In search of a greenium in international M&A

Evidence for the existence of a bid greenium and an absent shift in acquirer behavior towards sustainable strategies

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MSc thesis program financial economics

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Key words: Green M&A, Bid premiums, environmental performance, CO_2 emissions performance, reputation greenwashing.

Publication date: 30-04-2022

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Abstract

Although the international green M&A market has tripled in 2021, there is still a lot of ambiguity surrounding the presence of a greenium controlled for risks of reputation greenwashing. Therefore, the aim of this thesis is to test for evidence of a bid greenium in the M&A market and acquirers' motivation behind paying such greeniums. Additionally, I examine whether acquirers of 'green' companies are also adopting more sustainable strategies. Which I test using a Multiple Linear Regression model, for a sample of 397 internal deals that occurred between 2005 and 2020. This thesis is divided in two subsets of hypotheses, on the one hand hypotheses related to environmental performance (EP). While on the other hand I test CO_2 emissions related hypotheses using a self-constructed variable, namely CO_2 emissions performance (CO_2EP). Lastly, both measures are combined to test whether there is any interaction between EP and CO_2EP increasing acquisitions. The results show that environmental performance is generally valued by acquirers and that there is no sign of reputation greenwashing. Although this result should be considered with caution since it does not hold after controlling for year and industry fixed effects. The results on the CO_2EP measure indicated that acquirers do not generally value CO_2EP but do use CO_2EP to negotiate a discount on targets than perform worse than themselves. Which results in a negative effect on bid premiums of -6.6%, the result holds after controlling for year and industry fixed effects. Lastly, there was no evidence for interaction between both variables. Hence, I conclude that acquirers engage in paying a greenium in exchange for reduced exposure to climate risks, but that there is no evidence for a shift towards more sustainable strategies.

Acknowledgements

I want to thank R.M. Spigt for all the help and feedback that she provided me throughout the thesis process. Additionally, I want to thank all the people and companies that enabled me to perform this research for the gathering and reporting of data related to environmental performance and CO_2 emissions. Lastly, I want to thank all the other people that enabled me to write this thesis.

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1. Introduction

In 1989, one of the most polluting companies in the world, namely Royal Dutch Shell, was the first company to act on mitigation of climate risk. Based on fears for a rising sea level in the future, the company heightened its natural-gas production platform '*Troll A*' from 470 meters to 472 meters (New York Times, 1989). An action that increased costs by up to $35 million, making Royal Dutch Shell one of the first companies to pay a premium on its investment to reduce its future exposure to climate risk, i.e., a greenium. A phenomenon explained as the willingness to accept a lower return on investment in exchange for reduced exposure to climate risks.

In recent years, financial literature has made substantial progress in understanding the effects of climate change on asset prices across asset classes. With the first greenium discovered in the fixed-income markets, where Kapraun and Scheins (2019) found investors are willing to accept lower yields on green projects, with greeniums averaging 20-30 basis points on green bonds. While greeniums are even more profound for issuing companies incorporated in countries that are also perceived 'green', which further increases the issuers 'green credibility'. Hence reducing risks of 'greenwashing', the practice of channeling proceeds from green bonds towards non-green projects (Flammer, 2021). More recently, Alessi et al. (2020) proved the existence of a greenium in equity markets, controlled for risks of greenwashing. They created a synthetic green score, which proxies for a company's greenness by combining the quality of a company's environmental disclosure with its greenhouse gas (GHG) emissions intensity. Using this self-constructed, they found investors are willing to accept lower returns on investments in greener and more transparent companies, with the objective to hedge their portfolios against climate related risks. Additionally, Chan and Walter (2014) found that Initial Public Offerings (IPOs) and Seasoned Equity Offerings (SEOs) of environmentally friendly companies outperform their control group by about 7% of risk-adjusted returns per annum. Furthermore, while post-IPO performance decline is frequently documented for traditional companies, this effect is absent for environmentally friendly companies. Which Chan and Walter (2014) attributed to a decreased level of risk for green companies.

Based on previous literature (Chan & Walter, 2014; Kapraun & Scheins, 2019; Alessi et al., 2020), it is evident that markets increasingly start to believe greener investments have a lower level of risk compared to traditional investments. These results are further motivated by numerous studies that found institutional investors believe climate risks have financial implications for their portfolio companies. While they further believe that these risks have already begun to materialize (Krueger, Sautner, & Starks, 2019). Hence, institutional investors are actively engaging with portfolio companies on improving environmental performance (EP) and reducing climate risks. Which can potentially result in an increased appetite for green M&A according to Salvi, Petruzzela, & Giakoumelou, (2018). An approach through which management attempts to answer climate-related shareholder demands by acquiring greener companies. Gomes and Marsat (2018) substantiated this statement by finding that increased EP results in significantly higher bid premiums for target companies. They attributed this result on an acquirer' understanding that 'good' EP decreases information asymmetry and hence company specific risk. This result can be interpreted as a first indication for the existence of a greenium on bid premiums, a phenomenon to which I refer to in this paper as 'bid greenium'. However, according to Salvi et al. (2018), this result does not provide an answer on whether companies are trying to improve their EP or rather attempt to improve their reputation with such deals, i.e., 'reputation greenwashing'.

The statement by Salvi et al. (2018) is underscored by an article in Reuters[1] (2021) which suggests that ambiguity surrounding acquirer' motives behind green M&A remains. Even though the market for green M&A has tripled to $164bn in 2021, there is still a lot of debate on whether companies engage in green M&A with the objective to pursue a sustainable strategy, or rather to

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[1] Reuters: Climate M&A will shift from risk to opportunity (Currie, 2021).

improve their corporate image. A fitting example of the latter is the recent acquisition of *Oil Search* by Australian natural gas company *Santos Ltd.* Since the deal was motivated by CEO Kevin Gallagher to help the company "successfully navigate the transition to a lower carbon future". But as it turned out, he meant that the extra cash flow, resulting from a 45% increase of fossil-gas drillings, would help the company navigate to a net zero strategy by 2040[2]. The Australian Centre for Corporate Responsibility labelled this action as a clear example of corporate reputation greenwashing, by claiming a climate rationale on a non-green acquisition with the aim of signaling ecological virtue.

While previous literature on greeniums in financial markets has made substantial progress on identifying and tackling these risks of greenwashing, such attempts have barely been undertaken in the field of green M&A. Therefore, the main objective of this thesis is to fill the gap in existing literature and gain a better understanding on the effect of companies' EP on bid premiums. I attempt to fill this gap by answering the call of Salvi et al. (2018) to further study the existence of a bid greenium:

Research question 1: "Is there empirical evidence for a greenium in the M&A market, controlled for risks of reputation greenwashing behavior?"

I address this question by first establishing a thorough understanding of the relationship between EP and bid premiums. While Gomes and Marsat (2018) stated that acquirers are using bad environmental performance of the target as a lever to negotiate a discount, they did not consider acquirer environmental performance in their study. Therefor I analyze both the target -and acquirer EP in relation to bid premiums, using a multiple linear regression model for an international sample of 397 deals that occurred between 2005 and 2020. Additionally, I examine why acquirers engage in paying such premiums. Are they motivated by reduced information asymmetry -and exposure

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[2] Reuters: Greenwashing hostility crashes friendly gas deal (Currie, 2021).

to climate risk or because they attempt to boost their environmental reputation through green acquisitions?

Besides providing an answer to the previous questions on bid premiums and acquirers motivation behind them. This thesis also examines whether acquirers of green companies are adopting more sustainable strategies, since this is a topic of debate according to Reuters (2021). Hence, I introduce the second research question:

Research question 2: "Are acquirers of 'green' companies actively pursuing more sustainable strategies?"

To answer the second research question, I include a self-constructed proxy for a company's pollution level, namely CO_2 emissions performance (CO_2EP). Which enables me to rate a company's CO_2EP compared to a control group of industry peers in the year prior to the takeover announcement. In this system, companies that have a higher CO_2 emissions intensity than 75% of their industry control group receive the lowest ranking. While companies with a lower CO_2 emissions intensity than 75% of their industry control group receive the highest ranking. Hence increased CO_2EP is associated with a lower level of CO_2 emissions. Using this metric, I test the effect of CO_2EP on bid premiums. In addition, I also examine the effect of CO_2EP increasing and decreasing acquisitions. Although the CO_2EP variable enables me to gain a better understanding of the relationship between CO_2 emissions and bid premiums. On its own, it does not provide an answer to the second research question. Therefore, I include an interaction term to test for interaction between a target's environmental performance and a CO_2EP increasing acquisitions.

This thesis is structured as follows; in the next section I provide a review of relevant literature that helps to gain an understanding of where the field of green M&A currently stands. Additionally, I motivate the bid greenium channel, which is followed by the introduction of the hypotheses. In section 3, I discuss risk of biases related to EP and CO_2 emissions data and how I mitigate these biases. Afterwards, I explain how I select and collect my sample data. Followed by an overview and interpretation of descriptive and summary statistics. Section 4 presents the methodology used to test the hypotheses, namely a multiple linear regression model. Additionally, I provide an explanation of how I construct the variables of interest and especially the CO_2EP, followed by a discussion on the necessary control variables. In section 5, I test the validity of the regression, followed by the presentation and interpretation of the results of the hypotheses tests. Afterwards, I check the results for robustness. Lastly, I conclude upon the results, address limitations, and provide recommendations for further research in section 6.

2. Literature review

2.1 Introduction

This section provides an evaluation of existing literature on bid premiums, the relation with EP and the incorporation of CO_2 emissions into investment decisions. Section 2.2 addresses the motivation behind bid premiums, followed by a discussion on several determinants of bid premiums identified in previous literature. While section 2.3 provides a review on the emerging field of green M&A and previous studies on the relation between EP and bid premiums. Afterwards, I address remaining ambiguity surrounding the existence of a greenium and a previous attempt to solve this issue. In section 2.4. previous results on the relation between CO_2 emissions and market value are presented. Followed by a discussion on the emergence of CO_2 emission trading schemes and its potential implications for bid premiums. Lastly, the results on a study that combined environmental performance and GHG-emissions in the equity market is presented in section 2.5 and valuable insights to develop the interaction term. Lastly, I address the contributions of this thesis to the emerging field of green M&A.

2.2 Bid premiums

In the market for corporate control, also referred to as the takeover market, it is common practice that acquiring companies offer a bid premium on top of the target's current market price. In 1983, Jensen and Ruback were the first to investigate bid premiums and found that they averaged up to 30%. While Gondhalekar, Sant, and Ferris (2004), reported an average bid premium of 53% for acquisitions in the U.S. between 1973-1999. Whereas Betton, Eckbo, and Thorburn (2008a) identified the true offer premium to be about 45-50%. Although these results showed that bid premiums do significantly differ across various studies and geographies, they tend to be positive on average, since target company's shareholders demand compensation in return for their control rights in the company (Bradley, 1980). Additionally, bid premiums tend to be higher for cash transactions compared to equity transactions, which is explained by the corporate tax code (Wansley, Lane, & Yang, 1983). Since cash transactions result in immediate financial gains that are subsequently being taxed, while equity transactions are not being taxed right away.

The reason for acquiring firms to indulge in paying a premium is because they expect synergy effects, i.e., economies of scale and scope, to enable them to operate the target company more efficiently and hence improve future earnings (Díaz, Azofra, & Gutiérrez, 2009). According to Walkling and Edmister (1985), management of bidding companies face a dilemma in formulating their bid, since too high a price will reduce their return on investment, while too low a price may result in a failed offer and missed opportunity. In 1988, Thaler introduced the winner's curse hypothesis, suggesting that the successful bidder tends to be the one that most overestimates the target's value. Which is in line with market expectations, since Jensen and Ruback (1983) found that acquirer' shareholders earn a zero abnormal return on average at the acquisition announcement. While Fuller, Netter, and Stegemoller (2002) found tremendous variation in these returns. Suggesting that acquirer returns are severely depended on whether the market agrees with the price that is paid for the target company.

The height of bid premiums and subsequently the return on investment for the acquirer is explained by numerous variables. For example, the existence of opposing bids and thus increased competition during the bidding process often results in a higher premium (Walkling & Edmister, 1985). Additionally, their results showed that a target's low valuation ratio and low leverage commands a significantly higher bid premium. Since low valuations are interpreted as an indication of managements inability to manage the company efficiently, while low leverage provides the acquirer with additional external financing capacity and tax shield benefits. According to Cording et al. (2010), there is a total of 218 explanatory variables used in previous literature as determinants for bid premiums. Therefore, I provide an complete overview of the control variables that I selected for my model in section 4.4.

2.3 Green M&A and Environmental performance

Over the past decades, many scholars have investigated the effects of numerous variables on bid premiums. More recently, literature in the emerging field of green M&A (Choi, Christmann, & Kim, 2015; Gomes & Marsat, 2018; Qiao & Wu, 2019) examined the impact of target company Corporate Social Responsibility (CSR) on bid premiums. The studies focused on the relationship between CSR and information asymmetry between the acquirer and target companies. Since improved CSR performance reduces information asymmetry. Additionally, good CSR performance is regarded as a form of goodwill that insures a company against the impact of negative events, hence reducing company-specific risk (Salvi et al., 2018).

Choi et al. (2015) investigated the effect of CSR and Corporate Social Irresponsibility (CSiR) performance on bid premiums. Using a sample of 215 cash-only acquisitions by U.S. acquirers between 1995 and 2013, they found CSiR to have a negative effect on bid premiums, while good CSR performance results in higher bid premiums. They further suggested the results to be more profound for acquisitions with increased information asymmetries and therefore recommend investigation of cross-border acquisitions for further studies. Qiao and Wu (2019) answered this call and studied the effect of CSR on bid premiums for an international sample of 252 cross-border acquisitions between 1991 and 2016. They tested the effect of a target company's combined Environmental, Social and Governance (ESG) rating on bid premiums and found that foreign acquirers are willing to pay more for socially responsible companies. This result is further substantiated by Gomes and Marsat (2018), who studied the effect of the environmental -and social pillar score individually on bid premiums. After testing an international sample of 588 deals between 2003 and 2014, there results showed a positive relation for ESG ratings on bid premiums. More specifically, they found that a target company's environmental performance is generally valued by acquirers, while social performance is only valuable in cross-border transactions (Gomes & Marsat, 2018).

Besides the information asymmetry channel, another explanation for the significant positive effect on the environmental pillar by Gomes and Marsat (2018) is presented in the work of Salvi et al. (2018). By looking at bidders' post-acquisition performance, they investigated whether 'green' acquisitions are a viable way for companies to support their growth in a sustainable manner. Additionally, they were interested in exploring companies' motives behind green M&A. Whether acquirers engage in such transactions to improve their corporate social responsibility status or to achieve superior financial results (Salvi et al., 2018). In their study they used a sample of 84 deals that occurred in the United States and European Union between 2001 and 2013. Using a 'text search' function they qualified companies that are regarded to be green and compared the acquirer's performance on Return-on-Assets (ROA), up to three years post-acquisition, with a control group. In line with previous research (King et al., 2004; Zollo & Meier, 2008), they found acquisitions to have an average negative effect on ROA. However, when comparing the group of green deals with their control group of traditional deals. They found that green deals significantly outperform traditional deals on ROA in the 3-years post acquisition. Hence, they concluded that green deals have a positive effect on bidders' post-acquisition performance and encourage companies to engage in green M&A to improve corporate image and obtain superior financial results.

Based on the results found by Gomes and Marsat (2018) and the channel provided by the empirical results of Salvi et al. (2018). I expect that target company's performance on the environmental pillar remains to be valuable for acquirers in international deals between 2005 and 2020. I test this assumption under the following hypothesis:

H1: A target company's environmental performance positively effects bid premiums.

While this testing this hypothesis provides an answer to the question whether acquirers are willing to pay more for companies with good environmental performance. It does not answer the question posed by Salvi et al. (2018) why acquirers are willing to pay more. Is this because of improved corporate image, superior financial results, or reduced level of risk? De Klerk (2020) made a first attempt to answer this question regarding the risk of greenwashing through the acquisition of greener companies. He created a dummy variable for companies identified to be 'green', using the same 'text search' methodology as Salvi et al. (2018). In addition to the text search, he identified companies with an environmental pillar score >50 in the year prior to the acquisition as green. Using this methodology, he found that green companies receive a significantly higher bid premium than non-green companies, reaching an additional premium of up to 12.7%. Concluding that there is evidence for a bid greenium that goes beyond just environmental pillar scores. Although his results further improve the case for the existence of a bid greenium, the results are not without ambiguity. Because in his sample of 992 deals that occurred between 2010 and 2016, only 33 deals were identified as green using the text search methodology, while an additional 167 deals were identified based on their environmental pillar score. Hence, the results are still largely reliant on target's environmental pillar scores and thus the risk of greenwashing prevails.

In this thesis, I therefor attempt to address these issues by examining the relation between the acquirer's -and target's EP regarding bid premiums. Although scholars (Bettinazzi & Zollo, 2017; Arouri, Gomes, & Pukthuanthong, 2019) examined the effect of acquirer CSR performance on post-acquisition performance and uncertainty surrounding deal completion. The channel that increasing or decreasing EP acquisitions influence bid premiums has not previously been studied. Following the prevailing rationale (Gomes & Marsat, 2018; Salvi et al. 2018) that acquiring greener companies results in reduced risk and improved corporate image, I expect that acquirers with lower EP can capture more EP related synergies, i.e., improved corporate image, than acquirers that have already established good EP. Especially during times in which pressure on a company's EP is gradually increasing from multiple directions, i.e., regulatory pressure, shareholder engagement and societal pressure (Saka & Oshika, 2012; Krueger et al., 2019; Bos & Gupta, 2019). Based on the channel that companies with bad EP can obtain more synergies of improved corporate image by acquiring companies with good EP, I expect that acquirers with bad EP are willing to pay more for such targets. I test this under the following hypotheses:

H2a: Environmental performance increasing acquisitions have a positive effect on bid premiums.

H3a: A ≥ quartile EP improving acquisition has a positive effect on bid premiums.

In the opposing direction, Gomes and Marsat (2018) found that acquiring companies integrated CSR performance in their valuation of the target company and that bad EP is increasingly being used by acquiring companies as a lever to negotiate a discount. Following this rationale, I expect good EP acquirers to negotiate a discount when buying a company with bad EP. I test this using the following hypotheses:

H2b: Environmental performance decreasing acquisitions have a negative effect on bid premiums.

H3b: A ≥ quartile EP decreasing acquisition has a negative effect on bid premiums.

