



The Value of ESG: Evidence from M&As

An Empirical Analysis of ESG in M&As in the OECD from 2010 to 2021

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Master thesis, Economics and Business Administration

Major: Financial Economics

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This thesis was written as a part of the Master of Science in Economics and Business Administration at NHH. Please note that neither the institution nor the examiners are responsible – through the approval of this thesis – for the theories and methods used, or results and conclusions drawn in this work.

Acknowledgements

This master's thesis concludes our Master of Science in Economics and Business Administration at the Norwegian School of Economics. We would like to extend our gratitude to our supervisor Carsten Gero Bienz for his attentive comments, thought-provoking discussions, and helpful insight.

Norwegian School of Economics

Bergen, May 2022

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Abstract

This paper investigates whether acquirers are willing to pay a premium for targets with greater environmental, social, and governance (ESG) performance in mergers and acquisitions (M&A). The topic is scarcely investigated, and the existing research offers ambiguous findings on the value of ESG. Our thesis provides evidence that acquirers pay an ESG premium and shows that ESG is valued in M&A transactions.

We construct a sample of 1,944 deals conducted between 2010 and 2021, where the target is incorporated in an OECD country. In 485 of these transactions, the target has an ESG score. We use ESG scores provided by Refinitiv as the measure for ESG performance. Additionally, we test for the target's degree of self-reporting by using the ESG disclosure score provided by Bloomberg.

Using a standard OLS regression model, we find a positive relationship between target ESG score and deal premium. Furthermore, our findings indicate that the environmental and governance categories drive the ESG premium. Additionally, we run separate regression models for strategic and financial acquirers and find that an ESG premium is paid by strategic acquirers only. This result indicates that target ESG performance is valuable to strategic acquirers in M&A transactions.

Our paper suggests that acquirers value targets' ESG performance in M&A transactions, as it may be considered a way to reduce information asymmetry and target-specific risk.

Keywords – ESG, CSR, mergers and acquisitions, deal premium

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1 Introduction

In 2021, mergers and acquisitions (M&A) spending amounted to \$5.8 trillion (Nishant, 2021), which in comparison, amounts to 4.8% of global equity market capitalisation (Statista Research Department, 2022). Additionally, \$649 billion were invested in environmental, social, and governance (ESG) focused funds in 2021. These funds now account for approximately 10% of global fund capitalisation (Kerber and Simon, 2021). According to United Nations Global Compact (nd), ESG considerations in private investments are developing from a risk management practice to a tool for creating new opportunities and innovation that generate long-term value for both business and society. The question is, do such ESG considerations pay in M&A transactions?

This paper investigates the existence of an ESG premium in M&A transactions. The term ESG premium implies that there is a positive relationship between the target ESG score and the deal premium. There is growing research interest in the effect and importance of ESG in financial settings. However, attempts to empirically investigate the impact of ESG in M&A transactions are still scarce. The empirical research that has been done shows ambiguous results, and a conclusive consensus has not been reached.

Our thesis establishes a positive relationship between the target ESG score and the deal premium. Additionally, our results indicate that the environmental and governance aspects of ESG drive the ESG premium. Interestingly, we also find that an ESG premium is paid by strategic acquirers only and not by financial acquirers.

There are two reasons why investigating M&A transactions is particularly interesting. Firstly, M&A acquirers conduct thorough due diligence of their targets to reduce the inherent information asymmetry between acquirer and target. Secondly, M&A acquirers are more concerned with firm-specific risk than marginal investors due to higher investment concentration. In combination, these arguments translate to a thorough assessment of target companies by potential buyers.

The M&A bidding process is extensive, where a number of observable and unobservable factors determine the outcome. We have gathered several deal- and target-specific control variables to handle these factors. By using a unique sample combination, we provide evidence of an ESG premium in M&A transactions. Our sample is restricted to transactions

in the period 2010 to 2021, where the target is incorporated in a member country of the Organisation for Economic Co-operation and Development (OECD). The number of transactions in our sample amounts to 1,944. In 485 of these transactions, the target has an ESG score.

Our analysis employs regression models with the deal premium as the dependent variable. We test six different hypotheses. Our main hypothesis is that there exists an ESG premium in M&A transactions. In addition to our main hypothesis, we test for the individual environmental, social, and governance pillar scores. We run regressions with the Bloomberg ESG disclosure score as the explanatory variable of interest. Additionally, we test for differences in the potential ESG premium between strategic and financial acquirers. Finally, we test for differences in ESG premium over time by dividing our sample into three four-year periods.

The focus of corporations has changed over time. Previously, one was mostly concerned with short-term profit maximisation. Today, the focus has shifted towards long-term and sustainable value creation. As an example, in July 2020, 90% of the total company value in the S&P500 consisted of intangible assets (Oceantomo, nd). Historically, investors were willing to pay for physical assets like property, equipment and machinery. Whereas today, the value of companies consists largely of intangible values such as reputation, culture, sustainability, and customer loyalty. Sustainability is a broad and hardly measurable concept. However, ESG can serve as a specific quantitative measure of a company's sustainability and corporate social performance. Consequently, ESG allows us to understand the impact of social responsibility efforts on the company's financial and operational performance.

We analyse the effect of ESG performance assigned to the target firm by M&A bidders, instead of investigating the impact of ESG performance on the firm value as perceived by a marginal investor (i.e., by stock market prices). As mentioned, acquirers in M&A transactions conduct an extensive investigation of the target before submitting a takeover bid. In addition, acquirers assume a large amount of specific risk due to investment concentration and the high cost associated with divestiture of acquired businesses. This is drastically different from a marginal investor who has the ability to diversify his portfolio and liquidate positions at a low cost. Firm-specific risk is therefore of much greater

interest for an M&A acquirer than for a marginal investor who is mainly concerned with systematic risk. Positive relationships with stakeholders enhance goodwill, reducing the potential cash-flow impact of negative events, resulting in lower firm-specific risk (Godfrey et al., 2009). Therefore, target ESG performance should be of interest to the acquirer.

In this paper, we will investigate whether there exists an ESG premium in M&A. In other words, whether acquirers are willing to pay a greater amount in M&A transactions for targets with greater ESG performance. As a proxy for ESG performance, we use ESG scores from Refinitiv, which has coverage for over 11,800 companies worldwide (Refinitiv, ndb). There are numerous providers of ESG scores: Bloomberg, Morgan Stanley Capital International (MSCI), Sustainalytics, and more. Previous research uses different ESG score providers, and there is no de-facto standard. We have chosen Refinitiv due to the extensive coverage. In addition, the analysis contains several control variables in the form of target and deal characteristics. These control variables are carefully defined, and their relevance is explained in the data section of our paper.

We contribute to the existing literature by investigating the relationship between ESG and deal premium in M&A transactions on a unique sample. Our sample consists of more recent transactions than most other studies. Additionally, we have constrained our sample to include only deals where the target is incorporated in a member country of the OECD, ensuring that the deals in our sample were conducted in a somewhat comparable regulatory and financial environment.

The following chapter provides background information on ESG and M&A, we also review existing literature on our topic of interest. Chapter 3 presents our hypotheses. Chapter 4 describes our sample construction and the variables included in our models. Chapter 5 gives an overview of the methodology used in the analysis, while chapter 6 presents and discusses our results. Chapter 7 provides a conclusion to our paper.

2 Related literature

This chapter explores literature that is relevant to our thesis. We will describe ESG and its value implications. Furthermore, we will explain the motivations behind M&A activity, describe which factors contribute to determining the deal premium, and describe the information asymmetry inherent in M&A deals. Finally, we will review extant research on the relationship between ESG and deal premiums in M&A.

2.1 ESG and its value implications

The term ESG was first coined in the "Investing in Long-Term value" report from the 2005 conference "Who Cares Wins". At the conference, institutional investors, asset managers, buy-side and sell-side research analysts, global consultants, and government bodies and regulators examined the role of environmental, social, and governance (ESG) value drivers in asset management and financial research (onValues Investment Strategies and Ltd., 2005).

ESG and corporate social responsibility (CSR) have been used somewhat interchangeably in recent years. While CSR only includes environmental and social aspects, ESG includes governance as well. However, research conducted on CSR must be interpreted as highly relevant to our study.

Our study can be traced back to the Friedman-Freeman debate and their opposing views on the purpose of the firm. Friedman argues the shareholder view, which states that the firm's purpose should be to maximise its profits only. Other social goals should be left to politics, shareholders, employees, or customers to spend from their own pocket on the particular action if they desire to do so (Friedman, 1970). The early interpretation was a uniformly negative relationship between CSR and financial performance (e.g., see (Vance, 1975; Wright and Ferris, 1997)). Freeman, in opposition to Friedman, argues the stakeholder view. In the stakeholder view, CSR and profits are non-conflicting (Freeman, 2010; Porter and Kramer, 2006). Such social responsibility initiatives could create competitive advantages, which can enhance profits. Hence, the two views reach opposing conclusions regarding the value of ESG activities.

A selection of newer papers suggests a negative relationship between abnormal returns for firms that report greater investments in environmentally friendly activities (Fisher-Vanden and Thorburn, 2011; Jacobs et al., 2010). Entailing that investors are punishing firms for what they perceive as costly investments with lower expected returns. On the other hand, Fatemi et al. (2018) and Malik (2015) find that socially responsible behaviour may have a net positive effect on firm value.

The relationship between ESG performance and firm value has been widely studied. However, no clear consensus has been reached. One of the reasons this relationship may be unclear is the intangible nature of these attributes that stem from ESG activities. Such attributes can be corporate culture, reputation, and employees' tacit knowledge. These attributes can be a source of competitive advantage in accordance with the resource-based view of the firm if they are challenging to imitate (Wernerfelt, 1984).

