiple Bidders	0.209945	0.105884	0.121073	-0.0785772	-0.0451543	-0.0761842	-0.242569	1

(a) Table 1

	Cross Border	Leverage	Investment rate	Premium	Ref Total	ESG Bloom	ESG Sust
Cross Border	1	0.0441889	0.143394	-0.12888	-0.065345	-0.00733276	0.00801302
Leverage	0.0441889	1	0.133277	-0.125903	0.152786	0.227748	-0.0201872
Investment rate	0.143394	0.133277	1	0.286791	-0.0237939	-0.0267807	0.261801
Premium	-0.12888	-0.125903	0.286791	1	0.0372447	0.026171	0.0281174
Ref Total	-0.065345	0.152786	-0.0237939	0.0372447	1	0.716348	0.0724716
ESG Bloom	-0.00733276	0.227748	-0.0267807	0.026171	0.716348	1	-0.0600314
ESG Sust	0.00801302	-0.0201872	0.261801	0.0281174	0.0724716	-0.0600314	1

(b) Table 2