The positive results of previous literature (Choi et al., 2015; Gomes & Marsat, 2018; Qiao & Wu, 2019) on the relation between EP and bid premiums provides a first indication for the existence of a greenium. With my first set of hypotheses on EP, I first test whether the results on target EP and bid premiums also holds for my sample and if so, why are companies motivated to pay such greeniums.

However, Salvi et al. (2018) additionally pointed out, that it is still unclear why acquirers engage in green M&A. Therefore, I also address this question by testing whether acquirers are pursuing more sustainable strategies or that they are rather motivated by other motives. Here for, I include CO_2 emissions performance as a proxy for levels of pollution.

2.4 Green M&A and CO_2 emissions

To begin, Saka and Oshika (2012) studied the relation between CO_2 emissions and market value. Arguing that CO_2 emissions may adversely affect a company's future cash flow because of investments in emissions reduction and costs on CO_2 emission trading schemes, which are emerging around the world. Using a sample of 784 companies listed on the Nikkei Index, they indeed found that CO_2 emissions are negatively impacting market value. Which is in line with the result by Clarkson, Li, and Richardson (2004) who showed that market values rise in response to environmental investments aimed at reducing pollution. Additionally, Saka and Oshika (2012) found that for companies participating in emissions trading schemes, CO_2 emissions did not negatively impact market value. Indicating that investors are actively incorporating company's CO_2 emissions and participation in emissions trading schemes into their investment decision.

Although the relation between CO_2 emissions and market value has been studied for the equity markets, there is no previous literature on the relation between CO_2 emissions and bid premiums. Therefore, I begin by testing the general effect of target's CO_2EP on bid premiums. Based on the emergence of CO_2 emission trading schemes around the world and active incorporation of CO_2 emissions in investment decisions by investors. I expect that acquirers are also incorporating CO_2 emissions into their investment decision. More specifically, I expect that they are willing to pay an additional premium for companies that perform better on CO_2 emissions compared to their industry peers. I test this channel under the following hypothesis:

H4: A target company's CO_2EP positively effects bid premiums.

A hypothesis that is further substantiated by a statement by Lu (2021) that companies with high pollution levels have recently been active acquirers of greener companies to increase their environmental sustainability and adopt environment-friendly technologies. Which suggests that acquirers do indeed attempt to improve their CO_2EP through green M&A. In this paper I empirically test this statement by examining whether there is proof that CO_2EP improving acquisitions have an additional positive effect on bid premiums. In line with the statement by Lu (2021), I expect that acquirers are indeed willing to pay for target companies with better CO_2EP than their own, which I test under the following hypothesis:

H5a: A CO_2EP increasing acquisition has a positive effect on bid premiums.

Lastly, the growing number of CO_2 emissions trading schemes around the world (Saka & Oshika, 2012), provides an additional channel for an increased appetite by acquirers for green targets (Lu, 2021). Since these schemes effectively monetize CO_2 emissions. Furthermore, the amount of CO_2 emission rights is gradually decreasing over time, *ceteris paribus*, this will result in gradually increasing costs for CO_2 emissions. Which adversely affects future cash flows according to Saka and Oshika (2012) and allows for incorporation of financial costs of CO_2 emissions into business models used for investment decisions. Due to the monetization of CO_2 emissions rights, on the one hand companies can justify investments in reduction of CO_2 emissions as an asset since this improves future earnings or at least decreases future CO_2 emissions costs. While on the other hand, traditional assets become liabilities because of the increased costs associated with operating these assets. Hence traditional companies increasingly risk ending up with stranded assets (Bos & Gupta, 2019), a risk that has already begun to materialize according to institutional investors (Kreuger, et al. 2019). Therefore, I expect that bad CO_2EP and thus the risk of stranded assets is already being used by acquirers as a lever to negotiate a discount on the offer price, as is done with bad ESG ratings according to Gomes and Marsat (2018). I test this assumption under the following hypothesis:

H5b: A CO_2EP decreasing acquisitions has a negative effect on bid premiums.

By testing the second set of hypotheses on the relation between CO_2EP and bid premiums, I examine whether there is evidence of active incorporating of CO_2 emissions into the investment decision by acquirers.

2.5 Green M&A and a shift in company behavior towards more sustainable strategies

In the first section I discussed the effect of EP on bid premiums, to examine whether a greenium exists and whether this is motivated by reputation greenwashing behavior. While in the second section, I discussed the effect of CO_2EP on bid premiums, to examine whether highly pollutive companies are indeed actively acquiring greener companies to improve their CO_2EP. In this last section, I combine both measures to answer the question of whether there is evidence for acquirer' engagement in green M&A due to a shift towards more sustainable strategies.

Alessi et al. (2020) were the first to provide empirical evidence for the existence of a greenium in equity markets, suggesting that investors are willing to accept a lower return on their investment insofar as the investment is in a greener and more transparent company. Previous studies (Bolton & Kacperczyk, 2020; Choi, Gao, & Jiang, 2020) investigated the existence of a greenium in the equity markets by using companies' environmental ratings, but so far, they had failed to reach consensus. Alessi et al. (2020) attributed the lack of consensus to the risk of greenwashing effects and argued that this risk arises from solemnly using companies' environmental ratings as a measure of company greenness. Since these ratings are based on self-reported data on environmental disclosures and therefor subjective. Alessi et al. (2020) proposed to tackle the risk of greenwashing using a synthetic green score, which was constructed by combining a company's environmental pillar score with its Green House Gas (GHG) intensity. They argued that a green score is a more comprehensive proxy of a company's greenness. Since for example, companies that disclose lower GHG-emission intensities and are very transparent, attain the highest green scores. While a company with higher GHG-emission intensity is awarded with a lower green score, *ceteris paribus*. Following this framework, Alessi et al. (2020) performed their research on a sample of 942 companies included in the STOXX Europe Total Market Index (TMI) between 2005 and 2017. They found a highly significant negative return for greener companies, indicating that investors accept a lower ROI when investing in greener and more transparent companies. Which further suggests that investors use green investments as a hedging strategy to reduce their exposure to climate risks (Saka & Oshika, 2014; Alessi et al. 2020; Gimeno & Sols, 2020). They concluded their paper by stating that awareness of investors towards climate-risks has evidently increased in recent years.

Based on the interesting results of Alessi et al. (2020) on the relation between environmental performance and GHG-emission intensities, I also test the relation between target's EP and its level of pollution using CO_2EP. In contrast to their self-constructed green score, I do this by testing the interaction between both variables using an interaction term. This is especially interesting since this test shows whether the result for EP is dependent of the result for CO_2EP and vice versa. Which enables me to answer the question of whether acquiring companies that engage in paying a greenium for EP, are actively following a more sustainable strategy. Based on the channel that EP reduces risk and improves corporate image, in combination with the channel for CO_2EP that the emergence of CO2 emission schemes monetizes a company's level of pollution. I expect acquirers who value EP, also attempt to decrease their own level of pollution, and hence consider whether the acquisition improves its CO_2EP. Therefor I expect that EP becomes more valuable when the acquisition is CO_2EP improving, I test this under the final hypothesis:

H6: There is positive interaction between a target's EP and increasing CO_2EP acquisitions.

The test of this hypothesis shows whether a potential greenium is accompanied by a shift in company behavior towards more sustainable strategies, through acquisitions of greener and less pollutive companies.

This thesis provides a substantial contribution to existing literature in multiple ways. The tests of the first set of hypotheses will show whether EP is valued by acquirers and whether there is evidence for reputation greenwashing behavior by acquirers. While the results on the second set of hypotheses will show whether acquirers are actively seeking to reduce their level of pollution by engaging in green M&A. In addition to filling the gap in existing literature on the relation between

CO_2 emissions and bid premiums. While the interaction term will provide clarity on whether there is a relation between EP and a shift towards more sustainable strategies. Hence, this thesis will supplement the field of research on green M&A and provide ample implications for further research.

3. Data

3.1 Introduction

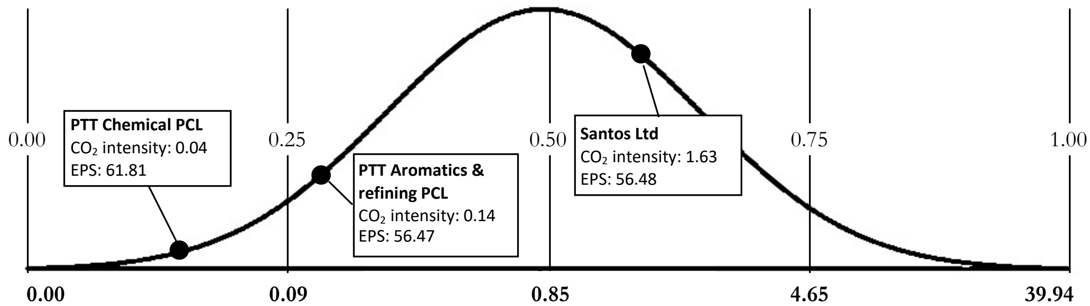
In this section, I discuss the selection and collection of the sample data. Section 3.2 discusses the data availability for the independent variables and addresses any self-reporting biases that might be present in the sample. followed by a description of the sample selection and data collection process in section 3.3. While section 3.4 presents descriptive and summary statistics for the sample, followed by an interpretation of these statistics.

3.2 Environmental performance and CO_2 emissions performance

In this thesis, I test the effect of EP and CO_2EP on bid premiums. Although numerous scholars (Choi et al., 2015; Gomes & Marsat, 2018; Qiao & Wu, 2019) studied the relation between ESG reporting and M&A, the combination of EP and CO_2EP has not previously been studied in relation to M&A. A potential explanation for the lack of research on this topic may reside in the limited availability of data on both environmental pillar scores and company's CO_2 emissions. Although regulation and coverage of both data items has increased over recent years, this is a study of historical data and reporting of both items occurred largely voluntarily in the past. The voluntary nature results in a high risk of self-reporting bias (Alessi et al., 2020). Since better performing companies are more inclined to report on their EP or levels of CO_2 intensity. To mitigate any such risks, both acquirer and target company are required to have reported their environmental pillar score in the year prior to, or of, the acquisition. While risks of self-reporting bias for CO_2 emissions are mitigated by using company's *estimated* CO_2 emissions, instead of self-reported *actual* CO_2 emissions. Besides reducing the risk of self-reporting bias, this decision significantly increases the number of deals matching the selection criteria. Additionally, it is important to mention that Refinitiv follows the greenhouse gas (GHG) protocol for all its emissions classifications and therefore, total CO_2 emissions are the aggregate of direct scope-1 emissions and indirect scope-2 emissions (Refinitiv, 2022). Resulting in a substantial limitation for understanding a company's total level of pollution due to the exclusion of scope-3 emissions. Which, among others[3], represent emissions released from the use of end-products and can account for up to 88% of total emissions for the oil & Gas sector and 75% for utilities (IHS Markit[4], 2021). Unfortunately, it is not possible to mitigate this problem because of a severe lack of companies reporting on scope-3 emissions. However, I account for this problem as best as possible by comparing companies with their industry peers based on the TRBC Industry Classification (TR3) as can be seen in figure 1 and is further explained in section 4.4b. The figure indicates that although the scope-3 emissions are excluded, comparison of companies with their industry peers still provides an indication of a company's pollution level.

Figure 1: Oil & Gas in 2010

TRBC industry classification: 501020



3.3 Sample selection and data collection

The M&A transactions data is extracted from the Thomson One database, which contains international deals between listed companies. Following previous literature on bid-premiums, only deals resulting in a majority stake for the acquirer are included. Additionally, deals below a deal size threshold of $10 million are excluded from the sample and only 'completed' deals in which

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[3] Extensive explanations of scope 1, 2 and 3 emissions are provided in Appendix C.

[4] IHS Markit: Oil & gas companies under pressure to manage Scope 3 emissions to reach net-zero goals. (Saiyid, 2021).

the acquirer and target are not the same company are included. Furthermore, the deal must be announced between 01-01-2005 and 31-12-2020, while both acquirer and target company must be publicly traded companies. Lastly, only acquirer and target companies that are not qualified as financial companies based on their primary SIC-code (between 6000-6999) are included in the sample, as is common practice in financial literature.

The initial dataset from Thomson One contains 18,185 M&A deals, after excluding doubles and deals with no availability on offer prices, the dataset is merged with the DataStream database to get data on the necessary control variables. The data on the control variables is collected using UK-Sedol codes and cross-checked with DataStream codes to optimize the usage of available data. Afterwards, the environmental pillar scores and estimated CO_2 emissions are collected from DataStream, data in the year of the announcement is used in case there is no data available for the year prior to announcement.

Environmental pillar scores are collected from the Refinitiv database on ESG, since this is one the most comprehensive databases in the industry, covering over 80% of global market cap (Refinitiv, 2021). One of the main advantages of using the Refinitiv database in contrast to the MSCI database for example, is the quantitative nature of the ratings from 0 to 100, which allows for easy integration of the ratings into the regression model. Additionally, the EPS is constructed using numerous general measures and 68-industry specific benchmarked measures, based on the Industry Group (TR3) of Refinitiv Business Classifications (TRBC). This is Refinitiv's own business classification system that is comparable to the commonly used Standard Industrial Classification (SIC) system. The industry group classification is comparable to the two-digit SIC codes system and yields the same number of unique industries for the sample, namely 47. To perform an exact analysis between the Refinitiv's environmental pillar scores and the estimated CO_2 emissions, the acquirer and target companies are accordingly classified using the Refinitiv Business Classifications retrieved from DataStream. Lastly, I merge the sample with data on stock prices adjusted for any capital actions as can be retrieved from DataStream. These prices enable calculation of the 42-day bid premium and runup that occurred between t-42 and t-1 based on takeover rumors, while Thomson One only provides 21-day bid premiums. After deleting missing values, the final sample contains 397 international deals that occurred between 2005 and 2020 with target companies distributed over 31 countries.

3.4 Descriptive statistics

In this section I provide descriptive statistics on the distributions of the sample data and details on the variables. Afterwards, the descriptive statistics are interpreted and compared with data characteristics of previous literature.

Table 1: Geographical distribution

Country	Deal count	Proportion (%)	Bid Premium	Target EPS	Acquirer EPS	Target CO_2 intensity	Acquirer CO_2 intensity
United States	193	48.61	0.32	22.31	52.09	0.18	0.53
Australia	43	11.00	0.37	17.70	44.99	0.14	0.64
Canada	29	7.30	0.30	18.01	59.03	0.04	0.34
United Kingdom	29	7.30	0.27	42.60	59.00	0.27	0.32
France	12	3.02	0.09	53.64	58.38	0.23	0.31
Germany	9	2.27	0.41	44.08	36.55	0.28	0.30
Japan	8	2.02	0.09	81.91	64.20	0.84	0.55
Netherlands	7	1.76	0.50	51.27	60.41	0.50	0.18
Switzerland	7	1.76	0.44	46.06	65.51	0.28	0.26
Brazil	7	1.75	0.21	26.30	73.89	0.45	0.30
Spain	6	1.51	0.27	79.83	85.81	0.43	0.75
Italy	5	1.26	0.18	54.91	68.64	0.53	0.93
South Africa	5	1.26	0.49	54.33	74.23	0.51	0.80
Thailand	5	1.26	0.05	56.47	61.81	0.82	0.98
India	4	1.01	0.30	39.52	70.91	0.68	0.29
Other	28	7.05	0.30	28.47	57.61	0.24	0.53
Total/ Median	**397**	**100.00**	**0.31**	**28.41**	**57.46**	**0.25**	**0.55**

Table 1 displays the geographical sample distribution with a total of 397 deals distributed over the top 15 countries, the total sample contains 31 countries and is displayed in Appendix A. The geographical distribution is to a large extent similar to the sample of Gomes and Marsat (2018). Where about 65% of the deals occurred in the United States, Australia, or Canada. However, the proportion of deals that occurred in the United States is 48.61% for my sample compared to

36.90% for the sample of Gomes and Marsat (2018). This proportional increase can be explained by the decision to include both acquirer and target data on EP, in addition to including CO_2 intensities. Since most companies that report on EP are incorporated in the United States. When it comes to the independent variables, it is interesting to point out that in almost all countries, median EPS is higher for the acquirer than the target. While Median acquirer CO_2 intensities are higher than target CO_2 intensities in almost all countries. This can indicate that acquirers put more emphasis on decreasing CO_2 intensity acquisitions compared to improving EPS acquisitions. The sample geographical distribution is further tested on robustness in section 5.5.

Table 2: Target industry distribution

Sector	Deal count	Proportion (%)	Bid premium	Target EPS	Target CO_2 intensity
Basic Materials	63	15.87	0.33	24.67	0.02
Consumer Cyclicals	54	13.60	0.35	33.83	0.81
Consumer Non-Cyclicals	31	7.81	0.30	40.49	0.27
Energy	52	13.10	0.21	23.69	0.04
Healthcare	33	8.31	0.33	26.56	0.43
Industrials	65	16.37	0.27	28.52	0.36
Technology	68	17.13	0.37	23.34	0.38
Utilities	31	7.81	0.24	47.20	0.03
Total/ Median	**397**	**100.00**	**0.31**	**28.41**	**0.25**

All sectors are to a more or lesser extend represented in the sample as can be seen in table 2 and hence the sample proves to be a comparable representation of the real economy. The technology sector yields the highest median bid premium at 37% while the energy sector comes in last with a median premium of 21%. The median bid premium of 31% for the whole sample, with a mean of 33.2% is comparable with results of previous literature (Jensen & Ruback, 1983; Gomes & Marsat, 2018). When it comes to target company EP, the median performance of 28.41 is in the lower segment of satisfactory performance. The utilities sector has the highest median EPS at 47.20 and this is explained by a relatively high amount of renewable energy target companies in the sample. Which appears to be in line with the statements by Salvi et al. (2018) and Lu (2021) on the increased appetite of highly polluting companies for green targets. Lastly, the target companies median CO_2 emissions intensity of 0.25 is just below the global average CO_2 emissions intensity of 0.26 in 2020

(IEA[5]). With the consumer cyclicals sector being the most polluting sector in the sample and the basic materials, energy and utilities sectors the least polluting. Which can be attributed to the exclusion of scope-3 emissions as is discussed in section 3.2.