In a survey conducted by McKinsey & Company (2020), the respondents, given a hypothetical opportunity to acquire a new business, say that they are willing to pay a 10% premium for a company with an overall positive record on ESG issues compared to a company with an overall negative record. Moreover, executives and investment professionals that were a part of this survey had changed their opinions significantly since 2009:

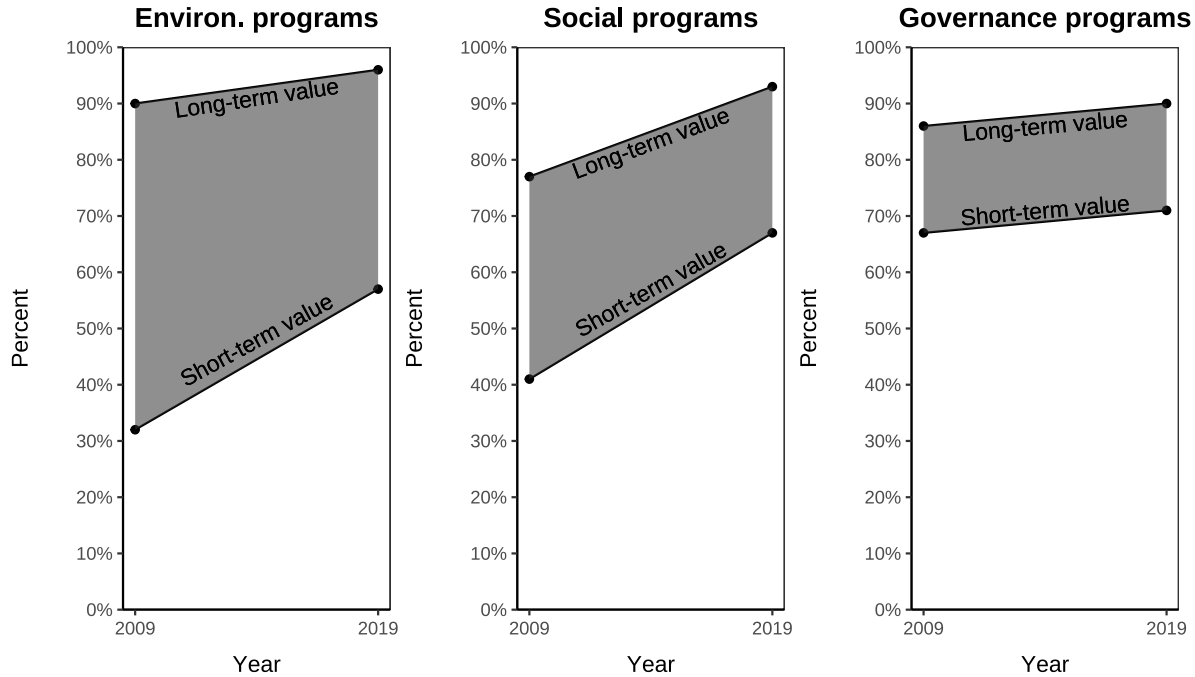


Figure 2.1: McKinsey survey on ESG premium

Source: McKinsey & Company, 2020

The survey shows that the perceived value of social programs has increased the most. It is also worth noticing that the respondent's perception of the short-term value of environmental programs has risen drastically, while the long-term value perception is nearly unanimous. Later on, we will look into quantitative research regarding this topic, but a qualitative survey like this can suggest that ESG plays an important role when negotiating deals.

2.2 Motivations for M&A transactions

There are several hypotheses on what motivates M&A transactions. We will introduce three of the most prevalent: the synergy hypothesis, the growth hypothesis, and "The Market for Corporate Control" hypothesis. Malik (2015) states that the goal of all M&As is to achieve synergy gains. Synergy is achieved when the value of the two combined entities is larger than the sum of the two stand-alone values. Such synergies can be both operational and financial and come in many different forms. Cost reductions are a usual source of synergies and can be achieved by economies of scale or scope, greater bargaining power against suppliers, or the closing of duplicate production facilities. The deal premium should reflect such synergy gains (Diaz et al., 2013).

Another usual motive for M&A activity is growth. Companies that seek to expand can do so both through internal growth or M&As (Gaughan, 2018, p.127). Rapid growth can be achieved by expanding through M&As, either horizontally or vertically. Managers are under pressure to achieve growth, and if they find themselves in an industry with little or no growth, they often look to M&A.

The theory of "The Market for Corporate Control" was first proposed by Manne (1965). The market for corporate control is an arena where managerial teams compete for the rights to manage corporate resources (Jensen and Ruback, 1983). If a potential target is undervalued due to incompetent or irresponsible management, an acquirer can detect the undervaluation, acquire the target, and increase its value by replacing the management (Jensen and Ruback, 1983). The increase in value is the value of the deal premium, which is the potential gain from managing the target more efficiently.

2.3 Determinants of deal premium

When an acquirer purchases a controlling stake in a target, it receives two goods: the investment features associated with ownership of shares, as well as the right to control the company and the ability to make decisions on behalf of the company. The control feature commands its own price (Gaughan, 2018, p.583). This price is often referred to as the control premium, the acquisition premium, or the deal premium. Numerous factors contribute to deciding the size of this premium. Varaiya (1987) analysed several of these factors. He found significant support for the role of competitive forces and anti-takeover measures in the determination of the deal premium. Additionally, he found mixed results for the role of anticipated synergies.

Eckbo (2008) provides valuable insight on takeover premiums. He reviews several elements of the bidding process and investigates their effect on the deal premium. In his article, Eckbo (2008) reviews existing literature and conducts new analyses. The findings can be summarised as follows:

Table 2.1: Effect of target and deal characteristics on deal premium

Effect	Factor
The deal premium is higher when:	<ul style="list-style-type: none"> • The bidder is a public company • The offer is an all-cash offer • The target has a higher runup
The deal premium is lower when:	<ul style="list-style-type: none"> • The target has a higher equity capitalization • The target is a growth company relative to industry rivals • The bid is a tender-offer • The bidder has a toehold
The deal premium is unaffected by:	<ul style="list-style-type: none"> • Target poison pills • Target hostility • Target stock liquidity • Multiple bidders in the bidding process • Whether the takeover is horizontal

Source: Eckbo, 2008

Additional research also support the findings of Eckbo (2008). Alexandridis et al. (2013) find evidence that acquirers pay a significantly smaller premium for larger targets. Furthermore, they find that the overpayment potential is lower when acquiring larger targets. However, they still destroy more value for acquirers around deal announcements. The interpretation is that target size may proxy for the unobserved complexity inherent in larger deals. Betton et al. (2008b) found evidence that the target's runup positively impacts the premium, which is in line with the markup pricing effect in M&A found by Schwert (1996). We will explore more literature relating to the factors that affect the deal premium when justifying our control variables in [the data chapter of our thesis](#).

2.4 Information asymmetry

Several papers uncover a positive relationship between information asymmetry and cost of capital and a negative relationship to firm value (Anderson et al., 2009; Barth et al., 2013; Fu et al., 2012). When an acquirer decides to perform a takeover of a foreign target, the deal is usually characterised by greater risk and greater information asymmetry compared to a domestic M&A (Gatignon and Anderson, 1988). In this case, it is natural to believe that the acquirer would value ESG performance as a way to reduce information

asymmetry and risk (Gomes and Marsat, 2018). Rossi and Volpin (2004) find that cross-border transactions, on average, command a higher takeover premium. Even though cross-border M&As pose greater risks than domestic ones, they also provide opportunities to acquire new capabilities, resources, and knowledge (Shimizu et al., 2004).

Reuer et al. (2012) extend signalling theory to the M&A research and find evidence that target firms' signals can increase the premium they receive. If the target has a high ESG score, it can be interpreted as a positive signal to its involved stakeholders to maximise the transaction value. Due to the aforementioned information asymmetry, acquirers need all signals available from the target firm to value the deal as correctly as possible (Connelly et al., 2011). ESG can offer benefits such as improved reputation, employee motivation, retention, financial performance, valuation, and reduced risk (Weber, 2008; Gao and Zhang, 2015; Aktas et al., 2011; Kim et al., 2014). These benefits can be interpreted as signals by bidders and help mitigate the information asymmetry, thus reducing the target-specific risk. Lower target-specific risk should lead to a higher deal premium, as acquirers are willing to pay more for less uncertainty (Gomes and Marsat, 2018). Target firms may use such ESG signals to improve their future value. The benefits of high ESG involvement by the target contribute to the return and operating performance of the acquiring company post-acquisition (Deng et al., 2013).

The article "Establishing ESG as Risk Premia" by Pollard and Sherwood (2018) presents arguments built upon the risk premia identified by Fama and French (1992). Fama and French's research led to the documentation of risk premia such as value, market, size, profitability, and investment. Pollard and Sherwood (2018) demonstrates that the characteristics needed to establish the existence of risk premium are present in ESG, which namely is the existence of geographic and longitudinal evidence that increases insight into the return distribution of an asset by a measurable factor. In addition, they found that ESG factors measured by independent rating agencies fit the characteristics of an independent risk premium.

2.5 Previous research on ESG and deal premium

Previous research is mainly concerned with the relationship between CSR and deal premium. Nevertheless, research conducted on CSR must be viewed as highly relevant for

this paper. Several studies find that the targets' CSR score pre-acquisition is positively related to deal premium, but there are also several studies that find no relationship between targets' CSR scores and deal premium. This subchapter reviews several studies that examine different aspects of ESG in M&A transactions.

Investigating a sample of 588 international deals announced over the 2003–2014 period, Gomes and Marsat (2018) found that CSR is positively related to bid premiums. They use CSR scores provided by Thomson Reuters ASSET4 (now Refinitiv). In addition, they find that while acquirers generally value environmental performance, social performance only demands a premium in cross-border transactions. The economic interpretation is that acquirers value targets' CSR performance because it reduces information asymmetry and the firm-specific risk relating to the target (Gomes and Marsat, 2018).

Aktas et al. (2011) use an event study approach to measure the impact of targets' social and environmental performance on acquirer gains. They use Innovest's Intangible Value Assessment ratings as a measure of firms' ability to cope with social and environmental risks. The results suggest that deals with greater synergies occur with targets that exhibit better environmental performance. Furthermore, they find that the CSR performance of an acquirer increases after acquiring a Socially Responsible Investment (SRI) aware target. The interpretation of this result is that the acquirer will learn from the target's SRI practices and knowledge (Aktas et al., 2011).

An article by Ozdemir et al. (2021) investigates the effect of targets' CSR performance on the M&A deal premium in the service industry. Based on a sample of 277 acquisitions from 1996 to 2018 and CSR data from the MSCI ESG database, they find that the targets' pre-acquisition CSR performance is positively related to deal premium. Furthermore, they find that the positive effect of targets' CSR performance on the deal premium is greater for firms operating in the service industry than those in other industries (Ozdemir et al., 2021).

Using a sample of 608 deals between 2003 and 2014 and CSR scores from the Thomson Reuters ASSET4 database, Gomes (2019) investigates the impact of CSR on M&A target choices. A control group of firms (non-targets) is created using propensity score matching. These firms are as similar as possible to the treated firms (targets) ex-ante. By the use of a logit regression, Gomes (2019) shows that CSR is positively related to the likelihood

of being subject to a takeover offer. Moreover, the results show that target firms have a higher CSR score than similar non-target firms. The conclusion is that target CSR performance matters for acquirers (Gomes, 2019).

Deng et al. (2013) utilises a large sample of US M&A deals to investigate whether CSR creates value for the shareholders of the acquiring firm. They use CSR performance from the KLD Research & Analytics, Inc. STATS database to measure CSR. Their research uncovers several interesting findings. They find that high CSR acquirers realise higher deal announcement returns than low CSR acquirers. Furthermore, they find that high CSR acquirers achieve greater returns on the value-weighted portfolio of the acquirer and the target. Acquirers with greater CSR scores also achieve greater increases in post-merger long-term operating performance. Finally, they find that deals conducted by high CSR acquirers are less time-consuming and are less likely to fail than deals conducted by low CSR acquirers. To conclude, Deng et al. (2013) argue that their results support the stakeholder theory proposed by Freeman (2010) and Porter and Kramer (2006).

Hussaini et al. (2021) investigates whether acquirers' CSR performance impacts the deal premium. The study uses a large sample of US M&A deals that took place between 1992 and 2014, using MSCI ESG ratings as the CSR measure. They find that higher acquirer CSR performance is associated with a higher takeover premium, in line with the shareholder expense view. Furthermore, Hussaini et al. (2021) argue that their results depict that CSR engagement is not a shareholder choice but rather management's search for personal objectives, like reputation and personal benefits.