Table 3: Acquirer industry distribution

Sector	Deal count	Proportion (%)	Acquirer EPS	Acquirer CO_2 intensity
Basic Materials	60	15.11	58.10	0.43
Consumer Cyclicals	48	12.09	40.65	0.31
Consumer Non-Cyclicals	39	9.82	80.37	0.52
Energy	51	12.85	46.96	0.38
Healthcare	36	9.07	57.16	0.26
Industrials	58	14.61	47.42	0.30
Technology	76	19.14	60.06	0.30
Utilities	29	7.30	68.41	1.06
Total / median	**397**	**100.00**	**57.46**	**0.55**

Table 3 displays the industry distribution for the acquiring companies and is comparable to the target distribution when it comes to proportionality of industry representation. It is interesting to point out that, on the one hand, acquirer median EPS is substantially higher than target company for all industries. While on the other hand, acquirer CO_2 intensity is higher for acquiring companies compared to target companies in most cases. The difference is especially interesting when it comes to the basic materials, energy, and utilities sectors. Which again confirms the statement by Lu (2021) that highly pollutive companies are acquiring greener companies. Additionally, acquirers have considerably higher levels of pollution than the global average (IEA, 2022), which further underscores the increased appetite for green M&A to decrease pollution levels.

Table 4 displays the yearly distribution of deals in the sample. A relatively small number of deals occurred at the beginning of the period, with deals for 2006 being completely absent from the sample, due to a lack of data on EP and CO_2EP. This distribution is in line with the development of ESG coverage by Refinitiv and hence data availability on EP for both targets and acquirers.

5 Global energy review: CO_2 emissions in 2021 (IEA, 2022).

Table 4: Descriptive statistics of yearly distribution

Year	Deal count	Proportion (%)	Bid premium	Target EPS	Acquirer EPS	Target CO_2 intensity	Acquirer CO_2 intensity
2005	2	0.50	0.16	51.79	20.78	0.57	0.88
2007	4	1.01	0.27	17.29	49.91	0.47	0.27
2008	8	2.02	0.39	25.84	71.25	0.26	0.40
2009	12	3.02	0.55	39.95	65.04	0.14	0.20
2010	27	6.80	0.35	25.85	56.34	0.11	0.76
2011	32	8.06	0.30	41.66	67.73	0.18	0.93
2012	18	4.53	0.43	23.04	60.23	0.32	0.31
2013	11	2.77	0.33	35.97	41.14	0.32	0.36
2014	24	6.05	0.26	38.08	68.49	0.23	0.45
2015	39	9.82	0.27	39.21	56.75	0.21	0.54
2016	45	11.34	0.30	22.31	56.03	0.16	0.59
2017	42	10.58	0.28	26.86	54.34	0.37	0.35
2018	47	11.84	0.24	22.82	47.16	0.25	0.47
2019	45	11.34	0.37	23.8	55.47	0.33	0.44
2020	41	10.33	0.36	35.05	66.16	0.19	0.76
Total/ Median	**397**	**100.00**	**0.31**	**28.41**	**57.46**	**0.25**	**0.55**

When it comes to environmental performance and CO_2 emissions intensity, on the one hand, one might expect an upward trend for EPS, due to increased focus and pressure on EP in recent years. While on the other hand, one might expect a gradually decreasing trend for CO_2 intensities because of improved efficiency in business processes. However, for both cases the descriptive statistics do not indicate this to be the case. Which can be explained by the randomness of the data since the statistics vary widely based on the industry representation each year. In addition to other factors that play a role on CO_2 emissions intensities as is further explained in section 4.4b. While EP is compared relative to industry peers, hence there are always companies scoring better than others.

Table 5 presents the summary statistics on a total of 16 control variables and the 4 variables of interest used to construct the regression variables for the model as is further explained in section 4.2. The average bid premium is 33.2% with a standard deviation of 27%, which is consistent with previous research (Jensen & Ruback, 1983; Betton et al., 2008; Gomes & Marsat, 2018). Although the target companies' average EPS of 34.49 is below the reported average of 45.30 by Gomes and Marsat (2018), while the acquirers EPS is above their average with a value of 51.91. This difference in average EPS can be explained by their use of a different database, namely ASSET4, different sample period and the inclusion of both acquirer and target EPS data in this study. Overall, the control variable statistics portray normal values in line with expectations and previous literature (Betton et al., 2008; Gomes & Marsat, 2018). Except for the average deal size of around $7bn with a standard deviation of $12.7bn and a median of $2.6bn, which is quite substantial compared to traditional M&A literature (Alexandridis, Mavrovitis & Travlos, 2012; Yilmaz & Tanyeri, 2016). This is also explained by the inclusion of both acquirer and target EPS, since larger companies tend to report ESG information more often.

Table 5: Summary statistics

Variables	Mean	Median	SD	Min	p25	p75	Max	N
Bid premium	0.33	0.31	0.27	-0.40	0.15	0.46	1.45	397
Target EPS	34.49	28.41	25.48	0.19	13.40	52.26	98.76	397
Acquirer EPS	51.91	57.46	28.60	0	27.83	76.55	97.66	397
CO_2 intensity	0.62	0.25	1.06	0	0.03	0.66	5.73	397
Acquirer CO_2 intensity	1.41	0.55	1.65	0	0.24	2.32	11.53	397
Deal size	14.80	14.87	1.48	10.50	13.95	15.72	18.25	397
Size	14.77	14.85	1.38	9.88	13.83	15.61	18.83	397
Acquirer size	16.36	16.35	1.58	11.83	15.21	17.49	21.35	397
Market-to-Book	3.07	2.04	3.30	0.18	1.31	3.31	24.26	397
Liquidity	2.10	1.52	1.65	0.24	1.05	2.38	8.66	397
Return-on-Equity	0.09	0.10	0.24	-0.81	0.02	0.17	1.54	397
Runup	0.07	0.07	0.18	-0.69	-0.02	0.16	1.06	397
Growth	0.09	0.05	0.20	-0.48	-0.01	0.13	1.58	397
Leverage	0.27	0.26	0.19	0	0.14	0.39	0.92	397
Acquirer leverage	0.27	0.25	0.16	0	0.15	0.36	0.87	397
CAPEX	0.09	0.04	0.12	0	0.02	0.11	0.52	397
Dividend yield	0.02	0.01	0.02	0	0	0.03	0.17	397
Cross-Border	0.44	0	0.50	0	0	1	1	397
Competing	0.08	0	0.27	0	0	0	1	397
Cash	0.46	0	0.50	0	0	1	1	397
Horizontal	0.70	1	0.46	0	0	1	1	397
Regression variables								
TQEP	1.91	2	1.01	1	1	3	4	397
AQEP	2.63	3	1.11	1	2	4	4	397
TCO_2EP	3.22	4	0.99	1	3	4	4	397
ACO_2EP	3.04	3	0.76	1	3	4	4	397

For the regression variables, it is interesting to point out that the mean acquirer AEP of 2.63 indicates that acquirers have 'good' EP on averages. While targets have 'satisfactory' EP on average. Hence, the summary statistics indicate that acquirers often have better EP than target companies. Which might indicate that green M&A is not used by acquirers to improve their EP as was stated by Salvi et al. (2018). Whether this is the case will be shown by the empirical tests presented in section 5. The statistics on the target and acquirer CO_2EP indicate that, on average, the sample companies score better than 75% of their industry peers. This can again be explained by the constraint that only companies that have data available on EP and estimated CO_2 emissions are included in the sample. Lastly, target CO_2EP proves to be mildy better than acquirer CO_2EP, which could indicate a small tendency by acquirers to buy companies with better CO_2EP. Which is again tested in section 5. In Appendix A, descriptive statistics tables are displayed that show the variables of interest after converting of underlying environmental pillar scores and CO_2 intensities into the regression variables.

4. Methodology

4.1 Introduction

In this section I present the methodology used to answer my research question by testing the hypotheses as formulated in section 2. Section 4.2 introduces the Multiple Linear Regression model used to test the independent variables; this model is constructed using numerous variables identified by previous literature as having an impact on bid premiums. Section 4.3 describes how the dependent variable is calculated, i.e., the bid premium. While section 4.4, introduces the independent variables and explains how these have been constructed per hypothesis. Section 4.5 presents the selection of the control variables, followed by an explanation of the rationale behind each variable and its expected effect on the bid premium. While section 4.6 addresses the potential influence of fixed effects on the model.

4.2 Multiple Linear Regression Model

To test the hypotheses formulated in section 2, I analyze the sample data using a multiple linear regression model. In multiple linear regression analysis, the independent variables of the regression are analyzed in relation to the dependent variable, using the minimum differences between the variables. In this thesis, I study the effect of EP and levels of CO_2EP on bid premiums. To test these regression variables, a general prediction model for bid premiums is constructed using control variables identified by previous literature to influence bid premiums:

$$\gamma_{i,t} = \beta_1 \delta_{i,t} + \beta_2 \rho_{i,t} + \beta_3 \rho_{i,t} + \beta_4 \tau_{i,t-1} + \beta_5 \tau_{i,t-1} + \beta_6 \tau_{i,t-1} + \beta_7 \tau_{i,t-1} + \beta_8 \tau_{i,t-1} + \beta_9 \tau_{i,t-1} + \beta_{10} \tau_{i,t-1} + \beta_{11} \tau_{i,t-1} + \beta_{12} \alpha_{i,t-1,} + \beta_{13} \alpha_{i,t-1} + \beta_{14} \varphi_{i,t} + \beta_{15} \varphi_{i,t} + \beta_{16} \varphi_{i,t} + \beta_{17} \varphi_{i,t} + \beta_{18} \xi_i + \beta_{19} \xi_i + \beta_{20} \xi_i + \varepsilon_{i,t} \quad (1)$$

Where γ is the bid premium for company *i* in year of announcement *t* and δ is the variable of interested as further explained in section 4.4. With deal-specific variables ρ, Acquirer-specific variables α, target-specific variables τ and transaction-related dummy variables φ. An in-depth motivation for these control variables is presented in section 4.5. Lastly, I include variables for fixed effects ξ, for country, industry, and year, as is discussed in section 4.6. While the control variable model is constant for all models, the inclusion of industry fixed effects can vary as is discussed in section 5.3.

4.3 Bid premiums

The absolute bid premium is the delta between the offer price on the target company's shareholders shares and the share price 42-trading days prior to the takeover announcement (Betton, Eckbo, & Thorburn, 2009; Gomes & Marsat, 2018). This two-month period is used to account for any takeover rumors that could distort the target company's share price. However, absolute bid premiums are of little use when comparing bid premiums of different deals with each other, therefor the relative bid premiums γ are calculated:

$$\gamma = \frac{O_t - P_{t-42}}{P_{t-42}} \tag{2}$$

With offer price O_t and P_{t-42} is the capital actions adjusted stock price of the target company with *t* being the day of the takeover announcement.

4.4 Independent variables

The main objective of this thesis is to answer the research questions on whether there is evidence for a bid greenium and if there is also evidence that indicates acquirers are pursuing sustainable strategies. To answer these questions, I first establish a comprehensive understanding on the relationship between EP and bid premiums. Secondly, I test the effect of a company's industry and year adjusted CO_2EP on bid premiums. Afterwards, I test the combination of target's EP and increasing CO_2EP acquisitions using an interaction term to identify any existing interaction between the two variables.

4.4a Environmental performance

To answer the first research question, I begin by testing the effect of EP on bid premiums. There are different approaches on how to group regression data to test its relation to the dependent variable, in this case the data is divided into 4-quartiles based on the score range used by Refinitiv. Companies with an EPS ranging from 0 to 25 are qualified as having a poor EP and insufficient degree of transparency in their reporting (Refinitiv, 2021). While companies with an EPS between 75 and 100 are qualified as having an excellent EP and a high degree of transparency (Refinitiv, 2021). Based on their EPS, the companies are assigned to a quartile using the following methodology:

$$QEP = \begin{cases} 1 \; if \quad\quad EPS \leq 25 \\ 2 \; if \; 25 > EPS \leq 50 \\ 3 \; if \; 50 > EPS \leq 75 \\ 4 \; if \; 75 > EPS \end{cases} \tag{3}$$

Where QEP is a company's EP quartile ranging from 1 to 4 and EPS is a company's environmental pillar score ranging from 0 to 100. Using the Targets Environmental Performance Quartile (TQEP), I first test the effect of TQEP on bid premiums, using the following regression model:

$$\boldsymbol{H1}: \gamma_{i,t} = \beta_1 TQ\text{EP}_{i,t} + \beta_2\rho_{i,t} + \beta_3\rho_{i,t} + \beta_4\tau_{i,t-1} + \beta_5\tau_{i,t-1} + \beta_6\tau_{i,t-1} + \beta_7\tau_{i,t-1} + \beta_8\tau_{i,t-1} + \beta_9\tau_{i,t-1} + \beta_{10}\tau_{i,t-1} + \beta_{11}\tau_{i,t-1} + \beta_{12}\alpha_{i,t-1,} + \beta_{13}\alpha_{i,t-1} + \beta_{14}\varphi_{i,t} + \beta_{15}\varphi_{i,t} + \beta_{16}\varphi_{i,t} + \beta_{17}\varphi_{i,t} + \beta_{18}\xi_i + \beta_{19}\xi_i + \beta_{20}\xi_i + \varepsilon_{i,t} \tag{4}$$

Secondly, I investigate what role the difference between target and acquirer QEP has regarding bid premiums. Hence, I look at the effect of increasing and decreasing EP acquisitions under the second hypothesis by testing a dummy variable. I first test the effect for increasing or decreasing EP acquisitions using the following dummy variables:

EP increasing acquisition: Dummy turns $\begin{cases} 1 \; if \; \text{TEP} > \text{AEP} \\ 0 \; if \; otherwise \end{cases}$ For regression model:

$$\textbf{H2a}: \gamma_{i,t} = \beta_1 \text{EP increasing acq.}_{i,t} + \beta_2\rho_{i,t} + \beta_3\rho_{i,t} + \beta_4\tau_{i,t-1} + \beta_5\tau_{i,t-1} + \beta_6\tau_{i,t-1} + \beta_7\tau_{i,t-1} + \beta_8\tau_{i,t-1} + \beta_9\tau_{i,t-1} + \beta_{10}\tau_{i,t-1} + \beta_{11}\tau_{i,t-1} + \beta_{12}\alpha_{i,t-1,} + \beta_{13}\alpha_{i,t-1} + \beta_{14}\varphi_{i,t} + \beta_{15}\varphi_{i,t} + \beta_{16}\varphi_{i,t} + \beta_{17}\varphi_{i,t} + \beta_{18}\xi_i + \beta_{19}\xi_i + \beta_{20}\xi_i + \varepsilon_{i,t} \tag{5}$$

EP decreasing acquisition: Dummy turns $\begin{cases} 1 \; if \text{ TEP} < \text{ AEP} \\ 0 \; if \; otherwise \end{cases}$ For regression model:

H2b: $\gamma_{i,t} = \beta_1 \text{EP decreasing acq.}_{i,t} + \beta_2 \rho_{i,t} + \beta_3 \rho_{i,t} + \beta_4 \tau_{i,t-1} + \beta_5 \tau_{i,t-1} + \beta_6 \tau_{i,t-1} + \beta_7 \tau_{i,t-1} + \beta_8 \tau_{i,t-1} + \beta_9 \tau_{i,t-1} + \beta_{10} \tau_{i,t-1} + \beta_{11} \tau_{i,t-1} + \beta_{12} \alpha_{i,t-1,} + \beta_{13} \alpha_{i,t-1} + \beta_{14} \varphi_{i,t} + \beta_{15} \varphi_{i,t} + \beta_{16} \varphi_{i,t} + \beta_{17} \varphi_{i,t} + \beta_{18} \xi_i + \beta_{19} \xi_i + \beta_{20} \xi_i + \varepsilon_{i,t}$ (6)

Additionally, I test whether a quartile EP increasing or decreasing acquisitions effects bid premiums. By comparing the results on both hypotheses, I can examine whether the effect becomes more severe if the acquisition is not just increasing or decreasing, but strongly increasing or decreasing with a quartile Δ, this is tested using the following dummy variables:

QEP increasing acquisition: Dummy turns $\begin{cases} 1 \; if \; TQEP - AQEP \geq 1 \\ 0 \; if \; otherwise \end{cases}$ For regression model:

H3a: $\gamma_{i,t} = \beta_1 \text{QEP increasing acq.}_{i,t} + \beta_2 \rho_{i,t} + \beta_3 \rho_{i,t} + \beta_4 \tau_{i,t-1} + \beta_5 \tau_{i,t-1} + \beta_6 \tau_{i,t-1} + \beta_7 \tau_{i,t-1} + \beta_8 \tau_{i,t-1} + \beta_9 \tau_{i,t-1} + \beta_{10} \tau_{i,t-1} + \beta_{11} \tau_{i,t-1} + \beta_{12} \alpha_{i,t-1,} + \beta_{13} \alpha_{i,t-1} + \beta_{14} \varphi_{i,t} + \beta_{15} \varphi_{i,t} + \beta_{16} \varphi_{i,t} + \beta_{17} \varphi_{i,t} + \beta_{18} \xi_i + \beta_{19} \xi_i + \beta_{20} \xi_i + \varepsilon_{i,t}$ (7)

QEP decreasing acquisition: Dummy turns $\begin{cases} 1 \; if \; TQEP - AQEP \leq -1 \\ 0 \; if \; otherwise \end{cases}$ For regression model:

H3b: $\gamma_{i,t} = \beta_1 \text{QEP decreasing acq.}_{i,t} + \beta_2 \rho_{i,t} + \beta_3 \rho_{i,t} + \beta_4 \tau_{i,t-1} + \beta_5 \tau_{i,t-1} + \beta_6 \tau_{i,t-1} + \beta_7 \tau_{i,t-1} + \beta_8 \tau_{i,t-1} + \beta_9 \tau_{i,t-1} + \beta_{10} \tau_{i,t-1} + \beta_{11} \tau_{i,t-1} + \beta_{12} \alpha_{i,t-1,} + \beta_{13} \alpha_{i,t-1} + \beta_{14} \varphi_{i,t} + \beta_{15} \varphi_{i,t} + \beta_{16} \varphi_{i,t} + \beta_{17} \varphi_{i,t} + \beta_{18} \xi_i + \beta_{19} \xi_i + \beta_{20} \xi_i + \varepsilon_{i,t}$ (8)

4.4b CO_2 emissions performance

Firstly, to effectively compare companies' CO_2 emissions, I normalize estimated CO_2 emissions in tonnes by sales in millions of USD to calculate a company's level of CO_2 intensity (Alessi et al., 2020). Since this metric allows for better comparison between companies independent of their size. A company's CO_2 intensity (CI) is calculated in the following manner:

$$CI_{t-1,i} = \frac{CE_{t-1,t}}{S_{t-1,i}} \tag{9}$$

Where CE is accounts for estimated CO_2 emissions in tonnes and S for sales in millions of USD in year of announcement *t* for company *i*.