There has also been conducted research that shows no significant relationship between ESG/CSR and deal premiums. Using data from the Refinitiv ESG database, Jost et al. (2021) investigates whether CSR impacts M&A premia. They use an international sample of transactions completed in the period 2003 to 2018, with 1,598 deals from the acquirer's perspective and 449 from the target's perspective. Their results show that neither the acquirer's nor the target's CSR performance alone significantly impacts M&A premium. However, they find that the interaction of the acquirer's governance performance and CSR performance negatively impacts the deal premium. The interpretation is that the relationship between CSR and M&A premium is more complex than expected. And that this relationship cannot be fully explained by shareholder or stakeholder theory alone

(Jost et al., 2021).

Chen and Gaviols (2015) investigates whether the value implications of CSR differ between shareholder groups for companies listed on the Israeli stock exchange. CSR data from the Malaa report for 2007 to 2012 is used. The results show that the marginal investor values a firm's commitment to CSR and pays a premium for better CSR performance. However, for the M&A and institutional investors, the results show that CSR has no value implications. The interpretation is that sophisticated investors do not believe that CSR has a real profit potential for the firm. Another interpretation is that sophisticated investors have greater access to information about the target, which allows them to uncover aspects of the target that contradict good CSR behaviour. In their conclusion, Chen and Gaviols (2015) suggest that the positive pricing of CSR on the stock exchange is not associated with those aspects of social responsibility that are directly beneficial to the firm. It is rather associated with those aspects that are directly beneficial to humankind. The interpretation is that the positive pricing of CSR reflects sentimental utility, not real economic value.

Existing literature has yet to reach a clear consensus on the impact of ESG on the deal premium. Although several papers find a positive relationship, some articles find no significant relationship between ESG and deal premium. The relationship seems to be rather complex and would need further research to reach a concise conclusion.

The literature review has outlined several topics that are relevant to this thesis. We have described the emergence of ESG and its value implications, the motivations for M&A, the determinants of deal premiums, information asymmetry in M&A transactions, and reviewed extant research on ESG in M&A. In the following chapter, we will outline and describe our hypotheses.

3 Hypotheses

Before we elaborate on our sample and the results, we will describe and outline our hypotheses. In total, we have six hypotheses that vary in scope and complexity.

Hypothesis 1: A higher ESG score yields a greater premium (H1)

Our main hypothesis is that the ESG score is positively related to the deal premium. Gomes and Marsat (2018) argue that acquirers value targets' CSR performance because it reduces information asymmetry and the firm-specific risk relating to the target. We want to investigate whether we find results that support this statement. As outlined in the related literature chapter, the findings regarding an ESG premium are ambiguous. If acquirers value ESG activities in line with the stakeholder view of Freeman (2010) and Porter and Kramer (2006), we expect to find an ESG premium.

Hypothesis 2: The presence of an ESG score commands a higher premium (H2)

As described in the section 2.4 on information asymmetry, the target firms' signals can increase the premium they receive (Reuer et al., 2012). Hence, the existence of a target ESG score can have a risk-mitigating effect (Aktas et al., 2011; Kim et al., 2014). Thus, we propose that the ESG score dummy variable (equal to 1 if the target has an ESG score and 0 otherwise) is positively related to the deal premium.

Hypothesis 3: The E, S, and G components of ESG are all valued by acquirers (H3)

In addition to the overall ESG score, Refinitiv offers individual scores for the environmental, social, and governance components of the ESG score, which enables us to investigate the individual effects of these three aspects of the target firm. Gomes and Marsat (2018) find that the environmental score has a significant and positive relationship to the deal premium. The social score has a significant relationship to the deal premium in cross-border deals only. From the outset, we assume that all three components positively affect the deal

premium, as it is reasonable to believe that an acquirer would be willing to pay more for a company that performs better on environmental, social, and governance activities. Hence, we hypothesise that the individual environmental, social, and governance scores impact the deal premium.

Hypothesis 4: The Bloomberg ESG disclosure score is positively related to the premium (H4)

We have obtained ESG disclosure scores from Bloomberg for 764 of the targets in our sample. The rating is based on the companies' degree of self-reporting on ESG issues. We argue that if the Bloomberg ESG disclosure score truly represents a firm's degree of self-reporting on ESG issues, it can be a good proxy for transparency. Thus, a greater score can have a risk-mitigating effect in line with the findings of Aktas et al. (2011) and Kim et al. (2014). However, we do not find any previous research investigating the Bloomberg ESG disclosure score. We hypothesise that a greater ESG disclosure score leads to a greater deal premium, as acquirers are willing to pay more for less uncertainty. In addition, we also test the ESG disclosure dummy (equal to 1 if the target has an ESG disclosure score from Bloomberg and 0 otherwise).

Hypothesis 5: Strategic and financial acquirers value ESG differently (H5)

Bargeron et al. (2008) argues that different types of acquirers value the characteristics of their targets differently. Additional research finds that strategic and financial acquirers often reach disparate target valuations (Gorbenko and Malenko, 2014). In M&A research, deals conducted by financial acquirers are usually excluded from the sample when controlling for acquiring firm characteristics (Fama and French, 1992). We do not control for acquiring firm characteristics, and hence, our sample contains both strategic and financial acquirers. We categorise financial acquirers as firms with standard industry classification (SIC) codes from 6000 to 6999 (Ott, 2020). The SIC codes describes the primary business activity of a company, and is commonly used in research to categorise industries. For hypothesis 5, we propose that strategic and financial acquirers value ESG differently when conducting M&A transactions. To test this hypothesis, we run

two regression models: one that includes only strategic acquirers and one with financial acquirers only.

Hypothesis 6: The ESG premium is not stable over time (H6)

Sustainable debt and ESG fund capitalisation have grown at a great pace from 2010 until today. By splitting the data into different periods, we can observe whether this is reflected in deal premiums in the M&A field. To make sure that each period contains a satisfactory amount of transactions we split our sample into three four-year periods. These periods are 2010-13, 2014-17, and 2018-21. We hypothesise that the ESG premium is different over time, i.e. it varies between periods. To test this, we introduce an interaction term between the categorical period variable and the ESG score. Additionally, we run a separate regression model with an interaction between the categorical variable period and the ESG score dummy.

4 Data

We have used data from several sources to construct our sample. This chapter will describe the process of collecting the data, elaborate on our choices of region and time period, describe the independent variables in greater detail, and provide descriptive statistics of the sample.

4.1 Sample construction

The M&A data was collected from Thomson Reuters Securities Data Company (SDC) Platinum. The output from SDC resulted in 10,077 transactions and was based on the following criteria:

- The deal was completed between 01.01.2010 and 31.12.2021
- The target was publicly traded at the time of acquisition
- The transaction was larger than \$10 million
- The deal caused the acquirer to raise its stake in the target from below 50% to over 50%

Additionally, our sample contains ESG scores from Refinitiv, financial data from Compustat, and stock price data from The Center for Research in Security Prices (CRSP). The financial data was quoted in local currency for companies outside the US or Canada. We use the 1-year average local currency/USD to convert to USD in these cases. Market data for non-US and non-Canadian companies were also quoted in local currencies. In these instances, we convert using the local currency/USD exchange rate on the relevant date.

The ESG ratings were collected at the end of the last fiscal year before the deal was announced. In line with previous research, we remove self-tenders. Deals with no data for the premium paid and incomplete financial data are also excluded from the sample. The result is a sample of 485 transactions where the target has an ESG score. In addition, the sample also includes 1,459 transactions based on the same criterion where the target does not have an ESG score. In total, our sample contains 1,944 transactions.

Table 4.1: Sample creation and selection

Filter	Sample size
Output from SDC	10,077
Removing targets not incorporated in an OECD country	−2,441
Removing self-tenders	−790
Removing observations with missing premium	−1,914
Removing targets with incomplete financial data	−3,088
Final sample	1,944
Targets with ESG score	485
Targets without ESG score	1,459

4.1.1 Choice of region and time period

The sample is restricted to deals where the target is incorporated in an OECD country. The main objectives of the OECD are to establish evidence-based international standards and find solutions to a range of social, economic, and environmental challenges (OECD, nd). By basing our sample on OECD countries, we analyse corporations with somewhat comparable financial and regulatory environments and restrict ourselves to countries with less financial noise.

We restrict our sample to deals completed between 1. January 2010 and 31. December 2021. The Refinitiv database does, however, contain ESG scores that date back to 2002. ESG was relevant before 2010, but more recent regulations and instruments (i.e. ETS-quotas, green bonds, the European Green Deal and the EU Taxonomy, and increased strains on workforce diversification) led us to restrain ourselves to the aforementioned period.

Table 4.2: Targets by country

Country	No. of targets	Country	No. of targets
Australia	190	Latvia	1
Austria	3	Lithuania	1
Belgium	12	Luxembourg	1
Brazil	5	Mexico	6
Canada	32	Netherlands	9
Chile	12	New Zealand	15
Colombia	3	Norway	20
Denmark	10	Poland	40
Estonia	1	Slovenia	4
Finland	11	South Korea	70
France	86	Spain	13
Germany	41	Sweden	37
Greece	4	Switzerland	14
Ireland	9	Turkey	8
Israel	22	United Kingdom	174
Italy	30	United States	829
Japan	231	Total	1,944

Table 4.2 displays the country of incorporation of each target in the sample. The US has the highest number of targets, with 829 observations. While Estonia, Latvia, Lithuania and Luxembourg have the least observations, with one observation per country.

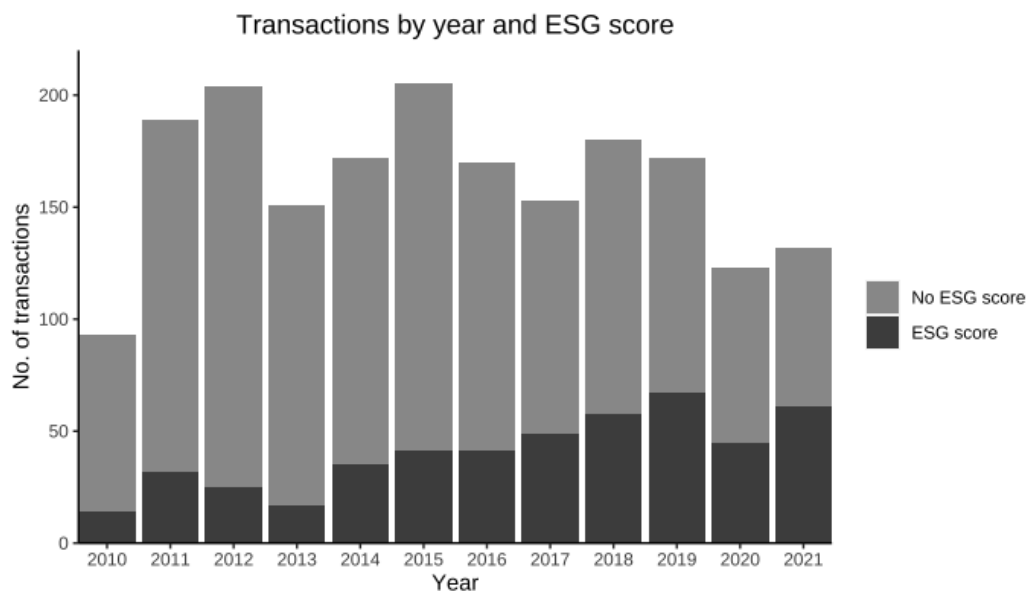
**Figure 4.1:** Time series on transactions in sample

Figure 4.1 displays a time series of the number of transactions from 2010 to 2021 with and without ESG scores from Refinitiv (described in the following section). The number of transactions varies from 93 in 2010 to 204 in 2012. The largest amount of transactions

with a target ESG score took place in 2019, amounting to 67 transactions. The year with the fewest transactions with a target ESG score was 2010, with only 14 transactions.