A direct analysis of a company's CO_2 emissions intensity while controlling for industry fixed effects would enable me to test the relative performance of a company compared to its industry peers present in the sample. However, I am interested in a broader relative comparison of a company's CO_2 emissions intensity compared to the industry as a whole and not just sample companies. However, such a variable does not yet exist, but can be used to assess a company's absolute CO_2 emissions performance. Therefore, I develop a new quartile system that enables me to compare a company's CO_2 intensity with the aggregated CO2 intensities in a given industry in the relevant year. To construct these performance quartiles, a control sample consisting of CO_2 intensities for 9,938 companies is retrieved from DataStream, sample companies are excluded from the control group. The control sample contains data on levels of estimated CO_2 intensities for each year between 2005 and 2020 for control group companies in every TRBC TR3[6] industry that is represented in the sample. Effectively creating industry control groups that consists of around 100-300 industry peers and are thus an accurate representation of the CO_2 intensity distributions for each industry. Target and acquirer CO_2 intensities are then compared with the CO_2 intensities

[6] The Refinitiv Business Classification System (TRBC), Industry Group Classification (TR3).

of their industry peers based on their TRBC TR3 classification, to see how these companies compare to the rest of the industry.

Besides adjusting for industry related differences, I also control for yearly differences. Since an industry's distribution of CO_2 intensities can vary greatly over time. Which can be a result of improved efficiency or innovations of production processes. In addition, price swings can have a significant effect on CO_2 intensities, because CO_2 intensities are calculated by taking a company's CO_2 emissions normalized by sales. For example, decreasing prices have an adverse effect on revenue. But when sales volume is held constant, the level of CO_2 emissions remains the same, hence a company's CO_2 intensity will increase due the same amount of CO_2 emissions divided by the lower sales income. In my self-constructed quartile system, I account for such effects by comparing a company's CO2 intensities with the industry CO_2 intensities distribution for the corresponding year. Using the control industry distribution, I classify each sample company in the corresponding quartile, as displayed in figure 2.

Figure 2: Oil & Gas in 2010

TRBC industry classification: 501020

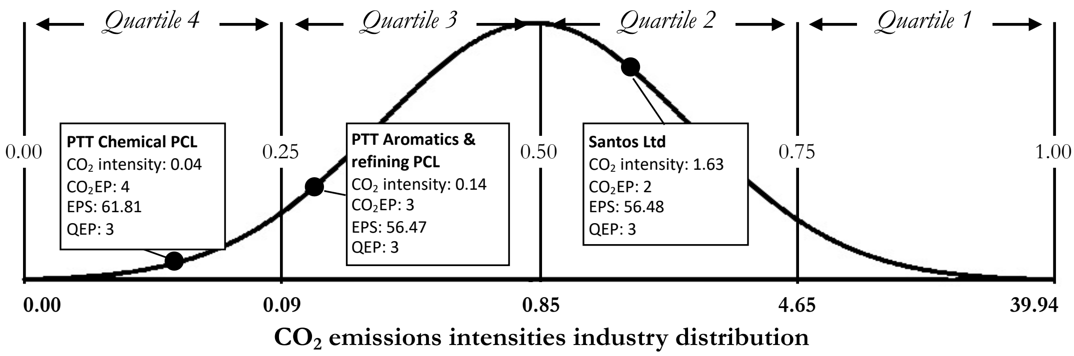

Figure 2 presents the CO_2 emissions intensity distribution for the Oil & Gas industry in 2010. Based on their TRBC TR3 codes, I compare target and acquirer companies with their industry peers. With a CO_2 emissions intensity of 0.04, PTT Chemical PCL has a lower CO2 emissions intensity than more than 75% of its industry peers. Hence, this company is classified in the 4^{th} quartile, which in this thesis is regarded as having excellent CO_2EP. While Santos Ltd has a higher

CO_2 emissions intensity (1.63) than more than 50% of the industry peers, but lower than the 25% companies with the highest CO_2 emission intensities. Hence, Santos Ltd is classified in the 2nd quartile. It is interesting to point out that all three of the companies presented in figure 2 have an environmental performance rating between 50 and 75. Thus, based on this rating, the companies are all regarded as having 'good' EP, while comparing on CO_2EP indicates otherwise. The quartile classification values range from one to four and are assigned in the following manner:

$$CO_2EP_{i,1-t} = \begin{cases} 1\ if \quad TCI_{i,1-t} \geq 0.75 \cdot CGCI_{i,1-t} \\ 2\ if\ 0.75 \cdot CGCI_{i,1-t} > TCI_{i,1-t} \geq 0.5 \cdot CGCI_{i,1-t} \\ 3\ if\ 0.50 \cdot CGCI_{i,1-t} > TCI_{i,t} \geq 0.25 \cdot CGCI_{i,1-t} \\ 4\ if\ 0.25 \cdot CGCI_{i,1-t} > TCI_{i,1-t} \end{cases} \quad (10)$$

Where CO_2EP is a company's CO_2 emissions performance quartile based on the performance of their industry peers *i* in year *t*. While Target CO_2 emissions intensity (TCI) is used to assess how a company performs compared to its Control Group CO_2 emission intensities (CGCI). With this variable I test the effect of a target's CO_2EP on bid premiums using the following regression model:

H4: $\gamma_{i,t} = \beta_1 TCO_2EP_{i,t} + \beta_2\rho_{i,t} + \beta_3\rho_{i,t} + \beta_4\tau_{i,t-1} + \beta_5\tau_{i,t-1} + \beta_6\tau_{i,t-1} + \beta_7\tau_{i,t-1} + \beta_8\tau_{i,t-1} + \beta_9\tau_{i,t-1} + \beta_{10}\tau_{i,t-1} + \beta_{11}\tau_{i,t-1} + \beta_{12}\alpha_{i,t-1,} + \beta_{13}\alpha_{i,t-1} + \beta_{14}\varphi_{i,t} + \beta_{15}\varphi_{i,t} + \beta_{16}\varphi_{i,t} + \beta_{17}\varphi_{i,t} + \beta_{18}\xi_i + \beta_{19}\xi_i + \beta_{20}\xi_i + \varepsilon_{i,t}$ (11)

The result of this test will indicate whether acquirers include a target's CO_2 emissions, compared to that of their industry peers in the relevant year, in their investment decision. Additionally, I am interested in understanding whether acquirers are willing to pay for increasing CO_2EP acquisition or whether they attempt to negotiate a discount for decreasing CO_2EP. I examine these effects using the following dummy variables:

CO_2EP increasing acquisition: Dummy turns $\begin{cases} 1\ if\ \mathrm{CO2EP} > \mathrm{ACO2EP} \\ 0\ if\ otherwise \end{cases}$ For regression model:

$\boldsymbol{H5a}$: $\gamma_{i,t} = \beta_1 \text{CO}_2\text{EP increasing acq.}_{i,t} + \beta_2 \rho_{i,t} + \beta_3 \rho_{i,t} + \beta_4 \tau_{i,t-1} + \beta_5 \tau_{i,t-1} + \beta_6 \tau_{i,t-1} + \beta_7 \tau_{i,t-1} + \beta_8 \tau_{i,t-1} + \beta_9 \tau_{i,t-1} + \beta_{10} \tau_{i,t-1} + \beta_{11} \tau_{i,t-1} + \beta_{12} \alpha_{i,t-1,} + \beta_{13} \alpha_{i,t-1} + \beta_{14} \varphi_{i,t} + \beta_{15} \varphi_{i,t} + \beta_{16} \varphi_{i,t} + \beta_{17} \varphi_{i,t} + \beta_{18} \xi_i + \beta_{19} \xi_i + \beta_{20} \xi_i + \varepsilon_{i,t}$ (12)

CO_2EP decreasing acquisition: Dummy turns $\begin{cases} 1 \; if \; \text{TCO2EP} < \text{ACO2EP} \\ 0 \; if \; otherwise \end{cases}$ For regression model:

$\boldsymbol{H5b}$: $\gamma_{i,t} = \beta_1 CO_2\text{EP decreasing acq.}_{i,t} + \beta_2 \rho_{i,t} + \beta_3 \rho_{i,t} + \beta_4 \tau_{i,t-1} + \beta_5 \tau_{i,t-1} + \beta_6 \tau_{i,t-1} + \beta_7 \tau_{i,t-1} + \beta_8 \tau_{i,t-1} + \beta_9 \tau_{i,t-1} + \beta_{10} \tau_{i,t-1} + \beta_{11} \tau_{i,t-1} + \beta_{12} \alpha_{i,t-1,} + \beta_{13} \alpha_{i,t-1} + \beta_{14} \varphi_{i,t} + \beta_{15} \varphi_{i,t} + \beta_{16} \varphi_{i,t} + \beta_{17} \varphi_{i,t} + \beta_{18} \xi_i + \beta_{19} \xi_i + \beta_{20} \xi_i + \varepsilon_{i,t}$ (13)

Although the construction of the CO_2EP system can be interpreted as a bit cumbersome. I believe it is necessary to gain a better understanding of whether acquirers value good industry adjusted CO_2EP, while it also enables me to compare CO_2EP for non-horizontal acquisitions.

4.4c Environmental performance and CO_2 emissions performance

With hypotheses 1 to 3, I extensively test the effect of a target's environmental performance and increasing or decreasing environmental performance acquisitions on bid premiums. To be able to answer the question on the acquirer' motives behind paying a greenium. While under hypotheses 4 & 5, I test the effect of a target's CO_2 emissions performance and increasing or decreasing CO_2 emissions performance on bid premiums. To gain an understanding of whether acquirers are actively pursuing more sustainable strategies by engaging in green M&A, to decrease their level of pollution. While, with the final hypothesis, I aim to understand whether the value of environmental performance is related to a target's level of pollution. Which is examined by testing the interaction between target EP and increasing CO_2EP acquisitions, here for I include the following interaction term in the regression model:

$\boldsymbol{H6}$: $\gamma_{i,t} = \beta_2 TQEP_{i,t} + \beta_2 CO_2\text{EP increasing acq.}_{i,t} + \beta_3 TQEP_{i,t} \times CO_2\text{EP increasing acq.}_{i,t} + \beta_4 \rho_{i,t} + \beta_5 \rho_{i,t} + \beta_6 \tau_{i,t-1} + \beta_7 \tau_{i,t-1} + \beta_8 \tau_{i,t-1} + \beta_9 \tau_{i,t-1} + \beta_{10} \tau_{i,t-1} + \beta_{11} \tau_{i,t-1} + \beta_{12} \tau_{i,t-1} + \beta_{13} \tau_{i,t-1} + \beta_{14} \alpha_{i,t-1,} + \beta_{15} \alpha_{i,t-1} + \beta_{16} \varphi_{i,t} + \beta_{17} \varphi_{i,t} + \beta_{18} \varphi_{i,t} + \beta_{19} \varphi_{i,t} + \beta_{20} \xi_i + \beta_{21} \xi_i + \beta_{22} \xi_i + \varepsilon_{i,t}$ (14)

4.5 Control variables

The MLR-model used to test the effect of the independent variables, is constructed using a manifold of control variables. In this section the selection of control variables is presented, which are motivated by previous literature on the determinants of bid premiums. In most cases, the target company's annual report in the year prior to announcement is the last publicly available information on the target's financial situation and thus used by the acquirer to formulate a takeover offer. Therefore, all non-deal specific values for the control variables are taken in the year prior to the takeover announcement, in case of missing values the data is taken in the year of the takeover announcement. An overview table of the control variables, method of calculation and source and is presented in Appendix B.

4.5a Deal related variables

Deal size (+/-): According to Alexandridis et al. (2012), larger deals tend to be more complex and riskier, therefore they find deal size to have a negative effect on bid premiums. While Harford and Li (2007) find that top executives may pay higher premiums for large deals because such deals often result in high private benefits for the executives, hence the sign can go both ways.

Runup (+): Previous literature (Betton et al., 2008b; Gomes & Marsat, 2018) finds a significantly positive relation between target runup and bid premium. Which can be explained by Schwert's (1996) markup hypothesis, suggesting that bidding companies increase their initial bid based on the price increases prior to the announcement date.

4.5b Target-specific variables

Target size (-): Incorporation costs tend to be less for smaller companies, enabling synergy effects to occur more early on (Díaz et al., 2009). Therefore, it is expected that acquiring companies pay smaller bid premiums for larger target companies.

Market-to-Book (-): Low MTB ratios are interpreted as a sign of bad management and missed investment opportunities, providing ample synergy opportunities (Nathan, 1988). While low MTB can also be a sign of undervaluation according to Walkling and Edmister (1985), both rationales suggest a negative sign for MTB.

Liquidity (+/-): Higher liquidity indicates greater financial health of a company, hence improving its negotiation position (Dionne et al., 2015). However, it can also indicate a lack of investment opportunities or higher level of risk, thus the sign can go both ways.

Return-on-Equity (-): Acquiring companies are expected to prefer undervalued and poorly managed target companies, since there is ample of room to improve efficiency (Walkling & Edmister, 1985). Hence, I expect acquirers to prefer targets with lower return-on-equity.

Growth (-): On the one hand, companies that have experienced higher growth rates in the 3-years prior to the announcement are expected to be better managed and thus there are less synergies to be obtained from a change in management. On the other hand, high growth companies are associated with a better financial health, which results in a better negotiation position (Dionne et al., 2015).

Target leverage (-): A company's leverage ratio is expected to be negatively associated with bid premiums according to results by Walkling and Edmister (1985). Since lower levels of target company debt are desired because they provide the acquiring company with additional tax shield benefits and debt-capacity. Enabling the acquiring company to take advantage of future investment opportunities. (Rampini & Viswanathan, 2010).

CapEx (-): A more CapEx intensive company is expected to be less desirable by an acquiring company compared to a low CapEx company. Because of the higher level of investments needed to operate the business, which reduces free cash flow.

Dividend yield (-): The payment of dividends can be interpreted as a sign that the company lacks interesting investment opportunities and therefor distributes the earnings to its shareholders. This can have an adverse effect on a company's outlook and thus results in a negative sign.

4.5c Acquirer-specific variables

Acquirer size (+): Larger companies are regarded as less risky and subsequently they can attract higher levels of external financing to finance the acquisition. Additionally, larger companies are likely to be more experienced in M&A, suggesting a higher capability to capture synergies (Moeller, Schlingemann, & Stulz, 2004).

Acquirer leverage (-): Acquiring companies with high leverage have less financial capacity to pay high bid premiums (Jaggi & Dorata, 2006). Additionally, shareholders are likely to be more stringent on the actions taken by management, which has an adverse effect on its ability to pay high premiums.

4.5d Dummy variables

Cross-border (+): According to Mateev and Andonov (2018), target companies in cross-border acquisitions receive higher takeover premiums based on variations in corporate governance structures, hence I expect a positive sign for the dummy variable for cross-border acquisitions.

Competition (+): Based on the winner's curse hypothesis (Thaler, 1988), increased competition is expected to have a positive effect on bid-premiums. Since the successful bidders tends to be the company that most overestimates the target's value.

Cash (+): According to Wansley, Lane, and Yang (1983) there is a relationship between the type of payment and the bid premium. Therefore, I include a dummy variable with an expected positive sign for all-cash offers, since shareholders demand a higher bid premium for cash offers due to immediate taxation, while capital gains on equity payments can be deferred.

Horizontal (+): Horizontal takeovers are expected to result in greater synergies, in the form of bargaining power or overlapping activities that can be merged and managed more efficiently.

4.6 Fixed effects

In financial literature, it is common practice to include fixed effects variables in a regression model. Fixed effects enable researchers to control for all variables that vary over the cross-sectional units but are constant over time (Stock & Watson, 2008). In financial literature, country, industry, and year fixed effects are commonly included in a regression model. To accurately examine the relationship between a variable of interest and the bid premium, it is also important to consider the inclusion of fixed effects. Because there can be differences in relation to the height of bid premiums between different countries, years, or industries. In this section, I discuss the potential for including fixed effects into the regression model. While the decision to include or not include such effects in the model is addressed in section 5.

Firstly, Li and Haleblian (2021) found that bid premiums are country-related since acquirers tend to consider prior premium decisions of industry peers in the same country, when formulating a takeover offer. To account for these effects, country fixed effects can be included, denoted as the target company's country of incorporation. Secondly, data can be distorted by the effect of yearly shocks. Since one could expect financial markets to operate differently during highly stressed periods, for example during the financial -or COVID-19 pandemic. Such effects can be accounted for by inclusion of year fixed effects using the year of announcement to denote the period. Thirdly, Strat and Zekiri (2019) found that high-tech target companies received higher bid premiums compared to companies in other industries, hence there are also differences between industries. Such affects can be accounted for using industry fixed effects. Normally, target companies' primary-SIC codes are used to include industry-fixed effects. However, in this study I use target companies TRBC TR3 codes to account for these effects. Since this classification system is also used to adjust for industry characteristics by Refinitiv in the construction of the EP and hence for the development of the CO_2EP measure. The total industries included in the sample are the same for SIC-codes and TRBC TR3 codes, although some companies are classified in a different industry.

5. Results

5.1 Introduction

In this section, I discuss and interpret the results of the hypotheses, followed by a battery of robustness checks. In section 5.2., the validity of the regression model is tested using the Gauss Markov assumptions. While different model setups are tested in section 5.3, followed by the presentation and interpretation of the results. Afterwards, the results are checked for robustness in section 5.4.