4.2 ESG scores

ESG scores aim to measure a company's exposure to environmental, social and governance risks. Our research is based on the ESG scores provided by Refinitiv. In addition, we will use the ESG disclosure score provided by Bloomberg.

4.2.1 Refinitiv ESG score

Refinitiv provides detailed ESG scores for more than 11,800 companies worldwide (Refinitiv, ndb). The analysts at Refinitiv measure 450 different ESG measures for each company, resulting in one overall ESG score. According to Refinitiv (nda), these measures are standardised to ensure comparability across countries and industries. The data for the ESG scores are gathered from sources such as company websites, annual reports, CSR reports, public filings, news sources, and NGO websites. The ESG measures are consolidated into ten main ESG themes. The ten different themes are attached to a representative ESG pillar:

Environmental	Social	Governance
<ul style="list-style-type: none"> • Resource use • Emissions • Innovation 	<ul style="list-style-type: none"> • Workforce • Human rights • Community • Product responsibility 	<ul style="list-style-type: none"> • Management • Shareholders • CSR strategy

The ESG scores are based on relative performance. Scores for the environmental and social pillars are calculated relative to industry peers, while the governance score is calculated relative to other companies in the same country. The reason is that governance practices are more consistent across countries than industries, contrary to environmental and social aspects, which are more consistent across industries. Through this scoring framework, firms are benchmarked against each other, and we can observe each firm's ESG performance relative to their industry and country peers. The formula below illustrates how Refinitiv's relative scoring is computed:

$$ESG \text{ score} = \frac{\text{No. of companies with a worse value} + \frac{\text{No. of companies with the same value}}{2}}{\text{No. of companies with a value}} \quad (4.1)$$

One consequence of relative scoring is that the effect of the same ESG initiative on the overall ESG score will vary between industries and countries, based on the relative importance of the initiative. Additionally, Refinitiv's ESG scores are based on a percentile ranking from 0% to 100%, which reduces the impact of any potential outliers.

Table 4.3: Transactions by year and ESG-score

Year	Target has ESG score			Target does not have ESG score	
	No. of transactions	Average ESG score	Average deal size	No. of transactions	Average deal size
2010	14	0.34	\$5,464.61m	79	\$252.19m
2011	32	0.40	\$6,048.13m	157	\$199.24m
2012	25	0.37	\$3,789.66m	179	\$218.99m
2013	17	0.39	\$4,541.39m	134	\$242.12m
2014	35	0.39	\$5,497.98m	137	\$232.93m
2015	41	0.40	\$9,625.70m	164	\$224.74m
2016	41	0.37	\$8,627.19m	129	\$256.54m
2017	49	0.38	\$7,042.94m	104	\$219.16m
2018	58	0.40	\$6,374.34m	122	\$165.62m
2019	67	0.37	\$5,767.94m	105	\$170.76m
2020	45	0.37	\$2,989.00m	78	\$160.45m
2021	61	0.38	\$2,886.43m	71	\$149.43m
Total	485	–	–	1,459	–

Table 4.3 divides the sample in two based on whether the target has an ESG score or not. The table showcases the number of transactions each year and the average deal size. We observe a substantial difference in deal size between targets with and without ESG scores, which will be discussed further in the analysis chapter.

Table 4.4: Transactions by industry

Industry (2-digit SIC code)	Average ESG score	No. of targets		No. of acquirers
		Targets with ESG score	Targets without ESG score	
Agriculture, forestry, and fisheries (01-09)	0.39	3	10	6
Mineral industries and construction (10-17)	0.32	72	141	161
Manufacturing (20-39)	0.39	197	594	611
Transportation and communication (40-48)	0.39	30	71	89
Utilities (49)	0.40	31	27	38
Wholesale and retail trade (50-59)	0.43	44	130	128
Finance, insurance, and real estate (60-69)	0.40	4	31	630
Service industries (70-89)	0.39	104	454	281
Total	0.38	485	1,459	1,944

Table 4.4 displays which industry the companies with and without ESG scores operate in. Manufacturing is the most dominant target industry in both categories, while finance, insurance, and real estate is the industry with the least transactions for companies with ESG scores. Utilities is the industry with the least transactions for those without a score. We find most acquirers in finance, insurance, and real estate, with manufacturing containing almost the same amount. Additionally, the highest average ESG score was achieved in the wholesale and retail industry, while the lowest was found in the mineral industries and construction category.

4.2.2 Bloomberg ESG disclosure score

The Bloomberg database does not contain a sufficient amount of ESG scores to investigate the relationship between Bloomberg ESG scores and deal premium. However, the Bloomberg database contains another interesting metric, namely the ESG disclosure score. The score is based on the firms' public disclosure of environmental, social, and governance issues (Bloomberg L.P., nd). The score ranges from 0.1 for companies that disclose a minimum amount of ESG data to 100 for those that disclose every data point collected by Bloomberg. The data points are weighted by importance, i.e. greenhouse gas emission disclosures carry greater weight than other disclosures. Whereas the Refinitiv ESG score aims to measure the quality of different ESG initiatives, the Bloomberg ESG disclosure score measures the quality and frequency of a firm's public reporting on ESG issues.

4.3 Dependent variable

We compute the premium based on the share price 42 trading days prior to the announcement date. The premium is calculated this way to avoid any market anticipation of the pending offer (Betton et al., 2008a). The premium is defined as follows:

$$Premium = \frac{Offer\ value\ per\ share}{Share\ price_{t-42}} - 1 \quad (4.2)$$

4.4 Control variables

We have chosen both deal-specific and target-specific variables as control variables in line with extant research. In M&A research, acquirer characteristics are usually controlled for when analysing post-acquisition aspects. We are only interested in the effect on the deal premium and not post-acquisition effects. Thus, we are not including any acquirer characteristics. In the remainder of this subchapter we will explain the inclusion of the control variables we have chosen, and provide summary statistics of our sample.

Size is the natural logarithm of the market value of the target's equity 42 trading days before the acquisition announcement. According to Alexandridis et al. (2013), larger firms are associated with lower premiums. One interpretation is that target size may proxy as an unobserved complexity inherent in large deals and as an implication of larger integration costs.

Next, we test for *Leverage*, which is the total debt divided by total assets. Dionne et al. (2015) find that a target with considerable debt is less attractive and that the premium should be lower.

Market-to-Book is the ratio of the market value to the book value of the target firm and is used as a proxy for growth. Betton et al. (2008a) find that a market-to-book ratio higher than the industry median is associated with a 3% increase in the premium. The economic explanation is that acquirers are willing to pay more for growth companies. According to Laamanen (2007) and Dionne et al. (2015), a low market-to-book ratio can imply an undervaluation of the target and a high ratio can signal restricted investment opportunities. Contrary to Betton et al. (2008a), they find a negative relationship between the market-to-book ratio and the deal premium.

Current ratio is the target's current assets divided by current liabilities and is used to proxy the target's liquidity. It provides information regarding the target's financial position and should thus affect the premium (Ayers et al., 2003).

Furthermore, *CAPEX ratio* is the target's total capital expenditures scaled by total assets and is used to signal the reinvestment rate of the target. Different firms have different reinvestment needs based on the firm's operations. Fidrmuc (2013) argues that firms with higher investment rates have a higher degree of innovation and that firms with a higher

degree of innovation generally are less profitable. Additionally, the reinvestment rate of the target will affect the cash-flow available to the acquirer and should be reflected in the deal premium.

R&D expenses ratio is the target's research and development expenses scaled by total assets. Laamanen (2007) finds that R&D activities can yield important synergistic resources and are positively associated with the deal premium.

ROE is the target's net income after tax divided by the shareholders' equity. We use ROE as a profitability measure. There are different ways to interpret the effect of profitability on the deal premium. Strong earnings are in itself a positive factor. However, strong earnings can reduce potential gains in the future.

Runup is the natural logarithm of the ratio of the target's share price on the day before the announcement to the share price 42 trading days before the announcement. The markup pricing theory in M&A (runup) was developed by Schwert (1996), and later revisited and supported by Betton et al. (2008b), both show that it impacts the deal premium positively. Additionally, Eckbo (2008) finds that the target runup impacts the premium positively.

We include the dummy variables *All cash* and *All stock*. If the offer was financed using cash only, the variable *All cash* takes the value 1, otherwise it takes the value 0. If the offer was financed using stock only, the variable *All stock* takes the value of 1. Otherwise, it is 0. Eckbo (2008) describes that the method of payment can influence the deal premium.

Additionally, we include the dummy variable *Cross-border*. The dummy variable takes the value 1 if the target and the acquirer are incorporated in different countries and 0 if they are incorporated in the same country. Cross-border transactions, on average, command a higher deal premium than domestic transactions (Rossi and Volpin, 2004). Furthermore, Gatignon and Anderson (1988) find that cross-border transactions are characterised by greater risk and greater information asymmetry.

Competing bid is a dummy variable that takes the value 1 if several bidders are involved in the process. Varaiya (1987) finds that if there are several bidders, the premium is higher, while Eckbo (2008) finds that the deal premium is unaffected by the presence of several bidders.

Additionally, we include the dummy variable *Financial acquirer*. In M&A research, one

often excludes financial acquirers due to differing leverage, payment options, regulation and asset tangibility. However, we are not controlling for acquirer characteristics, and therefore, we include financial acquirers. The dummy variable takes the value 1 if the acquirer is a financial company as categorised by SIC codes 6000 to 6999 (Ott, 2020).

The *Horizontal merger* dummy variable denotes whether the target and the acquirer operate within the same industry. The variable takes the value 1 if the acquirer and the target have the same four-digit SIC code. According to Eckbo (2008), the deal premium is unaffected by whether the transaction is horizontal or not.

Tender merger is a dummy variable that takes the value 1 if the bid was a tender offer and 0 otherwise. A tender offer occurs when an acquirer offers to buy shares from every shareholder of a publicly-traded company for a specific price at a specific time, instead of negotiating with the board and management of the target. Eckbo (2008) finds that the deal premium is lower when the offer is a tender offer. Finally, we include the variable

Toehold. The variable takes the value 1 if the acquirer had a stake, but that stake was smaller than 5 percent in the target company before the offer was made. Again, Eckbo (2008) finds that the deal premium is lower when the acquirer has a toehold.

Table 4.5 presents the summary statistics for the complete sample, while tables 4.6 and 4.7 present summary statistics for targets with and without ESG ratings.

Table 4.5: Summary statistics: complete sample

Variable	Unit	Observations	Mean	St. Dev.	Min	Max
Premium	Decimal	1,944	0.393	0.490	-0.896	6.088
ESG score	Decimal	485	0.381	0.177	0.007	0.912
Environmental score	Decimal	485	0.283	0.248	0.000	0.988
Social score	Decimal	485	0.402	0.201	0.012	0.963
Governance score	Decimal	485	0.435	0.217	0.006	0.920
ESG disclosure	Decimal	747	0.275	0.120	0.012	0.645
Size	Logarithm	1,944	5.088	1.804	0.627	11.067
Market-to-Book	Ratio/Decimal	1,944	1.141	1.839	0.003	33.097
Leverage	Ratio/Decimal	1,944	0.526	0.349	0.003	8.815
Current ratio	Ratio/Decimal	1,944	2.685	4.496	0.063	85.692
CAPEX ratio	Ratio/Decimal	1,944	0.046	0.083	0.000	2.507
R&D expenses ratio	Ratio/Decimal	1,944	0.031	0.525	0.000	17.658
ROE	Ratio/Decimal	1,944	0.047	1.792	-11.775	46.309
Runup	Logarithm	1,944	0.041	0.215	-2.154	2.159
All cash	Dummy	1,944	0.659	0.474	0	1
All stock	Dummy	1,944	0.129	0.335	0	1
Cross-border	Dummy	1,944	0.362	0.481	0	1
Competing bid	Dummy	1,944	0.043	0.202	0	1
Financial acquirer	Dummy	1,944	0.324	0.468	0	1
Horizontal merger	Dummy	1,944	0.273	0.445	0	1
Tender merger	Dummy	1,944	0.215	0.411	0	1
Toehold	Dummy	1,944	0.200	0.400	0	1

Table 4.6: Summary statistics: targets with ESG score

Variable	Unit	Observations	Mean	St. Dev.	Min	Max
Premium	Decimal	485	0.345	0.343	-0.896	2.651
ESG score	Decimal	485	0.381	0.177	0.007	0.912
Environmental score	Decimal	485	0.283	0.248	0.000	0.988
Social score	Decimal	485	0.402	0.201	0.012	0.963
Governance score	Decimal	485	0.435	0.217	0.006	0.920
ESG disclosure	Decimal	347	0.343	0.111	0.095	0.645
Size	Logarithm	485	7.139	1.666	1.734	11.067
Market-to-Book	Ratio/Decimal	485	1.282	1.638	0.018	19.253
Leverage	Ratio/Decimal	485	0.575	0.265	0.007	1.826
Current ratio	Ratio/Decimal	485	2.516	5.330	0.063	85.692
CAPEX ratio	Ratio/Decimal	485	0.056	0.075	0.000	0.733
R&D expense ratio	Ratio/Decimal	485	0.109	1.030	0.000	17.658
ROE	Ratio/Decimal	485	0.051	1.157	-8.191	11.596
Runup	Logarithm	485	0.057	0.186	-0.774	0.925
All cash	Dummy	485	0.540	0.499	0	1
All stock	Dummy	485	0.165	0.372	0	1
Cross-border	Dummy	485	0.419	0.494	0	1
Competing bid	Dummy	485	0.068	0.252	0	1
Financial acquirer	Dummy	485	0.153	0.360	0	1
Horizontal merger	Dummy	485	0.371	0.484	0	1
Tender merger	Dummy	485	0.161	0.368	0	1
Toehold	Dummy	485	0.120	0.325	0	1

Table 4.7: Summary statistics: targets without ESG score

Variable	Unit	Observations	Mean	St. Dev.	Min	Max
Premium	Decimal	1,459	0.410	0.529	-0.864	6.088
ESG disclosure	Decimal	400	0.216	0.095	0.012	0.517
Size	Logarithm	1,459	4.406	1.246	0.627	6.991
Market-to-Book	Ratio/Decimal	1,459	1.094	1.899	0.003	33.097
Leverage	Ratio/Decimal	1,459	0.510	0.372	0.003	8.815
Current ratio	Ratio/Decimal	1,459	2.742	4.183	0.082	73.314
CAPEX ratio	Ratio/Decimal	1,459	0.043	0.086	0.000	2.507
R&D expense ratio	Ratio/Decimal	1,459	0.005	0.114	0.000	4.352
ROE	Ratio/Decimal	1,459	0.046	1.959	-11.775	46.309
Runup	Logarithm	1,459	0.035	0.223	-2.154	2.159
All cash	Dummy	1,459	0.698	0.459	0	1
All stock	Dummy	1,459	0.117	0.322	0	1
Cross border	Dummy	1,459	0.343	0.475	0	1
Competing bid	Dummy	1,459	0.034	0.182	0	1
Financial acquirer	Dummy	1,459	0.381	0.486	0	1
Horizontal merger	Dummy	1,459	0.240	0.427	0	1
Tender merger	Dummy	1,459	0.233	0.423	0	1
Toehold	Dummy	1,459	0.227	0.419	0	1

From table 4.5, we observe that the average premium for the entire sample is 39.3%, with a standard deviation of 49.0%. For targets with ESG ratings, the average premium is 34.5%, with a standard deviation of 34.3%. The average ESG score is 38.1, with a standard deviation of 17.7%. From tables 4.6 and 4.7, we observe a noticeable difference in the premium between the companies with and without an ESG score. Furthermore, we observe a remarkably large difference in the size, which might explain the variation in the premium between the two groups. Alexandridis et al. (2013) and Eckbo (2008) find that larger targets receive lower premiums than smaller targets. A larger portion of the transactions involving targets without an ESG score is paid in cash. Again this could also be explained by the variation in size between the two groups, as it is easier to obtain financing for an all-cash purchase if the target is smaller. Unsurprisingly, the mean ESG disclosure score is higher for the companies with an ESG score.

5 Methodology

This chapter will describe the methodology that is used to test each hypothesis. Additionally, we will address robustness and endogeneity concerns.

5.1 The regression models

Hypotheses H1 to H6 apply standard OLS regressions with fixed effects for time, industry, and country. Our main hypothesis is based on the following model:

$$\begin{aligned}
 Premium = & \beta_0 + \beta_1 ESG\ score_i + \beta_2 Size_i + \beta_3 Market - to - Book_i \\
 & + \beta_4 Leverage_i + \beta_5 Current\ ratio_i + \beta_6 CAPEX\ ratio_i \\
 & + \beta_7 R\&D\ expenses\ ratio_i + \beta_8 ROE_i + \beta_9 Runup_i + \beta_{10} All\ cash_i \\
 & + \beta_{11} All\ stock_i + \beta_{12} Cross\ border_i + \beta_{13} Competing\ bid_i \\
 & + \beta_{14} Financial\ acquirer_i + \beta_{15} Horizontal\ merger_i \\
 & + \beta_{16} Tender\ merger_i + \beta_{17} Toehold_i \\
 & + Year\ Effects + Industry\ Effects + Country\ Effects + \varepsilon_i
 \end{aligned} \tag{5.1}$$

In the equation above, β_0 represents the constant. β_{1-17} represent the coefficient of the interdependent variables impact on *Premium*. The fixed effects are included to control for variations over time, industry, and country. While ε_i is the error term and represents the difference between the theoretical value of the model and the actual observed results.

In addition to the OLS, t-tests are applied to investigate the differences between targets with high and low ESG scores. H2 investigates the effect of simply having an ESG score. Hence, we introduce a dummy variable taking value 1 if the target company has an ESG score and value 0 if it does not have one. For all companies with an ESG score, Refinitiv offers individual environmental, social, and governance scores. These scores are tested in H3 to see the effect of the individual ESG pillars on the deal premium.

In H4, we test the Bloomberg ESG disclosure. In H5, we run one model including only strategic acquirers and another including only financial acquirers. Additionally, t-tests are

applied to elaborate on the differences between targets of financial and strategic acquirers. To test for differences between periods in H6, we introduce the interaction term *Period * ESG score*. Where *Period* is a categorical variable denoting the periods 2010 to 2013, 2014 to 2017, and 2018 to 2021. Additionally, we test for the interaction term *Period * ESG score dummy*. Since period dummies are included, year fixed effects are excluded from the model.

5.2 Endogeneity and robustness

Selection bias, reverse causality, and omitted variables bias are three major sources of endogeneity. The presence of such endogeneity can result in biased and inconsistent parameter estimates. Endogeneity exists when one or more of the independent variables are correlated with the error term ε_i (Wooldridge, 2020, p.800).

Reverse causality occurs when the dependent variable affects the outcome of the independent variables (Wooldridge, 2020, p.538). In our case, it is evident that the deal premium received will not affect the targets' financial results from the last fiscal year. However, there could be cases where the deal-specific variables (i.e. all cash) affect the premium. Therefore, there is a possibility that our models are subject to reverse causality biases.

Omitted variables bias occurs when one does not control for a variable that is correlated with another independent variable and is a determinant of the dependent variable (Wooldridge, 2020, p.84). Like most other corporate finance studies, our models are with a high degree of certainty subject to omitted variables bias, as it is not possible to capture all the factors that affect the deal premium. By using fixed effects, we reduce the impact of omitted variables that are constant over time, industry, and country (Wooldridge, 2020, p.439). However, the presence of such a bias must be taken into account.

We do acknowledge that our sample could be subject to selection bias. The sample is based on companies that receive bids and holds ESG scores. Refinitiv scores are supposed to be objective (Refinitiv, nda). However, randomisation seems implausible. The scores are based on annual reports, CSR reports and global media sources, and there could be cases where less sustainable corporations do not publish CSR reports or get media coverage. Additionally, there is a possibility that companies who feel they will benefit

from an ESG score could self-select into receiving an ESG score. Thus, we cannot be sure that the sample is randomly drawn from the population. One can also argue that the decision to bid on a firm is non-random, making it hard to obtain a truly randomised sample.

Similar studies, like Gomes and Marsat (2018), use an instrumental variable regression to test for endogeneity. In instrumental variable regressions, the following two assumptions have to be satisfied:

$$Cov(z, u) = 0 \tag{5.2}$$

$$Cov(z, x) \neq 0 \tag{5.3}$$

Gomes and Marsat (2018) run two instrumental variable models. In the first specification, they use the country-industry pair of the target as the instrument, and in the second specification, they use the country-year pair. If we were to include such instrumental variables, it would lead to an omitted variables bias in our model, as we would exclude one or more of our fixed effects. We observe no clear instrument z in our sample, and thus, we do not conduct an instrumental variable regression.

Another method that can be adopted in instances of a possible sample selection bias is the two-stage Heckman test. The method consists of using all observations, estimating a probit model of s_i on z_i , obtaining the estimates for \hat{y}_h , calculating the inverse Mills ratio and then including it as an independent variable in the second stage. However, the Heckman test is not applicable in our case. The test is used for selection concerns in the dependent variable, whereas we have selection concerns in the ESG score, which is an independent variable.

As an alternative method to correct for missing covariates, we use a dummy variable adjustment method. This is a simple alternative to the imputation of missing covariates. Allison (2002, p.9) explains how the method works:

- Create a new variable Z . Z is set equal to X for all cases where X is non-missing and set to a constant value, c , for those cases where X is missing. c is often set to

zero or the mean of X , but which of the alternatives does not matter.