5.2 Validity of the regression model

The validity of the regression models is tested using the Gauss Markov assumptions (Beck, 2008):

- Linearity: The variables used in the model are linear
- Random: The data is randomly sampled from the population
- Multicollinearity: The independent variables are not perfectly correlated
- Exogeneity: No significant correlations between the variables and the error term
- Homoscedasticity: The error of the variance is constant, independent of the variables' values

All independent variables have a weak linear relationship with the dependent variable, i.e., bid premiums, as is shown in Appendix D.1. While the data collection and selection criteria presented in section 3.3 meet the random selection assumption. The residuals are tested for autocorrelation using the Durbin-Watson test and the results confirm that there is no sign of autocorrelation. This result confirms that all variables are random and independent with Durbin-Watson values close to 2 as is shown in Appendix D.2. Cook's d values are well below 1 and even below 0.1, with a maximum result of 0.081, hence there are no significant cases influencing the model. While the values for the Variance Inflation Factor (VIF) are all well below the cut-off value of 10, except for some values of the interaction terms as is shown in Appendix D.3. The collinearity for the interaction terms is as expected and does not pose any problems for the interpretation of the results. Additionally, correlations between variables are all below 0.8, except for the correlation between deal size and target size as is shown in Appendix D.4. However, this correlation is as expected since both variables are a subset of the highly similar variable (Engel, 2019). In Appendix D.2, the results on the Breusch-Pagan test are presented. For all models, the prob>χ^2 values are <0.05, hence the null hypothesis is rejected. I conclude that there is evidence for heteroscedasticity in the residuals of the model as can also be noticed in the residuals vs. Fitted plot presented in appendix D.5. This result indicates unequal variances for the sample and possess a serious issue for the validity of my results. To deal with this problem, I use heteroscedasticity-robust standard errors for all models in line with the methodology proposed by Stock and Watson (2008). Furthermore, the inclusion of robust standard errors is achieved by using fixed effects models, hence potential risks of exogeneity are mitigated and thus do not pose a problem in this paper (Brooks, 2019).

5.3 Hypothesis testing

The main objective of this thesis is to provide an answer to the following two main research questions:

1: "Is there evidence for a greenium in the M&A market, controlled for risks of reputation greenwashing behavior?"

2: "Are acquirers of 'green' companies actively pursuing more sustainable strategies?"

To find an answer on both questions, I first formulated two subsets of hypotheses, one specifically related to EP and bid premiums, while the other focusses on the relation between CO_2EP and bid premiums. Lastly, I combine both sets of hypotheses to examine whether is any interaction between EP and CO_2EP increasing acquisitions. In this section, I present the results on the hypotheses tests. To begin, the results on the Breusch-Pagan test showed evidence for heteroscedasticity, hence I include robust standard errors in the model to mitigate these risks using fixed effects. The inclusion of fixed effects allows for comparison of observations within groups and the different fixed effects that might be applicable for this thesis are discussed in section 4.6.

5.3a Regression model

For the hypotheses testing, I constructed 3 different sets of regression models. The first model was constructed using only country-fixed effects. The second model builds on this model and additionally controls for year-fixed effects. While the third model controls for the complete panel of fixed effects by also including industry fixed effects. Before I examine the results of the hypotheses tests, I first interpret the results of the control model. Additionally, I motivate which model I find most applicable for the hypotheses testing.

Table 6 presents the results of the regression models for control variables only. Due to the inclusion of fixed effects, the Within R-squared is used to interpret how well the model predicts the variability in the dependent variable, namely bid premiums. However, in this case, it is more sensible to interpret the adjusted within R-squared since the R-squared has the tendency to increase with every variable added. The values for the adjusted within R-squared show that the models explain between 42.2% and 45.6% of the variance of bid premiums. Which is substantially higher than the 22.1% that is explained by the model of Gomes and Marsat (2018). The results on the F-tests show that all models are significant predictors the bid premium at p-value <0.01. Although the F-test value for the third model indicates that the predictive value of the model substantially declines after inclusion of industry fixed effects. Which can be related to the relatively low number of observations (N=123). Due to the substantial number of excluded observations because of singletons[7]. While the large number of singletons can be explained by the relatively large sample period in addition to an absence of any exclusions of geography or industries, except for financial companies. Due to the relatively low number of observations for model 3, some variables show

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[7] An observation is regarded as singleton in case it is the only observation within its group.

extreme results that should logically be identified as outliers in this model. Hence, model 3 shows not to be a reliable model for the hypothesis tests. While the results for models 1 & 2 are more comparable to each other, in addition to having a useable sample size with N > 300.

Although exclusion of industry fixed effects poses a problem to the reliability of the results. This risk of misinterpretation is limited for the variables of interest. Since the performance on EP and CO_2EP is already controlled for industry variation based on their industry TR3 codes. On the one hand, a company's environmental performance is analyzed by Refinitiv based on numerous general measures, but also on 68-industry specific benchmarked measures. While on the other hand, CO_2EP is assessed by comparing a company's CO_2 intensities to that of its industry peers. Additionally, both variables are also controlled for yearly effects, since Refinitiv assesses companies EP on a yearly basis. While CO_2EP is compared with CO_2 emission intensities in the year of observation. Hence, both variables of interest are to some extent robust to industry and yearly shocks. Therefore, I tested my hypotheses using the first model, which only controls for country fixed effects. Although results should be considered with caution because the control variables are not controlled for industry and yearly shocks. However, the relatively minor differences between the results for the models 1 & 2 indicate that this does not

Table 6: Control model VARIABLES	(1) **Control**	(2) **Control**	(3) **Control**
Deal size	0.058***	0.063***	0.053
Runup	0.749***	0.710***	0.762***
Target size	-0.102***	-0.108***	-0.103
Market-to-Book	0.001	0.005	0.013
Liquidity	0.009	0.005	-0.003
Return-on-Equity	-0.013	-0.040	-0.139
Growth	-0.019	-0.040	-0.056
Target leverage	0.070	0.057	0.053
CapEx	-0.122	-0.194*	-0.379
Dividend yield	0.090	0.063	0.925
Acquirer size	0.015	0.019*	0.019
Acquirer leverage	-0.116	-0.075	-0.107
Cross border	-0.026	0.005	-0.015
Competition	0.067	0.072	0.044
Cash	0.062**	0.026	-0.002
Horizontal	0.026	0.028	0.037
Constant	0.641***	0.592***	0.697**
Observations	391	312	123
Country fixed effects	Yes	Yes	Yes
Year fixed effects	No	Yes	Yes
Industry fixed effects	No	No	Yes
Within R-squared	0.456	0.490	0.549
Adjusted within R-squared	0.431	0.456	0.422
F test	17.26	13.17	3.590
Prob>F	0.000	0.000	0.000

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

pose a serious issue, although it should still be considered. In Appendix E, the complete output tables including robust standard errors are presented in addition to tables in which only the variables of interested are regressed with bid premiums for all setups.

Before I test the hypotheses using model 1, I first provide an interpretation of the results for the control variables. The adjusted within R-squared indicates that 43.1% of the variance of bid premiums is explained by model 1. While the model is a significant predictor of bid premiums based on the F-test result (17.26) and its corresponding p-value < 0.01 (p=0.000). The results on the control variables are generally in line with previous research, except for the target's Market-to-Book value, Leverage, Dividend yield and Cross border. However, all these variables do not have a significant effect on the bid premiums. Nevertheless, it is interesting to understand these differences. Market-to-Book value is to some extent associated with expectations about a company's outlook, hence it could be the case that acquirers in my sample were more willing to pay a premium for future growth than acquirers in samples used by previous studies. Such a phenomenon can be related to the sample selection, since the sample only contains companies that report on environmental performance, which is commonly associated with long-term risks. This potentially indicates that sample acquirers are more long-term oriented compared to acquirers in other samples. The result on leverage can be explained in a similar manner, because high leverage could indicate that target companies have invested large sums of money in future growth. If acquirers believe that these investments are accompanied by future increase of cashflows from these projects, a higher offer price should be appropriate. Additionally, a negative sign for dividend yield was expected since high dividend paying companies are expected to have less investment - and hence growth opportunities. A possible interpretation for the positive sign can be that high dividend paying companies generate stable free cash flows that are valuable to acquirers. Lastly, the negative result for cross-border acquisitions was unexpected based on results of previous literature (Mateev & Andonov, 2018; Gomes & Marsat, 2018). Although the effect is insignificant, the negative sign can potentially be explained by increased risk for cross-border acquisitions or by the quality of the corporate governance system of the acquirer's home country (Mateev and Andonov, 2018).

Additionally, the control variables Deal size, Runup, Target size and cash proof to be significant determinants of bid premiums for my sample and the results are all in line with expectations. A one-unit increase of standard deviation for Deal size increases bid premiums by 8.6%. While a one-unit increase of standard deviation for Runup results in a 13.5% higher bid premium, which confirms Schwert's (1996) markup hypothesis. Suggesting that bidding companies increase their initial bid based on the price increase prior to the announcement date. The result on target size indicates that an increase of one-unit standard deviation results in a -14.1% lower bid premium. Additionally, all-cash deals have a positive effect of 3.1% on bid premiums. Lastly, CapEx is a significant determinant for most of the CO_2EP regression models. Which can be explained by the relationship between investments in emissions reduction projects and capital expenditures (Saka & Oshika, 2012).

5.3b Environmental performance

In this section I provide an answer to the first research question on whether there is evidence for a greenium in the M&A market, controlled for risks of reputation greenwashing behavior. Which is tested using the first subset of hypotheses:

H1: A target company's environmental performance positively effects bid premiums.

H2a: Environmental performance increasing acquisitions have a positive effect on bid premiums.

H2b: Environmental performance decreasing acquisitions have a negative effect on bid premiums.

H3a: A ≥ quartile EP improving acquisition has a positive effect on bid premiums.

H3b: A ≥ quartile EP decreasing acquisition has a negative effect on bid premiums.

Table 7 presents the results on the first subset of hypotheses tests. The models explain between 42.9% and 43.6% of the variance as is shown by the adjusted within R-squared values, while the < 0.01 p-values for the F-test shows that all models are significant predictors of bid premiums, which is the case for all models presented in this section. Lastly, the inclusion of the country fixed effects results in 391 testable observations, the six absent observations are explained by the six countries in which only one deal occurred during the sample period, as can be seen in Appendix A.

Table 7: Environmental performance	(2)	(3)	(4)	(5)	(6)
VARIABLES	**H1**	**H2a**	**H2b**	**H3a**	**H3b**
TQEP	0.026**				
EP increasing		0.024			
EP decreasing			-0.025		
QEP increasing				0.037	
QEP decreasing					-0.006
Deal size	0.057***	0.057***	0.057***	0.057***	0.058***
Runup	0.748***	0.750***	0.749***	0.753***	0.749***
Target size	-0.109***	-0.103***	-0.103***	-0.103***	-0.102***
Market-to-Book	0.001	0.001	0.001	0.001	0.001
Liquidity	0.008	0.009	0.009	0.009	0.009
Return-on-Equity	-0.013	-0.016	-0.017	-0.014	-0.013
Growth	-0.012	-0.017	-0.016	-0.015	-0.019
Target leverage	0.063	0.072	0.072	0.069	0.070
CapEx	-0.129	-0.127	-0.127	-0.122	-0.123
Dividend yield	0.030	0.101	0.103	0.089	0.086
Acquirer size	0.015	0.018	0.018	0.017	0.015
Acquirer leverage	-0.113	-0.120	-0.120	-0.119	-0.117
Cross border	-0.030	-0.025	-0.025	-0.025	-0.025
Competition	0.063	0.067	0.067	0.068	0.067
Cash	0.061**	0.062**	0.062**	0.060**	0.062**
Horizontal	0.027	0.027	0.027	0.027	0.026
Constant	0.709***	0.619***	0.642***	0.635***	0.640***
Observations	391	391	391	391	391
Country fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects	No	No	No	No	No
Industry fixed effects	No	No	No	No	No
Within R-squared	0.462	0.457	0.457	0.458	0.456
Adjusted within R-squared	0.436	0.431	0.431	0.431	0.429
F test	16.71	16.86	16.89	16.55	16.30
Prob>F	0.000	0.000	0.000	0.000	0.000

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

Under my first hypothesis, I tested the effect of a target company's EP on bid premiums and find a positive result of 2.6% for each unit-standard deviation increase of a target company's environmental pillar score. Although less substantial, the result is in line with the results of Gomes and Marsat (2018), who found a 4.5% increase for each standard deviation unit-increase. Although in their sample, a standard deviation increase denoted a pillar score increase of 29.4, which is higher than the 25.48 pillar score increase for my sample. Nevertheless, the result indicates that 'good' target EP is generally valued by acquirers and confirms the first hypothesis. While the non-significant results for hypotheses 2 & 3 provide an answer to the question of Salvi et al. (2018) and indicate that there is no proof for EP green washing behavior by acquirers, therefore hypotheses 2 & 3 are rejected. However, although the results are not significant, the positive values for EP increasing acquisitions and negative for EP decreasing acquisitions are in line with expectations.

Testing the first subset of hypotheses regarding environmental performance shows that EP is generally valued by acquirers, independent of the acquirer's level of EP. The results on hypotheses 2a & 3b indicate that there is no evidence for any reputation green washing behavior. Additionally, the results on hypotheses 2b &3b show no proof for the statement by Gomes and Marsat (2018) that acquirers are actively using bad environmental performance as a lever to negotiate a discount. However, the significant result on the TQEP should be considered with caution since the result does not hold after controlling for year fixed effects and even changes sign when controlling for industry fixed effects.

5.3c CO_2 emissions performance

In this section I examine the relation between CO_2EP and bid premiums, which is an essential runup for answering the second research question in section 5.3c. To study the effect of CO_2EP on bid premiums, I tested the following subset of hypotheses:

H4: A target company's CO_2EP positively effects bid premiums.
H5a: A CO_2EP increasing acquisition has a positive effect on bid premiums.
H5b: A CO_2EP decreasing acquisitions has a negative effect on bid premiums.

Table 8 presents the results on the second subset of hypotheses. The result on target CO_2 emissions performance (TCO2EP) show that there is no proof for a significant effect of CO_2EP on bid premiums. Hence the result indicates that acquirers do not value a target's CO_2EP in general. Which could indicate that carbon offsetting[8] does also play a role in the investment decision (Saka & Oshika, 2012), a factor that has not been included in this thesis.

The results for hypotheses 5a & 5b are interesting. Since, on the one hand, acquirers do not significantly value increasing CO_2EP targets, hence hypothesis 5a is rejected. Which shows that there is no proof of acquirers paying additional bid premiums for CO_2EP increasing acquisitions. Although a positive relation was expected based on the statement of Lu (2021) that acquirers are actively seeking to reduce their level of pollution through green M&A. While, on the other hand, the significant result for CO_2EP decreasing acquisitions indicates that acquirers do incorporate TCO_2EP in their investment decision for decreasing CO_2EP acquisitions. Hence the results confirm hypothesis 5b and suggest that acquirers are using CO_2EP as a lever to negotiate a discount in case their CO_2EP is better than the target's. Since acquirers offer -6.3% lower bid premiums for CO_2EP decreasing targets.

[8] Carbon offsetting is the process of compensating for CO_2 emissions by anticipating in CO_2 emission trading schemes (Guardian, 2011).

Table 8: CO_2 emissions performance	(7)	(8)	(9)
VARIABLES	**H4**	**H5a**	**H5b**
TCO_2EP	0.016		
CO_2EP increasing		0.030	
CO_2EP decreasing			-0.063**
Deal size	0.059***	0.059***	0.063***
Runup	0.748***	0.750***	0.746***
Target size	-0.103***	-0.101***	-0.105***
Market-to-Book	0.002	0.001	0.002
Liquidity	0.008	0.007	0.008
Return-on-Equity	-0.010	-0.011	-0.012
Growth	-0.018	-0.024	-0.014
Target leverage	0.062	0.063	0.050
CapEx	-0.159*	-0.160*	-0.176*
Dividend yield	0.032	0.048	-0.021
Acquirer size	0.015	0.015	0.016
Acquirer leverage	-0.111	-0.111	-0.104
Cross border	-0.028	-0.029	-0.031
Competition	0.067	0.065	0.068
Cash	0.062**	0.061**	0.059**
Horizontal	0.023	0.024	0.022
Constant	0.590***	0.615***	0.628***
Observations	391	391	391
Country fixed effects	Yes	Yes	Yes
Year fixed effects	No	No	No
Industry fixed effects	No	No	No
Within R-squared	0.458	0.458	0.465
Adjusted within R-squared	0.432	0.432	0.439
F test	16.36	16.41	16.38
Prob>F	0.000	0.000	0.000

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

The results on the second subset of hypotheses show that CO_2EP is not generally valued by acquirers. Additionally, there is no indication that acquirers increase their bids for CO_2EP increasing acquisitions. These results suggest that acquirers are not actively engaging in green M&A to decrease their own pollution level. Although this result should be considered with caution because a significant positive effect for CO_2EP increasing acquisitions does present itself after controlling for year and industry fixed effects. Additionally, TCO_2EP in general also shows to be significant after controlling for year and industry fixed effects. Which could indicate that CO_2EP becomes more relevant when deals are compared on a more specific in-group basis.

Although hypothesis 4 & 5a are rejected based on the outcome of the tests for the country fixed effects model, the results on CO_2EP decreasing acquisitions are especially interesting. Since this result is present in all model setups. When controlled for year and industry fixed effects, the result even shows a negative effect on bid premiums of -11.9% for CO_2EP decreasing acquisitions. Indicating that acquirers discount target companies that decrease their CO_2EP.

5.3d Environmental performance and CO_2 emissions performance

After testing the first and second subset of hypotheses on EP and CO_2EP, I have established sufficient understanding of both variables to examine the second research question. On whether acquirers of green companies are actively pursuing sustainable strategies. Which I tested using an interaction term under the final hypothesis:

H6: There is positive interaction between a target's EP and increasing CO_2EP acquisitions.

Before interpreting the results on the interaction term, some additional explanation is needed on what is at display. Using the interaction term, I tested whether there is any interaction between target's environmental performance and CO_2EP increasing acquisitions. Thus, do acquirers that consider environmental performance in their investment decision, also include whether the acquisition will improve their CO_2EP. Because TQEP is a quartile variable with values ranging from 1 to 4 and while the dummy variable for CO_2EP increasing acquisitions takes values of 0 or 1. Table 9 first displays the result for the CO_2EP dummy variable and afterwards the individual results for each quartile of TQEP are shown. Lastly, the interaction term shows the interaction for each quartile of TQEP when the acquisition is CO_2EP increasing.

The results show that the there is no evidence for any interaction between EP and CO_2EP increasing acquisitions, hence the last hypothesis is rejected, and the second research question is answered. There is no indication of a shift towards a more sustainable strategy by acquirers of greener companies. This result is without ambiguity since the outcome remains the same after including year and industry fixed effects. However, the individual significant result on the 3rd quartile EP performance is interesting. Since companies ranking in the 3rd quartile (EPS: 50 to 75) are classified by Refinitiv as having 'good' EP. Thus, the result shows that acquirers significantly value 'good' EP targets and are paying 7.4% higher bid premiums for such companies. But again, this result should be interpreted with caution since it does not hold after controlling for year and industry fixed effects.