- Create a new variable D . This is a dummy variable equal to one for the cases where X is missing (in our case, such a variable already exists, in the form of the ESG score dummy variable. Hence, our observations with a missing X have the value zero, not one as in this example).
- Replace the X in the impact analysis model with Z and D . When X is not missing, the model will estimate the relationship between Y and X . When X is missing, the model will estimate the relationship between Y and D .

This method is prone to producing biased estimates (Jones, 1996). It is criticised by several scholars, e.g. Donders et al. (2006), who state that the dummy variable adjustment method almost always produces biased estimates. On the other hand, Allison (2002, p.87) argues that it could be appropriate to use when the unobserved value does not exist and that it in such cases produces optimal estimates. The determining factor is that the data does not exist, not that it is truly missing. In our case, it is unclear whether the data does not exist or whether it is truly missing. A company without an ESG score can miss it simply because they are in an index that Refinitiv does not cover. It is not certain that they are missing the ESG score due to non-existent data. Hence, we cannot conclude whether the data is missing or whether it does not exist. However, we will still conduct the dummy variable adjustment, bearing in mind that we are not sure whether it will produce biased estimates or not. The dummy variable adjustment procedure allows us to test the complete sample in the same model. Therefore, the method can indicate whether we have a sample selection bias in our model or not.

We will analyse these endogeneity concerns further and conduct the dummy variable adjustment method in the subchapter "[Analysing potential endogeneity concerns](#)".

We have replicated Stata's heteroskedasticity robust standard errors in R. Thus, a test for heteroskedasticity is unnecessary. Our sample is also robust to using ESG scores from one year before the announcement date.

6 Analysis

In this chapter, we will test the six different hypotheses defined in the hypotheses chapter. Furthermore, we will discuss the implications of our results. We will also analyse the results' robustness and address the endogeneity concerns introduced in the methodology chapter.

6.1 Deal premium and ESG score (H1)

Our main hypothesis is that there exists an ESG premium in M&A transactions. To test this hypothesis, we run an OLS regression with the specifications stated in [equation 5.1](#). All the previously described explanatory variables are controlled for. Specification 1 includes year fixed effects only. Specification 2 includes year and industry fixed effects. While specification 3 includes year, industry, and country fixed effects.

Table 6.1: H1: ESG score

	<i>Dependent variable:</i>		
	Premium		
	(1)	(2)	(3)
ESG score	0.252* (0.151)	0.290* (0.160)	0.305** (0.146)
Size	-0.072*** (0.018)	-0.082*** (0.021)	-0.089*** (0.021)
Market-to-Book	-0.003 (0.015)	-0.0003 (0.014)	0.002 (0.014)
Leverage	0.101 (0.104)	0.095 (0.107)	0.044 (0.102)
Current ratio	0.005 (0.003)	0.006 (0.003)	0.006* (0.004)
CAPEX ratio	-0.605 (0.368)	-0.629* (0.356)	-0.625* (0.363)
R&D expenses ratio	0.003 (0.012)	0.007 (0.014)	0.010 (0.016)
ROE	-0.056** (0.026)	-0.054* (0.028)	-0.055** (0.023)
Runup	0.728*** (0.129)	0.771*** (0.133)	0.779*** (0.129)

(Table continued on next page)

All cash	-0.005 (0.050)	-0.011 (0.052)	-0.058 (0.051)
All stock	-0.065 (0.063)	-0.063 (0.066)	-0.083 (0.062)
Cross border	0.023 (0.044)	0.038 (0.049)	0.024 (0.048)
Competing bid	0.089 (0.066)	0.059 (0.072)	-0.018 (0.081)
Financial acquirer	-0.243*** (0.078)	-0.219*** (0.080)	-0.164** (0.077)
Horizontal merger	-0.073 (0.053)	-0.057 (0.052)	-0.061 (0.055)
Tender merger	0.033 (0.060)	0.001 (0.062)	-0.020 (0.060)
Toehold	-0.135** (0.062)	-0.149** (0.069)	-0.120* (0.073)
Constant	1.285*** (0.180)	1.424*** (0.238)	1.513*** (0.250)
Year FE?	Yes	Yes	Yes
Industry FE?	No	Yes	Yes
Country FE?	No	No	Yes
Observations	485	485	485
R ²	0.616	0.637	0.696
Adjusted R ²	0.309	0.319	0.381
Residual Std. Error	0.285	0.283	0.270
F Statistic	2.009***	2.005***	2.211***
<i>Note:</i>	*p<0.1; **p<0.05; ***p<0.01		

Note: Table 6.1 is an OLS regression where Premium is the dependent variable. The independent variable of interest is the ESG score. The regressions are based on a sample of M&A deals over the period 2010 - 2021, extracted from the SDC database. The extraction criteria can be found [here](#). In addition, we control for the independent variables described in [equation 5.1](#). In the model, we use robust standard errors.

The regression table shows a positive and significant relationship between the ESG score and the deal premium when all fixed effects are accounted for (specification 3). These results suggest that one standard deviation unit-increase in ESG score implies 5.4 percentage points more premium ceteris paribus. In dollar terms, these findings imply that an acquisition of a target with a market value of \$4,416.10m (the mean market value of acquired firms with ESG scores) would be paid an additional \$238.40m for each one standard deviation increase in ESG score. The results are in line with previous research

conducted by Gomes and Marsat (2018), who found that one standard deviation increase in overall CSR score proposes a 5.5 percentage point increase in acquisition premium. Our findings are also supported by Ozdemir et al. (2021), who found evidence of an ESG premium within the service industry.

Additionally, we find a significant inverse relationship between premium and size, which is consistent with the findings of Alexandridis et al. (2013). Furthermore, we find a significant positive relationship between target runup and premium, in line with the results of Betton et al. (2008b) and Eckbo (2008), and the markup pricing effect found by Schwert (1996). We find a significant and inverse relationship between ROE and deal premium. Finally, we find a significant inverse relationship between the financial acquirer dummy and the deal premium. Indicating that, on average, the target receives a lower premium if the acquirer is a financial acquirer.

Our research supports the stakeholder view of Freeman (2010). The result alone suggests that ESG is valuable to the target firm, given that the costs of obtaining one standard deviation of ESG score cost less than the value added in the form of the increased deal premium. Furthermore, one may draw parallels to the findings on information asymmetry by Anderson et al. (2009), Barth et al. (2013) and Fu et al. (2012). They find a positive relationship between information asymmetry and cost of capital and a negative relationship to firm value, implying a higher valuation for companies that disclose more information. Hence, targets that disclose large amounts of ESG data, and receive a high ESG score, should command a premium as it helps reduce the information asymmetry between acquirer and target.

6.1.1 Targets with high versus targets with low ESG score

Furthermore, we want to investigate how the firm characteristics between targets with high and low ESG scores differ. To study our data closer, we employ t-tests for the 1st and 4th quartile of our observations ranked by ESG score. We investigate whether the averages differ significantly for the dependent variable *Premium* and the three control variables *Size*, *Market-to-Book*, and *Runup*.

Table 6.2: T-test for differences between 1st & 4th quartile of target ESG scores

Variable	Estimate 1 st quartile	Estimate 4 th quartile	Statistic	P-value	Parameter
Premium	0.321	0.333	t = -0.3211	0.748	df = 236.525
Size	6.221	8.144	t = -9.949	< 2.2e - 16***	df = 238.052
Market-to-Book	1.555	1.038	t = 2.615	0.0097***	df = 166.621
Runup	0.032	0.054	t = -0.955	0.341	df = 221.315

Note: *p<0.1; **p<0.05; ***p<0.01

Note: This table consists of four t-tests. We test for differences in premium, size, market-to-book, and runup between the targets with the 25 percent lowest and 25 percent highest ESG scores.

Table 6.2 outlines that the targets with the highest ESG scores differ from those with the lowest ESG scores in size and market-to-book. The results illustrate that the targets with low ESG scores are generally smaller than those with a high ESG score. The difference in market-to-book implies that the targets with a low ESG score are growth companies relative to those with a high ESG score. Our interpretation is that companies with higher ESG scores are more mature and well-established companies. Such companies could have more stable operations and thus, be able to focus more of their effort on ESG activities and ESG risk-mitigating initiatives.

6.2 ESG score dummy and the three ESG pillars (H2 & H3)

The sample contains both companies with an ESG score and companies that do not have an ESG score. In addition to the overall ESG score, Refinitiv provides individual scores for the three ESG pillars. Using these scores, we can test whether the individual scores for environmental, social and governance have an impact and whether they are different in their effects on deal premium.

Table 6.3: H2 & H3: ESG score dummy and the three pillars

	<i>Dependent variable:</i>		
		Premium	
	(1)	(2)	(3)
ESG score dummy	0.045 (0.043)		
Environmental score		0.263** (0.111)	0.277** (0.112)
Social score		-0.167 (0.134)	-0.080 (0.154)
Social score * Cross border			-0.215 (0.210)
Governance score		0.224** (0.110)	0.230** (0.112)
Size	-0.077*** (0.014)	-0.090*** (0.022)	-0.092*** (0.023)
Market-to-Book	-0.014** (0.006)	0.001 (0.013)	0.002 (0.013)
Leverage	0.061 (0.080)	0.037 (0.100)	0.028 (0.100)
Current ratio	0.004 (0.003)	0.007** (0.004)	0.007* (0.004)
CAPEX ratio	-0.324*** (0.114)	-0.647* (0.351)	-0.643* (0.354)
R&D expenses ratio	0.002 (0.009)	0.009 (0.017)	0.011 (0.017)
ROE	-0.0001 (0.007)	-0.051** (0.023)	-0.051** (0.023)
Runup	0.790*** (0.113)	0.792*** (0.131)	0.781*** (0.133)
All cash	0.021 (0.036)	-0.062 (0.052)	-0.063 (0.052)
All stock	0.004 (0.053)	-0.085 (0.062)	-0.088 (0.063)
Cross-border	0.064* (0.035)	0.038 (0.050)	0.122 (0.104)
Competing bid	0.198*** (0.074)	-0.031 (0.080)	-0.018 (0.079)
Financial acquirer	-0.131*** (0.034)	-0.155** (0.074)	-0.157** (0.074)
Horizontal merger	-0.012 (0.035)	-0.053 (0.053)	-0.050 (0.053)

(Table continued on next page)

Tender merger	0.085*** (0.031)	0.003 (0.059)	0.007 (0.058)
Toehold	-0.030 (0.039)	-0.126* (0.071)	-0.131* (0.071)
Constant	1.598*** (0.147)	1.449*** (0.251)	1.367*** (0.251)
Year FE?	Yes	Yes	Yes
Industry FE?	Yes	Yes	Yes
Country FE?	Yes	Yes	Yes
Observations	1,944	485	485
R ²	0.407	0.707	0.708
Adjusted R ²	0.193	0.399	0.400
Residual Std. Error	0.440	0.266	0.266
F Statistic	1.904***	2.293***	2.294***
Note:	*p<0.1; **p<0.05; ***p<0.01		

Note: Table 6.3 is an OLS regression where Premium is the dependent variable. The independent variable of interest is the ESG score dummy variable in specification 1. In specification 2, the independent variables of interest are the environmental, social and governance scores. In specification 3, we introduce the interaction term Social score * Cross-border. The regressions are based on a sample of M&A deals over the period 2010 - 2021, extracted from the SDC database. The extraction criteria can be found [here](#). In addition, we control for the independent variables described in [equation 5.1](#). In the model, we use robust standard errors.