Table 9 VARIABLES	(10) **H6**
CO_2EP increasing	0.017
(2) TQEP	0.022
(3) TQEP	0.074**
(4) TQEP	0.028
(2) TQEP × CO_2EP inc.	0.009
(3) TQEP × CO_2EP inc.	0.016
(4) TQEP × CO_2EP inc.	0.043
Deal size	0.057***
Runup	0.747***
Target size	-0.107***
Market-to-Book	0.002
Liquidity	0.008
Return-on-Equity	-0.015
Growth	-0.018
Target leverage	0.053
CapEx	-0.162
Dividend yield	-0.054
Acquirer size	0.015
Acquirer leverage	-0.109
Cross border	-0.035
Competition	0.058
Cash	0.057*
Horizontal	0.028
Constant	0.711***
Observations	391
Country fixed effects	Yes
Year fixed effects	No
Industry fixed effects	No
Within R-squared	0.468
Adjusted within R-squared	0.432
F test	13.10
Prob>F	0.000

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

5.4 Robustness checks

In this section I discuss the robustness checks that I performed to identify any outliers and biases present in the sample. The different models are presented in Appendix F.

Firstly, the results proved to be robust to winsorizing at the 0.01, 0.025 and 0.05 level as is shown in Appendix F.1 to F.3. These results show that there is no substantial effect of outliers in the sample data. Secondly, I tested my results on any geographical biases, I had preferred to test the difference between developed and developing countries. However, based on the Human Development Index classification for developed countries, the group of developing countries was limited to only 26 observations. Which would be too small of a group to show results with any empirical value, while I did not want to decide upon an arbitrary cut-off point. Hence, I tested the impact of geographical effects on the data by dividing the deals into three groups based on their county of incorporation. Namely, United States, European Union, and Rest of the world.

The results of these tests provide interesting insights on the geographical influence on the effect of EP and CO_2EP on bid premiums. Since the results for the United States show that EP in general is not a significant determinant of bid premiums. This result indicates that acquirers do not value EP of targets incorporated in the United States. Additionally, the results show a highly significant -9.8% lower premium for decreasing CO_2EP acquisitions. This is in stark contrast with the results for the European Union, where acquirers are paying highly significant additional premiums of up to 10.9% for a unit-increase of standard deviation in EP. While EP increasing or decreasing acquisitions result in a mildy significant increase or decrease of 17.5% and -17.5% respectively, on the bid premium. Suggesting that risk of reputation greenwashing behavior might be present in the European green M&A market. Which can be explained by the rising pressure on EP through the deployment of EU taxonomy for sustainable activities[9]. It is interesting to point out that CO_2

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[9] The EU taxonomy for sustainable activities, is a classification system that classifies which investments are environmentally sustainable, in the context of the European Green Deal (EC, 2020).

emissions do not play a significant role in the investment decisions regarding EU targets. This can be explained by the large number of CO_2 emissions trading schemes that are already operational in the EU. Which could further indicate that carbon offsetting[10] does also play a role in the investment decision (Saka & Oshika, 2012), a factor that has not been included in this thesis. However, the results should be interpreted with caution due to the relatively small sample size (N=83). Lastly, the results for the rest of the world show no significant influence for any of the variables of interest. Indicating that EP nor CO_2EP is included in the acquirer's investment decision. Hence, the results on the geographical robustness tests show that environmental performance and CO_2 emissions performance is only a significant determinant of bid premiums for target's incorporated in the United States and the EU. While for targets in the rest of the world, these factors do not proof to be relevant during the investment decision. This statement is supported by the high proportional availability of environmental performance scores for the United States and EU, as is shown in the EPS geographical distribution of Refinitiv in Appendix C. Which indicates that EP is regarded to a lesser extend in other geographical areas.

Thirdly, I tested the results on any time biases, I divided the sample into two groups. Here for I used the signing of the Paris Agreement[11], on 12 December 2015, as the cut-off point. Hence, I compared the sample for the group of deals that occurred pre-Paris agreement with the group of post-Paris agreement deals. This is especially interesting since the Paris agreement is a legally binding international treaty, which obligates countries to act against climate change. On the one hand, the results of the robustness tests for the first group show that there was no significant effect of EP on bid premiums in the first period, except for a significantly positive effect for quartile-decreasing EP acquisitions. Which indicates that, at the time, acquirers regarded EP as a liability

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[10] Carbon offsetting is the process of compensating for CO_2 emissions by anticipating in CO_2 emission trading schemes (Guardian, 2011).

[11] The 2015-Paris agreement is a legally binding international treaty on climate change that was adopted by 196 countries at COP 21 in Paris on 12 December 2015 and the agreement entered into force on 04/11/2016 (UNFCCC, 2022).

rather than an additional value driver. This can be explained by the relative lack of relevance for environmental performance at the time. It could further indicate that acquirers discounted companies with good EP because the conception was that EP resulted in additional investments without corresponding financial rewards. On the other hand, CO_2EP decreasing acquisitions resulted in a significant negative result on bid premiums of 8.8%. which can be explained by the rising discussions on the introduction of CO_2 emissions trading schemes that would adversely affect earnings. While for the group of post-Paris agreement deals, the perception of EP seems to have shifted. Since for this period, EP is significantly valued by acquirers in general. Whilst the result for decreasing EP acquisitions becomes negative and increasing EP acquisitions have a positive effect, which are both in line with my expectations. Although not significant, it is still of interest to point out the differences between both groups on the perception of EP. Lastly, the effect of CO_2EP decreasing acquisitions is no longer a significant determinant for bid premiums after the signing of the Paris agreement. This can again be explained by any carbon offsetting activities by target companies for which I did not account in this thesis.

The results on EP and CO_2EP prove to be robust in different setups, although some variation remains through the different set ups, which is further discussed in section 6.3. In an optimal situation, I would also have tested on industry biases since I expect differences to be present between industries. However, due to the limited number of observations in some industries, I was not able to test these differences between industries. But, as discussed in section 5.3, industry and year biases were incorporated in the construction of variables of interest, while the analyses have been executed as carefully as possible. Yet the interpretation of the results as discussed in section 5.4 should be interpreted with caution, because they are not controlled for year and industry fixed effects.

6. Conclusion, limitations, and recommendations

6.1 Introduction

In this thesis I attempted to answer two questions. Firstly, whether there is empirical evidence for a greenium in the M&A market, controlled for risks of greenwashing. Secondly, whether acquirers of 'green' companies are also actively pursuing more sustainable strategies. In this section I provide an answer to both questions by concluding on the hypotheses results in section 6.2. While in section 6.3, I address limitations to this paper, followed by recommendations for further research in section 6.4.

6.2 Conclusion

To answer the first research question, I did an in-depth analysis of EP and its relation to bid premiums. On this subset of hypotheses, I conclude that there is evidence for a bid greenium since acquirers increase their bid by 2.6% for each unit-increase of standard deviation. However, the greenium does not hold after controlling for year and industry effects. Although the Refinitiv's assessment process of a company's EP, does to some extent control for these effects by performing yearly assessments of EP that are partially based on industry-specific measures. This result should still be considered with caution. Additionally, I tested whether there is evidence for reputation greenwashing behavior by acquirers. Hereon, I conclude that this is not the case. Since the results do not indicate that acquirers with 'bad' EP are inclined to pay an additional premium for targets with 'good' EP. While for EP, the results contradict the statement by Gomes and Marsat (2018) that acquirers are using CSR as a lever in negotiating a discount. Since a significant result on EP decreasing acquisitions remains absent. These results can be interpreted without ambiguity since they hold after controlling for year and industry effects.

To conclude, the results on the first set of hypotheses related to EP, show that acquirers value EP in general and that there is no indication of reputation greenwashing behavior. Hence, the existence of a bid greenium, controlled for risks of greenwashing is confirmed. Because acquirers are willing to accept a lower return on their investment in exchange for reduced exposure to climate risk. However, the greenium should be considered with caution, as previously discussed.

To answer the second research question, I first gained a deeper understanding of the relation between companies' levels of pollution and bid premiums. Here for, I used a self-constructed variable, namely CO_2EP, as a proxy for a company's level of pollution compared to its industry peers. This measure assesses a company's CO_2 emissions performance by comparing its CO_2 intensity to the CO_2 intensities distribution of the corresponding industry control group in the relevant year. The hypotheses tests for this variable showed interesting results. Firstly, CO_2EP is not generally valued by acquirers, while there is no significant effect for CO_2EP increasing acquisitions either. However, the significantly negative result on the dummy variable for CO_2EP decreasing acquisitions proof that acquirers do indeed incorporate CO_2EP in their investment decision. The result holds after controlling for year and industry fixed effects, resulting in a negative effect on bid premiums of -7.1% and -11.9% after controlling for year fixed effects, the latter result even proves to be highly significant.

For the second subset of hypotheses, I conclude that acquirers do consider CO_2EP in their investment decision. But that there is no proof that acquirers include this measure because they want to reduce their own level of pollution. Rather, the results indicate that acquirers with 'good' CO_2EP use this to negotiate a discount for targets with worse CO_2EP. Which can suggest that acquirers do take the risks of stranded assets seriously (Bos & Gupta, 2019). Another explanation can be that acquirers discount future investments in CO_2 emissions reduction, which adversely affect future cash flows (Saka & Oshika).

After gaining a deeper understanding between companies' CO_2EP and bid premiums. I can answer the second research question with the results on the interaction term. The results show that there is no significant interaction between EP and decreasing CO_2EP acquisitions. Hence, I conclude that there is no evidence that indicates acquirers of 'green' companies are actively pursuing sustainable strategies. The results presented in this paper indicate that acquirers consider EP and CO_2EP separately. While the motivation of acquirers behind paying a greenium seems to be solemnly justified by reduced information asymmetry -and exposure to climate risks, in line with the results of Gomes and Marsat (2018). These results further suggest that acquirers do consider climate risks, although they a not inclined to reduce their own levels of pollution, at least not through engagement in green M&A.

6.2 Limitations

In this section I address limitations to this thesis, which mainly reside in the data collection due to limited availability of data on EP and CO_2 emissions and subsequently the analysis of the hypothesis's tests. Additionally, the decision to include a self-constructed variable further complicated things.

Firstly, the decision to examine EP and CO_2 emissions combined resulted in numerous difficulties. Since the data availability on both variables is severely limited, especially in the context of M&A which is often a one-off event. While the inclusion of acquirer EP and CO_2EP had an additional adverse effect on the number of available observations. Which severely limited the sample size and obliged me to substantially broaden the sample scope to international deals over a 15-year period. This resulted in numerous singletons after controlling for country, year, and industry fixed effects. Due to the large variation in number of observations and F-test value between the three setups, the results should be considered with caution.

Secondly, a major limitation lies with the neglect of consideration of any potential participation in CO_2 emission schemes by the sample companies. Although the estimated amount of CO_2 emissions is not influenced by such activities, a company's net level of pollution does change. Additionally, Saka and Oshika (2012) found that their results changed after including participation in emissions trading schemes and concluded that investors do take such activities into account. Hence, the neglect of participation in such schemes can be regarded as a severe limitation.

Thirdly, the decision to include a self-constructed variable in the analysis may result in difficult replication and interpretation of the results. Although I believe that this measure was needed to assess a company's absolute CO2 emissions performance compared to industry peers. In hindsight, company CO_2 intensities controlled for industry, year and industry fixed effects might have been sufficient. Although this would not have solved the problem of the limited number of observations, it would have simplified the interpretation of the results.

6.3 Recommendations

In this thesis, I examined two topics that have largely been unaddressed by previous literature. Namely, the risk of greenwashing -and the role of CO_2 emissions in M&A. Therefore, this thesis provides ample recommendations for further research.

Firstly, I recommend analysis of the two topics separately, which will substantially increase the number of available observations for each topic. Since I believe both topics are interesting on their own. For example, the results of the robustness tests showed that it can be interesting to study EP and the influence of EP increasing and decreasing acquisitions for a specific geography. Ideally by comparing between the U.S. and EU because the results seem to differ quite a lot and the data availability on these two geographies is relatively good. The same goes for the examination of the relationship between CO_2 emissions and bid premiums in these geographies.

Secondly, as the results of the robustness tests indicated, it is interesting to study the difference in results between observations pre -and post-Paris agreement. Since the signing of this legally binding agreement obliged countries to act on climate change. With the long-term goal for most countries of becoming climate-neutral by 2050. This aspiration implies that companies will also be obliged by governments to reduce their pollution levels. While the results in this thesis did not indicate that there is evidence that such a shift is already materializing in the green M&A market. I expect a shift in acquirer behavior to be forthcoming when environmental performance and CO_2 emissions are further being monetized.

Lastly, scope-3 emissions were not included in the data analysis due to limited data availability. However, the pressure on mandatory reporting of scope-3 emissions has risen in recent years. Hence, when the data becomes available, there will be numerous of highly interesting research topics to explore. Additionally, I would recommend stand-alone research on the relation between CO_2 emissions and bid premiums, while controlling for participation in CO_2 emissions trading schemes. Lastly, research can be performed on the emergence of CO_2 emission trading schemes and the monetization of CO_2 emissions, which will result in a shift for investments in CO_2 reductions from liability to asset.

7. Bibliography

Alessi, L., Ossola, E., & Panzica, R. (2020). The Greenium matters: greenhouse gas emissions, environmental disclosures, and stock prices (No. 418).

Alexandridis, G., Mavrovitis, C. F., & Travlos, N. G. (2012). How have M&As changed? Evidence from the sixth merger wave. The European Journal of Finance, 18(8), 663-688.

Arouri, M., Gomes, M., & Pukthuanthong, K. (2019). Corporate social responsibility and M&A uncertainty. Journal of Corporate Finance, 56, 176-198.

Beck, N. (2008). Time-series-cross-section methods. Oxford handbook of political methodology, 475-93.

Berg, F., Koelbel, J., and Rigobon, R., 2020, Aggregate confusion: the divergence of ESG.

Bettinazzi, E. L., & Zollo, M. (2017). Stakeholder orientation and acquisition performance. Strategic Management Journal, 38(12), 2465-2485.

Betton, S., Eckbo, B. E., & Thorburn, K. S. (2008a). Corporate takeovers. Handbook of empirical corporate finance, 291-429.

Bolton, P., & Kacperczyk, M. T. (2020). Carbon premium around the world.

Bos, K., & Gupta, J. (2019). Stranded assets and stranded resources: Implications for climate change mitigation and global sustainable development. *Energy Research & Social Science*, *56*, 101215.

Bradley, M. (1980). Interfirm tender offers and the market for corporate control. Journal of business, 345-376.

Brooks, C. (2019). Introductory econometrics for finance. Cambridge university press.

Chan, P. T., & Walter, T. (2014). Investment performance of "environmentally-friendly" firms and their initial public offers and seasoned equity offers. Journal of Banking & Finance, 44, 177-188.

Choi, D., Gao, Z., & Jiang, W. (2020). Attention to global warming. The Review of Financial Studies, 33(3), 1112-1145.

Choi, G., Christmann, P., & Kim, T. N. (2015). Target CSR as a signal in acquisitions: Its effect on acquisition premium. In Academy of Management Proceedings (Vol. 2015, No. 1, p. 17621). Briarcliff Manor, NY 10510: Academy of Management.

Clara, S. De., et al. (2022). ICAP: Emissions trading worldwide, status report 2022. Available at: https://icapcarbonaction.com/en/?option=com_attach&task=download&id=815

Clarkson, P. M., Li, Y., & Richardson, G. D. (2004). The market valuation of environmental capital expenditures by pulp and paper companies

Cording, M., Christmann, P., & Weigelt, C. (2010). Measuring theoretically complex constructs: The case of acquisition performance. Strategic organization, 8(1), 11-41.

Currie, A. (2021). Reuters: Climate M&A will shift from risk to opportunity. Available at: https://www.reuters.com/article/us-climate-m-a-breakingviews-idDEKBN2J804C

Currie, A. (2021). Reuters: Greenwashing hostility crashes friendly gas deal. Available at: https://www.reuters.com/breakingviews/greenwashing-hostility-crashes-friendly-gas-deal-2021-09-15/

Díaz, K. B. D., Azofra, S. S., & Gutiérrez, C. L. (2009). Are M&A premiums too high? Analysis of a quadratic relationship between premiums and returns. *Quarterly Journal of Finance and Accounting*, 5-21.

Dionne, G., La Haye, M., & Bergerès, A. S. (2015). Does asymmetric information affect the premium in mergers and acquisitions?. Canadian Journal of Economics/Revue canadienne d'économique, 48(3), 819-852.

Dixon, W. J. (1960). Simplified estimation from censored normal samples. The Annals of Mathematical Statistics, 385-391.

Engel, Josephine. (2019, April 11). Does target CSR performance impact premia in M&A transactions? International Management CEMS. Retrieved from http://hdl.handle.net/2105/47501

European Commission (2022). EU Emission Trading Systems (EU ETS). Available at: https://ec.europa.eu/clima/eu-action/eu-emissions-trading-system-eu-ets_en#ecl-inpage-683

Flammer, C. (2021). Corporate green bonds. Journal of Financial Economics, 142(2), 499-516.

Friedrich, R. J. (1982). In defense of multiplicative terms in multiple regression equations. American Journal of Political Science, 797-833.

Fuller, K., Netter, J., & Stegemoller, M. (2002). What do returns to acquiring firms tell us? Evidence from firms that make many acquisitions. The journal of finance, 57(4), 1763-1793.

Gimeno, R., & Sols, F. (2020). Incorporating sustainability factors into asset management. Financial Stability Review, 39, 179-199.

Gomes, M., & Marsat, S. (2018). Does CSR impact premiums in M&A transactions?. Finance Research Letters, 26, 71-80.

Gondhalekar, V. B., Raymond Sant, R., & Ferris*, S. P. (2004). The price of corporate acquisition: determinants of cash takeover premia. Applied Economics Letters, 11(12), 735-739.

Harford, J., & Li, K. (2007). Decoupling CEO wealth and firm performance: The case of acquiring CEOs. The Journal of Finance, 62(2), 917-949.

Jaggi, B., & Dorata, N. T. (2006). Association between bid premium for corporate acquisitions and executive compensation. Journal of Accounting, Auditing & Finance, 21(4), 373-397.

Jensen, M. C., & Ruback, R. S. (1983). The market for corporate control: The scientific evidence. Journal of Financial economics, 11(1-4), 5-50.

Kapraun, J., Latino, C., Scheins, C., & Schlag, C. (2021, April). (In)-Credibly Green: Which Bonds Trade at a Green Bond Premium?. In Proceedings of Paris December 2019 Finance Meeting EUROFIDAI-ESSEC.

King, D. R., Dalton, D. R., Daily, C. M., & Covin, J. G. (2004). Meta-analyses of post-acquisition performance: Indications of unidentified moderators. Strategic management journal, 25(2), 187-200.

Klerk, D.I.C. de. (2020). Expected performance or greenwashing as a premium driver in environmental M&A. Business Economics. Retrieved from http://hdl.handle.net/2105/52996

Krueger, P., Sautner, Z., & Starks, L. T. (2020). The importance of climate risks for institutional investors. The Review of Financial Studies, 33(3), 1067-1111.

Li, C., & Haleblian, J. (2021). The influence of nation-level institutions on acquisition premiums: a cross-country comparative study. Journal of Management, 01492063211010219.

Livsey, A. (2022). Financial Times: Boom in ESG ratings levels trail of confusion. Available at: https://www.ft.com/content/c34fe314-838b-4b00-ae25-9a4f0d93f822

Lu, J. (2021). Can the green merger and acquisition strategy improve the environmental protection investment of listed company?. Environmental Impact Assessment Review, 86, 106470.

Mateev, M., & Andonov, K. (2018). Do European bidders pay more in cross-border than in domestic acquisitions? New evidence from Continental Europe and the UK. Research in International Business and Finance, 45, 529-556.

Moeller, S. B., Schlingemann, F. P., & Stulz, R. M. (2004). Firm size and the gains from acquisitions. Journal of financial economics, 73(2), 201-228.

Nathan, K. (1988). Do firms pay to pool?: Some empirical evidence. Journal of Accounting and Public Policy, 7(3), 185-200.

New York Times (1989). *Greenhouse effect: Shell anticipates a sea change.* Available at: nytimes.com/1989/12/20/business/greenhouse-effect-shell-anticipates-a-sea-change.html

Qiao, L., & Wu, J. (2019). Pay for being responsible: the effect of target firm's corporate social responsibility on cross-border acquisition premiums. *Sustainability*, *11*(5), 1291.

Rampini, A. A., & Viswanathan, S. (2010). Collateral, risk management, and the distribution of debt capacity. The Journal of Finance, 65(6), 2293-2322.

ratings. Working Paper.

Refinitiv (2021). Environmental, Social and Governance scores from Refinitiv. Available at: https://www.refinitiv.com/content/dam/marketing/en_us/documents/methodology/refinitiv-esg-scores-methodology.pdf

Saka, C., & Oshika, T. (2014). Disclosure effects, carbon emissions and corporate value. Sustainability Accounting, Management and Policy Journal.

Salvi, A., Petruzzella, F., & Giakoumelou, A. (2018). Green M&A deals and bidders' value creation: the role of sustainability in post-acquisition performance. International Business Research, 11(7), 96-105.

Schwert, G. W. (1996). Markup pricing in mergers and acquisitions. Journal of Financial economics, 41(2), 153-192.

Stock, J. H., & Watson, M. W. (2008). Heteroskedasticity-robust standard errors for fixed effects panel data regression. Econometrica, 76(1), 155-174.

Strat, M. T., & Zekiri, S. (2019). How do payment methods and other deal characteristics affect abnormal returns?-A comparison of "high-tech" versus "non-high-tech" industries in the European M&A market (Master's thesis, Handelshøyskolen BI).

Swart, J., & van Marrewijk, C. (2011). The pollution effects of mergers and acquisitions: asymmetry, disaggregation, and multilateralism.

Thaler, R. H. (1988). Anomalies: The winner's curse. Journal of economic perspectives, 2(1), 191-202.

Vermeulen, F., & Barkema, H. (2001). Learning through acquisitions. Academy of Management journal, 44(3), 457-476.

Walkling, R. A., & Edmister, R. O. (1985). Determinants of tender offer premiums. Financial Analysts Journal, 41(1), 27-37.

Wansley, J. W., Lane, W. R., & Yang, H. C. (1983). Abnormal returns to acquired firms by type of acquisition and method of payment. Financial management, 16-22.

Zollo, M., & Meier, D. (2008). What is M&A performance? Academy of management perspectives, 22(3), 55-77.

8. Appendix

Appendix A: Descriptive statistics

Appendix A.1: Descriptive statistics - All countries

Table 10

Country	**Deal count**	**Proportion (%)**	**Bid Premium**	**Target EPS**	**Acquirer EPS**	**Target CO_2 intensity**	**Acquirer CO_2 intensity**
United States	193	48.61	0.32	22.31	52.09	0.18	0.53
Australia	43	11.00	0.37	17.70	44.99	0.14	0.64
Canada	29	7.30	0.30	18.01	59.03	0.04	0.34
United Kingdom	29	7.30	0.27	42.60	59.00	0.27	0.32
France	12	3.02	0.09	53.64	58.38	0.23	0.31
Germany	9	2.27	0.41	44.08	36.55	0.28	0.30
Japan	8	2.02	0.09	81.91	64.20	0.84	0.55
Netherlands	7	1.76	0.50	51.27	60.41	0.50	0.18
Switzerland	7	1.76	0.44	46.06	65.51	0.28	0.26
Brazil	7	1.75	0.21	26.30	73.89	0.45	0.30
Spain	6	1.51	0.27	79.83	85.81	0.43	0.75
Italy	5	1.26	0.18	54.91	68.64	0.53	0.93
South Africa	5	1.26	0.49	54.33	74.23	0.51	0.80
Thailand	5	1.26	0.05	56.47	61.81	0.82	0.98
India	4	1.01	0.30	39.52	70.91	0.68	0.29
Israel	3	0.76	0.45	25.83	89.82	0.15	0.31
Norway	3	0.76	0.40	39.13	72.02	0.30	0.01
Belgium	2	0.50	0.36	37.77	83.45	0.13	0.40
Chile	2	0.50	0.15	55.98	72.26	0.28	1.19
Cyprus	2	0.50	0.33	11.84	62.59	0.02	0.27
Egypt	2	0.50	0.79	17.95	83.82	0.22	0.03
Ireland-Rep	2	0.50	0.34	44.78	77.75	0.04	0.02
Mexico	2	0.50	0.32	59.88	62.75	0.06	0.33
Poland	2	0.50	0.17	42.23	65.30	0.07	0.53
Turkey	2	0.50	-0.06	47.42	66.16	0.10	2.01
Austria	1	0.25	0.44	11.05	14.73	0.01	1.24
China	1	0.25	0.56	1.51	50.67	0.12	1.19
Russian Fed	1	0.25	1.22	4.37	88.10	0.20	0.10
Saudi Arabia	1	0.25	0.00	76.37	57.02	0.04	0.17
South Korea	1	0.25	-0.03	33.47	79.36	3.23	0.19
Sweden	1	0.25	1.04	23.70	26.91	1.21	0.05
Total/ Median	**397**	**100.00**	**0.31**	**28.41**	**57.46**	**0.25**	**0.55**

Appendix A.2: Descriptive statistics – Converted variables of interest

Table 11: Geographical distribution

Country	Deal count	Proportion (%)	Bid Premium	TQEP	AQEP	TCO_2EP	ACO_2EP
United States	193	48.61	0.32	2	3	4	3
Australia	43	11.00	0.37	1	2	4	3
Canada	29	7.30	0.30	1	3	4	3
United Kingdom	29	7.30	0.27	2	3	4	3
France	12	3.02	0.09	3	3	3.5	3
Germany	9	2.27	0.41	2	2	3	3
Japan	8	2.02	0.09	4	3	1.5	3
Netherlands	7	1.76	0.50	3	3	2	3
Switzerland	7	1.76	0.44	2	3	3	4
Brazil	7	1.75	0.21	2	3	3	3
Spain	6	1.51	0.27	4	4	4	3.5
Italy	5	1.26	0.18	3	3	4	3
South Africa	5	1.26	0.49	3	3	3	3
Thailand	5	1.26	0.05	3	3	1	3
India	4	1.01	0.30	2	3.5	1.5	3
Israel	3	0.76	0.45	2	4	2	3
Norway	3	0.76	0.40	2	3	2	4
Belgium	2	0.50	0.36	2	4	4	3.5
Chile	2	0.50	0.15	2	3.5	4	3
Cyprus	2	0.50	0.33	1	3	3.5	2.5
Egypt	2	0.50	0.79	1	4	3	4
Ireland-Rep	2	0.50	0.34	2	4	2.5	4
Mexico	2	0.50	0.32	2	3	3.5	3.5
Poland	2	0.50	0.17	2	3	4	3
Turkey	2	0.50	-0.06	2	3	4	1
Austria	1	0.25	0.44	1	1	4	3
China	1	0.25	0.56	1	3	4	2
Russian Fed	1	0.25	1.22	1	4	3	3
Saudi Arabia	1	0.25	0.00	4	3	4	3
South Korea	1	0.25	-0.03	2	4	2	2
Sweden	1	0.25	1.04	1	2	1	2
Total/ Median	**397**	**100.00**	**0.31**	**2.10**	**3.10**	**3.10**	**3.00**

Table 12: Target industry distribution

Sector	Deal count	Proportion (%)	Bid premium	TQEP	TCO_2EP
Basic Materials	63	15.87	0.33	1	4
Consumer Cyclicals	54	13.60	0.35	2	2
Consumer Non-Cyclicals	31	7.81	0.30	2	4
Energy	52	13.10	0.21	1	4
Healthcare	33	8.31	0.33	2	3
Industrials	65	16.37	0.27	2	3
Technology	68	17.13	0.37	1	3
Utilities	31	7.81	0.24	2	4
Total/ Median	**397**	**100.00**	**0.31**	**2.10**	**3.10**

Table 13: Acquirer industry distribution

Sector	Deal count	Proportion (%)	AQEP	ACO_2EP
Basic Materials	60	15.11	3	3
Consumer Cyclicals	48	12.09	2	3
Consumer Non-Cyclicals	39	9.82	4	3
Energy	51	12.85	2	3
Healthcare	36	9.07	3	4
Industrials	58	14.61	2	3
Technology	76	19.14	3	3
Utilities	29	7.30	3	3
Total / median	**397**	**100.00**	**3.10**	**3.00**

Table 14: Descriptive statistics of yearly distribution

Year	Deal count	Proportion (%)	Bid premium	TQEP	AQEP	TCO_2EP	ACO_2EP
2005	2	0.50	0.16	3.00	1	3.5	3.5
2007	4	1.01	0.27	1.00	2.5	3.5	4
2008	8	2.02	0.39	1.50	3.5	4	3.5
2009	12	3.02	0.55	2.00	3	4	3.5
2010	27	6.80	0.35	2.00	3	4	3
2011	32	8.06	0.30	2.00	3	4	3
2012	18	4.53	0.43	1.00	3	3.5	4
2013	11	2.77	0.33	2.00	2	4	3
2014	24	6.05	0.26	2.00	3	4	3
2015	39	9.82	0.27	2.00	3	4	3
2016	45	11.34	0.30	1.00	3	4	3
2017	42	10.58	0.28	2.00	3	3	3
2018	47	11.84	0.24	1.00	2	3	3
2019	45	11.34	0.37	1.00	3	3	3
2020	41	10.33	0.36	2.00	3	4	3
Total/ Median	**397**	**100.00**	**0.31**	**2.10**	**3.10**	**3.10**	**3.00**

Appendix B: Overview table – Control variables and data sources

Table 15.

Variable	Explanation	Data source	Data item
Offer price	Offer price in USD	ThomsonOne	PR
Share price Runup	Dividends and stock splits adjusted and unpadded stock price in USD at day t-42 to calculate the bid premium and at day t-1 to calculate the Runup. The runup is taken as the logarithm of the ratio of the target's share price at t-1 to the share price at t-42, with t in days.	Datastream	P#S~U$
Environmental pillar score	Environmental pillar scores in the year prior to takeover announcement.	Datastream	ENSCORE
Estimated CO_2 emissions intensity	Estimated CO_2 emissions in tonnes divided by its revenue in millions USD., in the year prior to announcement.	Datastream	ENERDP123 WC07240
Deal size	Deal value in millions of USD	ThomsonOne	VAL
Liquidity	Current ratio	Datastream	WC08106
Target leverage	Target's long-term debt to total assets in the year prior to announcement.	Datastream	WC08236
Acquirer leverage	Acquirers' long-term debt to total assets in the year prior to announcement.	Datastream	WC08236
Target Size	Logarithm of the target's market capitalization in the year prior to announcement.	Datastream	WC07210
Acquirer size	Logarithm of the acquiror's market capitalization in the year prior to announcement.	Datastream	WC07210
MTB	Common equity market value to book value of equity in the year prior to announcement.	Datastream	PTBV
ROE	Net income before extraordinary items and discontinued operations to common and preferred book equity in the year prior to announcement.	Datastream	WC08301
Growth	Average sales growth in the previous 3-year period, taken in the year prior to the announcement.	Datastream	WC08633
CapEx	Capital Expenditures taken as a percentage of total sales in the year prior to the announcement.	Datastream	DWCX
Dividend yield	Dividends paid to market value of equity in the year prior to the announcement.	Datastream	DY
Cash	Dummy variable that takes the value of 1 in case of a 100% cash takeover and 0 otherwise.	ThomsonOne	PCT_CASH
Competition	Dummy variable that turns 1 in case there is a competing bid and 0 otherwise.	ThomsonOne	COMPETE
Cross-border	Dummy variable that turns 1 when the acquirer and target are incorporated in the same country and 0 otherwise.	ThomsonOne	CROSS
Horizontal	Dummy variable that turns 1 if the target and acquirer operate in the same industry based on TRBC Industry Group (TR3) Code and 0 otherwise.	ThomsonOne	TR3

Appendix C: Refinitiv's construction of the environmental performance measure

Pillars	Categories	Themes	Data points	Weight method
Environmental pillar	**Emissions**	Emissions	TR.AnalyticCO_2	Quant industry median
		Waste	TR.AnalyticTotalWaste	Quant industry median
		Biodiversity	n.a.	n.a.
		Environmental management systems	n.a.	n.a.
	Innovation	Product innovation	TR.EnvProducts	Transparency weight
		Green revenues, R&D, CAPEX	TR.AnalyticEnvRD	Quant industry median
	Resource use	Water	TR.AnalyticWaterUse	Quant industry median
		Energy	TR.AnalyticEnergyUse	Quant industry median
		Sustainable packaging	n.a.	n.a.
		Environmental supply chain	n.a.	n.a.

Table 16: Scope of Refinitiv's environmental pillar score methodology (Refinitiv, 2021).

Score	Definition
Refinitiv ESG resource use score	The resource use score reflects a company's performance and capacity to reduce the use of materials, energy, or water, and to find more eco-friendly solutions by improving supply chain management
Refinitiv ESG emissions reduction score	The emission reduction score measures a company's commitment and effectiveness towards reducing environmental emissions in its production and operational processes.
Refinitiv ESG innovation score	The innovation score reflects a company's capacity to reduce the environmental costs and burdens for its customers, thereby creating new market opportunities through new environmental technologies and processes, or eco-designed products.

Table 17: Refinitiv's categories explained (Refinitiv, 2021).

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

Table 18: Refinitiv's scoring range table (Refinitiv, 2021).

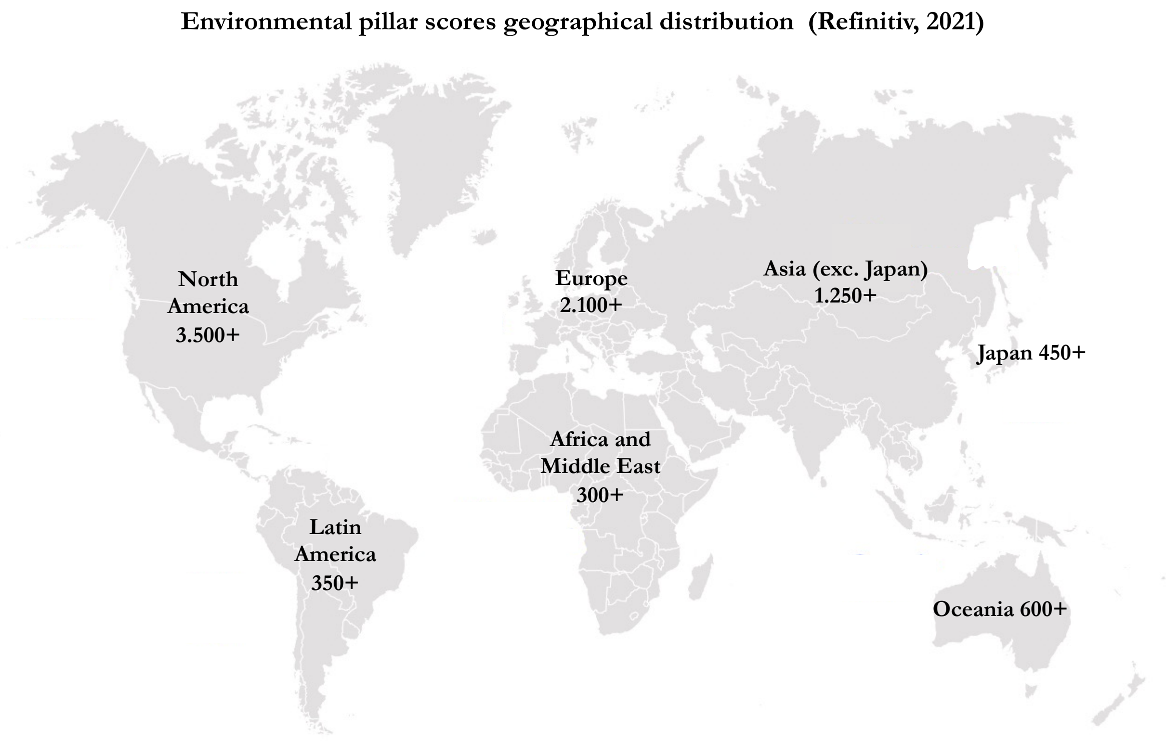
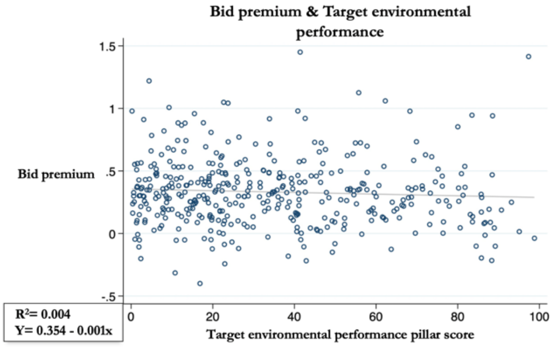
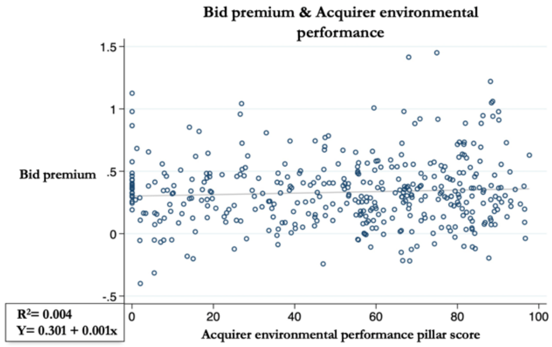


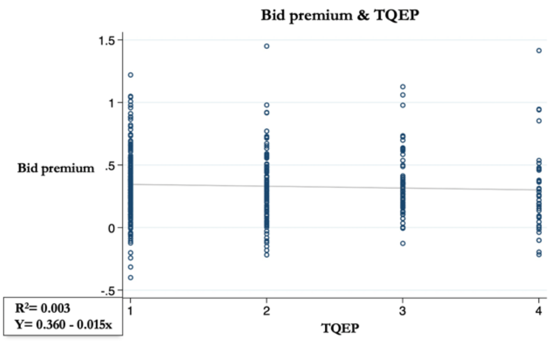
Figure 3: Geographical overview of Refinitiv's ESG ratings coverage (Refinitiv, 2021).