Specification 1 shows that whether the target has an ESG score or not does not impact the deal premium. In specification 2, we find that the governance and environmental scores positively affect the deal premium. The regression coefficients imply that bid premiums are increased by 6.5 and 4.9 percentage points for each standard deviation unit-increase in environmental and governance scores, respectively. The significant positive relationship between environmental score and deal premium suggests that acquirers value environmental initiatives and activities. The results support the findings of Gomes and Marsat (2018). An economic explanation of this relationship is that a strong environmental score mitigates risk related to negative environmental spillovers, reducing target-specific risk. In addition, a strong environmental score can increase the firm's image and moral capital (Godfrey et al., 2009).

The governance score is supposed to measure the quality of the system under which the company is governed and controlled. In line with our findings, Ammann et al. (2011) find

a positive relationship between corporate governance and firm valuation. They argue that the costs of implementing corporate governance mechanisms are smaller than the benefits, resulting in higher cash flows for investors and a lower cost of capital for the firm. Our findings exhibit that acquirers value target governance in M&A transactions.

Additionally, Gomes and Marsat (2018) find that the interaction between social score and cross-border yields significance. However, we run the same model in specification 3 and find no such association.

6.3 Bloomberg ESG disclosure score and deal premia (H4)

We have obtained ESG disclosure scores from Bloomberg for 747 of our targets. As mentioned in the data chapter, the disclosure score measures a company's degree of ESG self-reporting. We hypothesise that acquirers are willing to pay more for targets with a greater ESG disclosure score. The reason is that a greater ESG disclosure score signals less uncertainty around ESG issues and more certainty relating to projecting the targets' cash flows.

Table 6.4: H4: Bloomberg ESG disclosure score

	<i>Dependent variable:</i>	
	Premium	
	(1)	(2)
ESG disclosure	-0.461** (0.222)	
ESG disclosure dummy		0.008 (0.033)
Size	-0.013 (0.016)	-0.071*** (0.011)
Market-to-Book	-0.023 (0.019)	-0.015** (0.006)
Leverage	0.125 (0.095)	0.065 (0.080)
Current ratio	0.040** (0.017)	0.004 (0.003)

(Table continued on next page)

CAPEX ratio	-0.288 (0.406)	-0.324*** (0.114)
R&D expense ratio	0.524 (0.339)	0.004 (0.009)
ROE	-0.001 (0.017)	-0.0002 (0.007)
Runup	0.684*** (0.097)	0.793*** (0.113)
All cash	0.007 (0.052)	0.020 (0.035)
All stock	-0.087 (0.057)	0.002 (0.053)
Cross-border	-0.010 (0.044)	0.066* (0.035)
Competing bid	0.013 (0.067)	0.197*** (0.074)
Financial acquirer	-0.063 (0.048)	-0.134*** (0.034)
Horizontal merger	-0.048 (0.043)	-0.013 (0.035)
Tender merger	0.030 (0.045)	0.083*** (0.031)
Toehold	-0.057 (0.072)	-0.028 (0.039)
Constant	0.521** (0.226)	1.584*** (0.145)
Year FE?	Yes	Yes
Industry FE?	Yes	Yes
Country FE?	Yes	Yes
Observations	747	1,944
R ²	0.588	0.407
Adjusted R ²	0.292	0.193
Residual Std. Error	0.314	0.441
F Statistic	1.986***	1.900***
Note:	*p<0.1; **p<0.05; ***p<0.01	

Note: Table 6.4 is an OLS regression where we regress the independent variable of interest ESG disclosure score on the deal premium in specification 1. In specification 2, we regress the independent variable of interest ESG disclosure dummy on the deal premium. The regressions are based on a sample of M&A deals over the period 2010 - 2021, extracted from the SDC database. The extraction criteria can be found [here](#). In both specification 1 and 2, we control for other independent variables in accordance with [equation 5.1](#). In the model, we use robust standard errors.

We find a negative and significant relationship between the Bloomberg ESG disclosure score and the premium paid in specification 1. This finding does not support our notion that acquirers are willing to pay a premium for companies that are transparent on ESG issues. Based on our literature review on information asymmetry, Anderson et al. (2009), Barth et al. (2013), and Fu et al. (2012) suggest that a higher degree of transparency reduces target-specific risk and should therefore command a premium. However, the reliability of the Bloomberg ESG disclosure score is untested from what we can find. Additionally, one can speculate that firms that over-report are less attractive to acquirers and that they should distribute their resources differently. The results from this regression are contradictory to the other findings in our paper, which makes us question the score's reliability. If we interpret the results, the coefficient suggests that the more the target reports on ESG, the lower premium it receives.

In specification 2, we regress the ESG disclosure dummy on the deal premium. The result shows no association between the two variables.

6.4 Strategic versus financial acquirers (H5)

In our sample, both strategic and financial acquirers are included. As shown in the preceding models, the financial acquirer dummy is significant. Therefore, we analyse whether the two acquirer groups value ESG differently when conducting M&A transactions. We run separate models for each of them.

Table 6.5: H5: Strategic versus financial acquirers

	<i>Dependent variable:</i>	
	Premium	
	Strategic	Financial
ESG score	0.232** (0.111)	-0.083 (0.354)
Size	-0.073*** (0.017)	-0.0001 (0.066)
Market-to-Book	-0.018 (0.014)	0.035** (0.016)
Leverage	0.086 (0.089)	0.122 (0.228)

(Table continued on next page)

Current ratio	0.019* (0.010)	0.002 (0.003)
CAPEX ratio	-0.440 (0.302)	0.442 (1.090)
R&D expense ratio	0.012 (0.011)	
ROE	-0.059** (0.029)	-0.012 (0.014)
Runup	0.727*** (0.101)	0.938*** (0.224)
All cash	0.026 (0.036)	0.102 (0.156)
All stock	-0.088* (0.051)	-0.188 (0.360)
Cross-border	0.031 (0.037)	-0.090 (0.087)
Competing bid	0.073 (0.069)	0.029 (0.203)
Horizontal merger	-0.011 (0.032)	
Tender merger	-0.011 (0.044)	0.061 (0.126)
Toehold	-0.172*** (0.061)	0.071 (0.121)
Constant	0.747*** (0.166)	-0.212 (0.468)
Year FE?	Yes	Yes
Industry FE?	Yes	Yes
Country FE?	Yes	Yes
Observations	411	74
R ²	0.543	0.743
Adjusted R ²	0.397	0.431
Residual Std. Error	0.264	0.244
F Statistic	3.727***	2.380***
<i>Note:</i>	*p<0.1; **p<0.05; ***p<0.01	

Note: Table 6.5 is an OLS regression where we regress the independent variable of interest ESG score on the deal premium. We have split the sample based on whether the acquirer is strategic or financial. The regressions are based on a sample of M&A deals over the period 2010 - 2021, extracted from the SDC database. The extraction criteria can be found [here](#). In both specifications, we control for other independent variables in accordance with [equation 5.1](#). In the model, we use robust standard errors.

We run the same model as in H1 for strategic acquirers and observe that the variable ESG

score is statistically significant at the 5%-level. However, no relationship between the ESG score and the deal premium is found for financial acquirers. For targets of strategic acquirers, one standard deviation unit-increase in ESG score implies 4.1 percentage points more premium *ceteris paribus*. In dollar terms, these findings imply that a strategic acquisition of a target with a market value of \$5,138.09m (the mean market value of firms with ESG scores purchased by strategic acquirers) would be paid an additional \$ 210.99m for each one standard deviation increase in ESG score.

The difference can be explained by the fact that strategic and financial buyers value target characteristics differently and that financial buyers generally pay a lower premium than strategic acquirers (Lai and Pu, 2020). Gorbenko and Malenko (2014) find additional evidence that strategic buyers usually pay a larger premium than financial acquirers. Moreover, they find that targets who perform poorly and have few investment opportunities are systematically valued higher by financial bidders. These differences may indicate that strategic and financial buyers value synergies and growth opportunities differently.

Strategic acquirers typically search for targets with potential strategic and operational synergies and good integration capabilities. On the other hand, financial acquirers value the target based on how it will perform as a stand-alone cash-generating entity, as it will not be integrated with another business. Suppose it is believed that the target's ESG activities will not impact its cash-generating ability. If that is the case, a financial buyer will not have the same incentives to value the target's ESG performance. Another reason could be that strategic acquirers are in a position to absorb the ESG scores of their targets. For further research, it would be interesting to analyse the post-merger effects of ESG scores to shed light on the differences between financial and strategic acquirers.

Table 6.6: T-test for differences between targets of strategic and financial acquirers

Variable	Strategic acquirer	Financial acquirer	Statistic	P-value	Parameter
Target ESG score	0.394	0.308	t = 4.160	0.0002***	df = 106.656
Size	5.361	4.519	t = 11.386	< 2.2e - 16***	df = 1771.548
Premium	0.431	0.314	t = 4.883	< 2.2e - 16***	df = 1181.441

Note:

*p<0.1; **p<0.05; ***p<0.01

A simple t-test shows that the targets of strategic acquirers, on average, have a higher ESG score and are larger than the targets of financial acquirers. However, the t-test finds

no significant difference in the average premium paid by strategic and financial acquirers.

Table 6.7: Transactions with target ESG score by acquirer industry

Industry (2-digit SIC code)	Targets purchased by strategic acquirers		Targets purchased by financial acquirers	
	Number of targets	Proportion	Number of targets	Proportion
Agriculture, forestry, and fisheries (01-09)	2	0.49%	1	1.35%
Mineral industries and construction (10-17)	63	15.33%	9	12.16%
Manufacturing (20-39)	172	41.85%	25	33.78%
Transportation and communication (40-48)	22	5.35%	8	10.81%
Utilities (49)	27	6.57%	4	5.41%
Wholesale and retail trade (50-59)	37	9.00%	7	9.46%
Finance, insurance, and real estate (60-69)	3	0.73%	1	2.67%
Service industries (70-89)	85	20.68%	19	25.68%
Total	411	100.00%	74	100.00%

In table 6.7, we see that strategic and financial acquirers purchase targets in more or less the same industries and that there are no large deviations in the proportions. Hence, the difference in ESG premium between the two groups seems independent of the choice of target industries.

6.5 Differences in ESG premium over time (H6)

We have split our observations into three different periods, 2010-2013 (period 1), 2014-2017 (period 2), and 2018-2021 (period 3). The following model includes an interaction term between the continuous variable ESG score and the time period dummies. Additionally, we run a model including the interaction term between the ESG score dummy variable and the time period dummies.

Table 6.8: H6: Time period and ESG score interactions

	<i>Dependent variable:</i>	
	Premium	
	(1)	(2)
ESG score	0.098 (0.321)	
ESG score dummy		0.119 (0.072)
Period 2	-0.151 (0.174)	-0.068* (0.035)

(Table continued on next page)

Period 3	−0.281 (0.180)	0.015 (0.047)
ESG score * Period 2	0.080 (0.412)	
ESG score * Period 3	0.354 (0.398)	
ESG score dummy * Period 2		−0.018 (0.066)
ESG score dummy * Period 3		−0.116 (0.078)
Size	−0.086*** (0.021)	−0.082*** (0.015)
Market-to-Book	0.003 (0.015)	−0.014** (0.007)
Leverage	0.078 (0.108)	0.060 (0.080)
Current ratio	0.006 (0.004)	0.004 (0.003)
CAPEX ratio	−0.745* (0.432)	−0.343*** (0.110)
R&D expenses ratio	0.006 (0.012)	−0.004 (0.009)
ROE	−0.059** (0.023)	0.0001 (0.007)
Runup	0.773*** (0.126)	0.782*** (0.110)
All cash	−0.060 (0.053)	0.016 (0.035)
All stock	−0.080 (0.063)	0.002 (0.052)
Cross-border	0.008 (0.048)	0.059* (0.035)
Competing bid	0.039 (0.079)	0.203*** (0.073)
Financial acquirer	−0.207*** (0.076)	−0.132*** (0.034)
Horizontal merger	−0.078 (0.056)	−0.011 (0.036)
Tender merger	−0.0002 (0.063)	0.083*** (0.031)

(Table continued on next page)

Toehold	-0.114* (0.067)	-0.027 (0.038)
Constant	1.665*** (0.303)	1.668*** (0.143)
Industry FE?	Yes	Yes
Country FE?	Yes	Yes
Observations	485	1,944
R ²	0.670	0.404
Adjusted R ²	0.348	0.193
Residual Std. Error	0.277	0.440
F Statistic	2.083***	1.915***
<i>Note:</i>	*p<0.1; **p<0.05; ***p<0.01	

Note: Table 6.8 is an OLS regression. In specification 1, we regress the interaction term between the continuous variable ESG score and the time categorical variable Period on the Premium. In specification 2, we regress the interaction term between the dummy variable ESG score dummy and the time categorical variable Period on the Premium. The regressions are based on a sample of M&A deals over the period 2010 - 2021, extracted from the SDC database. The extraction criteria can be found [here](#). In both specifications, we control for other independent variables in accordance with [equation 5.1](#), except for year fixed effects which are excluded. In the model, we use robust standard errors.

We find no significance between the interactions *Period * ESG score* and *Period * ESG score dummy* and the deal premium. The interpretation is that there is no difference in the ESG premium between the periods.

6.6 Analysing potential endogeneity concerns

Since randomisation of receiving an ESG rating seems implausible, the sample can be prone to endogeneity. In the absence of a selection test, we address the endogeneity problem by applying the dummy variable method and investigating different characteristics of ESG targets. Although similar papers to ours generally do not find any issues regarding endogeneity, some statistics may suggest that our sample and thus our results could be subject to endogeneity issues.

6.6.1 Dummy variable adjustment

As described in the methodology section, we employ a dummy variable adjustment to address potential selection issues in the independent variable ESG score. Such a method allows us to analyse the effect of the independent variable of interest on the complete sample. In the following model, all NA observations in ESG score are replaced by the mean ESG score in our sample (approx. 0.38).

Table 6.9: Dummy variable adjustment

	<i>Dependent variable:</i>		
	Premium		
ESG score	0.184** (0.080)	0.362*** (0.119)	0.469*** (0.121)
ESG score dummy	-0.095*** (0.033)	-0.107** (0.045)	-0.087* (0.047)
Size	-0.075*** (0.010)	-0.078*** (0.015)	-0.089*** (0.015)
Market-to-Book	0.001 (0.005)	-0.008 (0.006)	-0.012* (0.006)
Leverage	0.018 (0.060)	0.053 (0.081)	0.052 (0.080)
Current ratio	0.007** (0.003)	0.005* (0.003)	0.004 (0.003)
CAPEX ratio	-0.284*** (0.079)	-0.290*** (0.101)	-0.297*** (0.109)
R&D expenses ratio	0.005 (0.008)	0.0003 (0.009)	0.002 (0.010)
ROE	0.002 (0.008)	0.0002 (0.008)	-0.0003 (0.007)
Runup	0.735*** (0.100)	0.755*** (0.112)	0.785*** (0.112)
All cash	0.038 (0.027)	0.054 (0.034)	0.021 (0.036)
All stock	-0.056 (0.039)	-0.018 (0.051)	0.004 (0.053)

(Table continued on next page)

Cross border	0.064*** (0.022)	0.047* (0.029)	0.061* (0.034)
Competing bid	0.218*** (0.066)	0.214*** (0.074)	0.193*** (0.075)
Financial acquirer	-0.124*** (0.026)	-0.117*** (0.035)	-0.119*** (0.035)
Horizontal merger	0.015 (0.024)	0.006 (0.035)	-0.008 (0.035)
Tender merger	0.075*** (0.023)	0.079*** (0.029)	0.090*** (0.031)
Toehold	-0.104*** (0.029)	-0.119*** (0.037)	-0.030 (0.039)
Constant	0.776*** (0.087)	1.195*** (0.133)	1.543*** (0.162)
Year FE?	Yes	Yes	Yes
Industry FE?	No	Yes	Yes
Country FE?	No	No	Yes
Observations	1,944	1,944	1,944
R ²	0.228	0.378	0.412
Adjusted R ²	0.216	0.171	0.199
Residual Std. Error	0.434	0.446	0.439
F Statistic	19.474***	1.829***	1.937***

Note: *p<0.1; **p<0.05; ***p<0.01

Note: Table 6.9 is an OLS regression using the dummy variable adjustment method. In this model, we use the complete sample (1,944 obs.), where we set all NA observations of the ESG score to the mean of the ESG score in the sample (approx. 0.38). The independent variables of interest are the ESG score and the ESG score dummy. The regressions are based on a sample of M&A deals over the period 2010 - 2021, extracted from the SDC database. The extraction criteria can be found [here](#). Furthermore, we control for the independent variables described in [equation 5.1](#). In the model, we use robust standard errors. The complete regression table is found in the appendix.

The dummy variable adjustment method shows a positive and significant relationship between ESG score and the deal premium. The result enables us to comment further on endogeneity since we, in this method, use the whole sample and, in theory, avoid the selection problem. As the table above shows, we still get similar results as in H1 when testing the complete sample.

However, the method is prone to producing biased estimates. Thus, we investigate

endogeneity concerns further by looking at characteristics that may cause firms to receive ESG scores.

Table 6.10: Size and ESG score

Quartiles of Size	No. of targets	No. of targets with ESG score	Average ESG score	Proportion
25% smallest firms	486	12	0.27	2.47%
25% largest targets	486	352	0.41	72.43%

The table above splits the sample into the 25% smallest and largest firms and counts the number of targets with ESG scores within those quartiles. Interestingly, out of the largest targets, 72.43% have an ESG score, whilst among the 486 smallest targets, only 2.47% have an ESG score. The results clearly display that larger firms have a higher chance of receiving an ESG rating.

Another interesting statistic is the link between the Bloomberg ESG disclosure score and the Refinitiv ESG score.

Table 6.11: Bloomberg ESG disclosure score and Refinitiv ESG score

Quartiles of ESG disclosure score	No. of targets	No. of targets with ESG score	Proportion
25% lowest ESG disclosure rating	187	31	16.58%
25% highest ESG disclosure rating	187	157	83.96%

As mentioned, the Bloomberg ESG disclosure score measures a firm's degree of self-reporting on ESG issues. The rating ranges from 0 to 100. In the table above, the 4th quartile represents the firms with the greatest disclosure ratings. We observe that among the 187 targets with the greatest ESG disclosure score, 83.96% have an ESG score. Among the 187 targets with the lowest ESG disclosure score, only 16.58% have an ESG score. This finding may support our notion that firms self-select into receiving ESG ratings by publishing CSR reports etc.

We acknowledge that statistics like these, combined with the fact that bidding on a firm is non-random, may indicate that the sample is non-random and that our results can be subject to endogeneity.

7 Conclusion

This paper has examined the relationship between ESG scores and deal premiums in M&A transactions. Using data from various credible sources, we compiled a sample of 1,944 transactions completed in OECD countries between 2010 and 2021. In 485 of these transactions, the target had an ESG score at the end of the last fiscal year before the deal was conducted.

Initially, we established a positive relationship between ESG and the deal premium. Our result suggests that one standard deviation unit-increase in ESG score implies 5.4 percentage points more premium *ceteris paribus*. The result is supported by the use of a dummy variable adjustment method. By testing the three ESG pillar scores individually, we find that the environmental and governance pillars drive the ESG premium. The regression coefficients imply that bid premiums are increased by 6.5 and 4.9 percentage points for each standard deviation unit-increase in environmental and governance scores, respectively.

Furthermore, we find an inverse relationship between the ESG disclosure score from Bloomberg and the deal premium. Our fifth hypothesis finds that only strategic acquirers pay an ESG premium. For targets purchased by strategic acquirers, one standard deviation unit-increase in ESG score implies 4.1 percentage points more premium *ceteris paribus*. This finding is one of the focus areas for our discussion, as it illustrates that financial acquirers might not be as concerned with target ESG scores as strategic acquirers.

Finally, we test for differences in the ESG premium in different periods of our sample. We do this by running regression models with interaction terms between the categorical variable time period and ESG score, as well as the ESG score dummy. We find no differences between the time periods.

In conclusion, we establish a positive relationship between the target ESG score and the deal premium. Additionally, our results indicate that the environmental and governance aspects of ESG drive the ESG premium. Furthermore, we find that an ESG premium is paid by strategic acquirers and not financial acquirers. We hope this paper can provide insight into why and how ESG impacts deal premiums in M&A transactions.

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Appendix

A1 Variable definitions

Table A1.1: Variable definitions

Variable	Definition	Source
Premium	Offer value per share divided by share price 42 trading days before deal announcement	SDC/CRSP
Size	The natural logarithm of the target's market value 42 trading days before deal announcement	CRSP
Market-to-Book	Market value of the target 42 trading days before deal announcement divided by total assets	CRSP/Compustat
Leverage	Total debt divided by total assets	Compustat
Current ratio	Current assets divided by current liabilities	Compustat
CAPEX ratio ratio	Capital expenditures divided by total assets	Compustat
R&D expenses ratio	Research and development expenses divided by total assets	Compustat
ROE	Net income after tax divided by shareholders' equity	Compustat
Runup	The natural logarithm of the target stock price one day before deal announcement to 42 days before deal announcement	CRSP
All cash	Dummy variable equal to one if the bid is an all-cash offer	SDC
All stock	Dummy variable equal to one if the bid is an all-stock offer	SDC
Competing bid	Dummy variable equal to one if there are several bidders	SDC
Financial acquirer	Dummy variable equal to one if the acquirer is a financial acquirer as defined by SIC codes	SDC
Horizontal merger	Dummy variable equal to one if the target and acquirer are in the same industry	SDC
Tender merger	Dummy variable equal to one if the accepted bid is a tender offer	SDC
Toehold	Dummy variable equal to one if the acquirer owned a stake less than 5% at the time of announcement	SDC