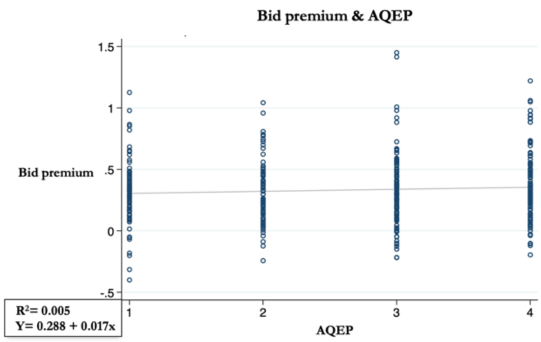
Appendix D: Testing the regression model

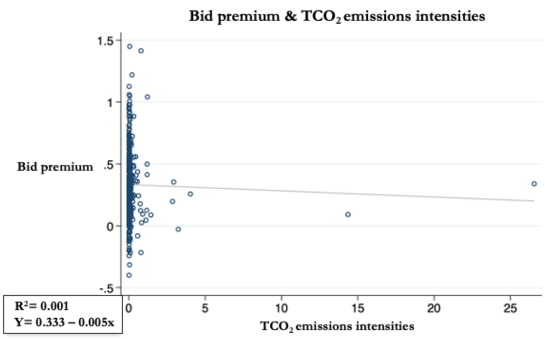
Appendix D.1: Scatterplots

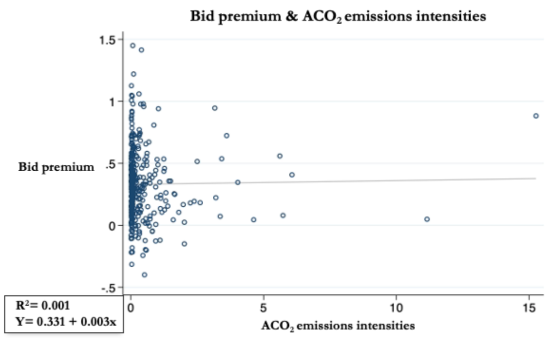


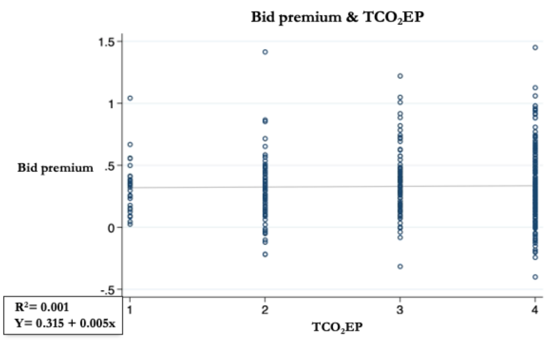


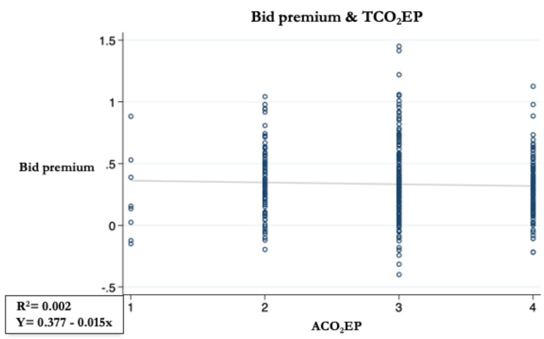


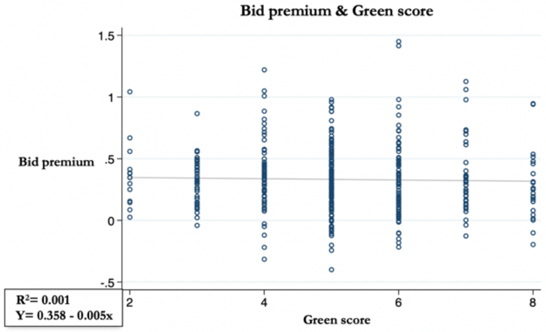


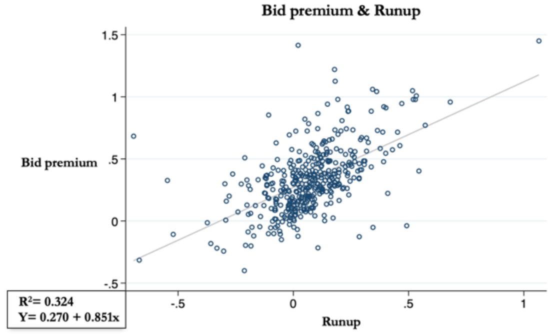


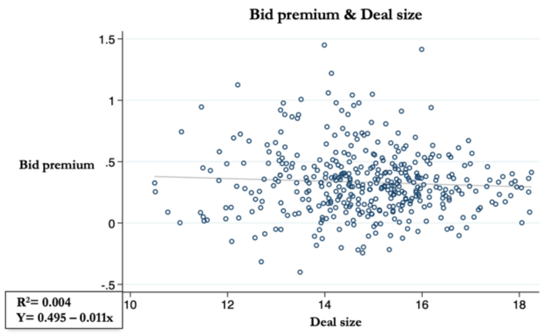




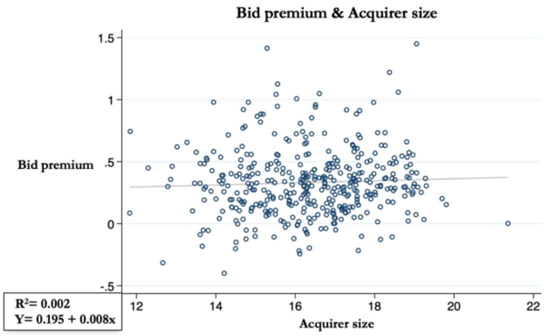


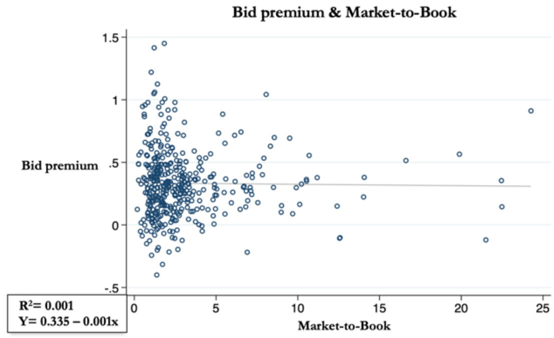

Bid premium & Green score
Bid premium
Green score
R²= 0.001
Y= 0.358 - 0.005x

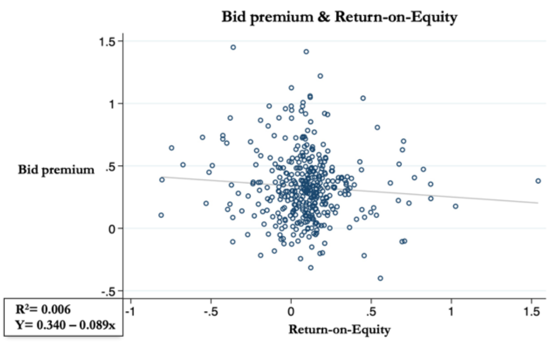

Bid premium & Runup
Bid premium
Runup
R²= 0.324
Y= 0.270 + 0.851x

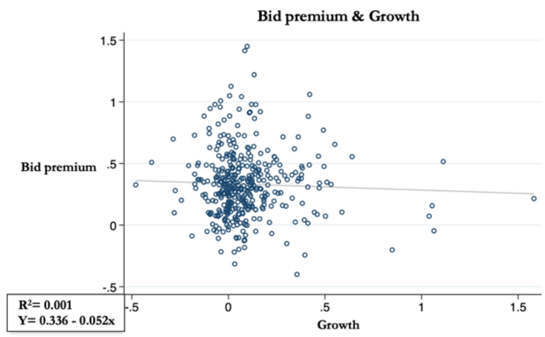

Bid premium & Deal size
Bid premium
Deal size
R²= 0.004
Y= 0.495 – 0.011x

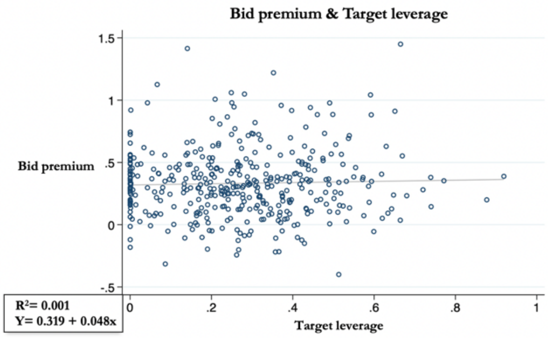

Bid premium & Target size
Bid premium
Target size
R²= 0.061
Y= 1.044 – 0.048x

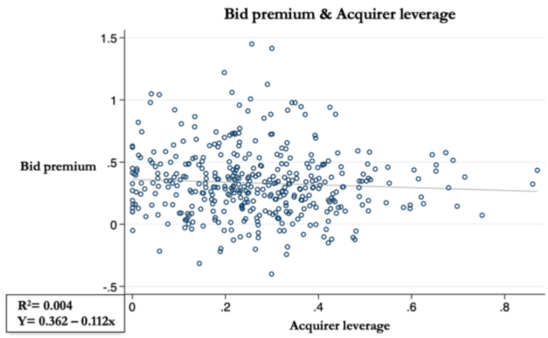

Bid premium & Acquirer size
Bid premium
Acquirer size
R²= 0.002
Y= 0.195 + 0.008x

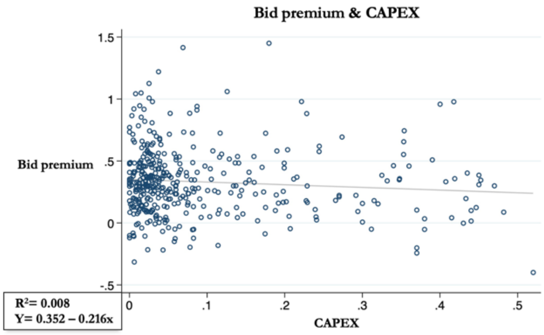

Bid premium & Market-to-Book
Bid premium
Market-to-Book
R²= 0.001
Y= 0.335 – 0.001x

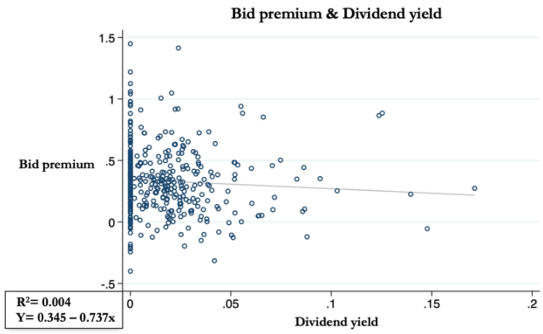

Bid premium & Return-on-Equity
Bid premium
Return-on-Equity
R²= 0.006
Y= 0.340 – 0.089x

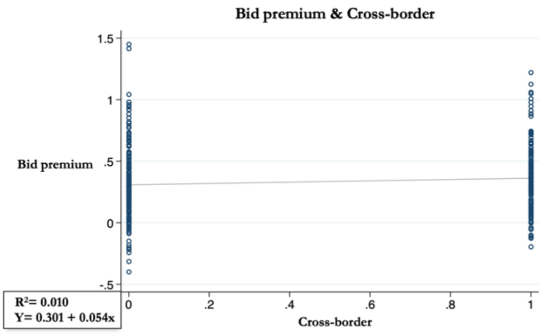

Bid premium & Growth
Bid premium
Growth
R²= 0.001
Y= 0.336 - 0.052x

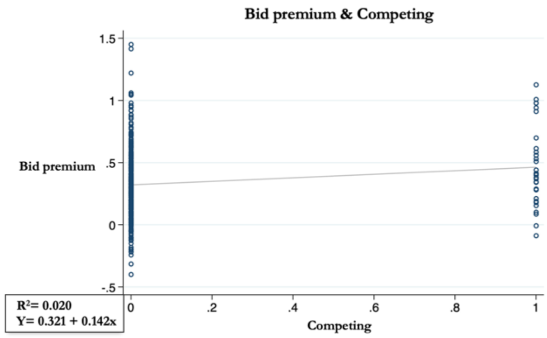

Bid premium & Target leverage
Bid premium
Target leverage
R²= 0.001
Y= 0.319 + 0.048x

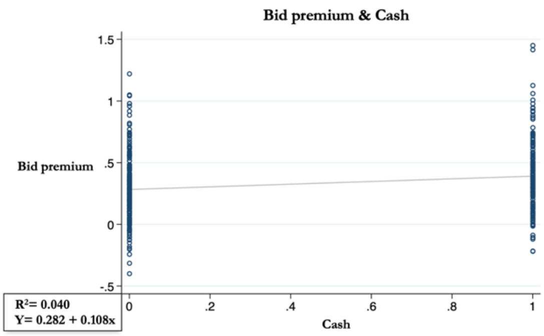

Bid premium & Acquirer leverage
Bid premium
Acquirer leverage
R²= 0.004
Y= 0.362 – 0.112x

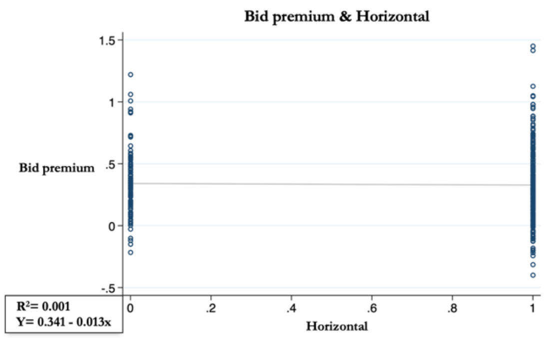

Bid premium & CAPEX
Bid premium
CAPEX
R²= 0.008
Y= 0.352 – 0.216x


Bid premium & Dividend yield
Bid premium
Dividend yield
R²= 0.004
Y= 0.345 – 0.737x


Bid premium & Cross-border
Bid premium
Cross-border
R²= 0.010
Y= 0.301 + 0.054x


Bid premium & Competing
Bid premium
Competing
R²= 0.020
Y= 0.321 + 0.142x


Bid premium & Cash
Bid premium
Cash
R²= 0.040
Y= 0.282 + 0.108x


Bid premium & Horizontal
Bid premium
Horizontal
R²= 0.001
Y= 0.341 - 0.013x

Appendix D.2: Durbin-Watson, Cook's d & Breusch-Pagan tests

Table 19.		Tests					
		Autocorrelation	*Significant cases*	*Multi-collinearity*	*Heteroscedasticity*		
Models	***Hypothesis***	**Durbin-Watson**	**Cook's d < 1**	**μ-VIF**	**Breusch-Pagan**		
					N	χ^2	*Prob* $>\chi^2$
Environmental performance:							
(H1)	TQEP	2.066	Yes	1.62	17	44.68	0.000***
(H2a)	EP increasing acq.	2.067	Yes	1.58	17	38.81	0.002***
(H2a)	EP decreasing acq.	2.061	Yes	1.59	17	39.97	0.001***
(H3a)	QEP increasing acq.	2.061	Yes	1.59	17	39.53	0.002***
(H3b)	QEP decreasing acq.	2.068	Yes	1.61	17	36.16	0.004***
CO_2 emissions performance:							
(H4)	TCO_2EP	2.074	Yes	1.58	17	36.22	0.004***
(H5a)	CO_2EP increasing acq.	2.082	Yes	1.58	17	31.95	0.015**
(H5b)	CO_2EP decreasing acq.	2.077	Yes	1.58	17	42.46	0.001***
EP and CO_2EP:							
(H6)	TQEP × CO_2EP increasing acq.	2.075	Yes	1.77	19	50.88	0.000***
(H7)	Green score	2.074	Yes	1.60	17	30.67	0.022**

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

Appendix D.3: Variance Inflation Factor (VIF)

Table 20.	**VIF values per variable per model**								
Variables	**(H1)**	**(H2a)**	**(H2b)**	**(H3a)**	**(H3b)**	**(4)**	**(5a)**	**(5b)**	**(6)**
TQEP	1.33								1.67
EP increasing acq.		1.17							
EP decreasing acq.			1.18						
QEP increasing acq.				1.10					
QEP decreasing acq.					1.24				
TCO_2EP						1.22			1.41
CO_2EP increasing acq.							1.17		
CO_2EP decreasing acq.								1.24	
TQEP × CO_2EP increasing									2.70
Green score									
Runup	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11
Deal size	3.47	3.44	3.44	3.44	3.43	3.43	3.44	3.42	3.43
Target size	4.66	4.18	4.18	4.20	4.36	4.10	4.10	4.10	4.23
Acquirer size	2.15	2.39	2.39	2.25	2.45	2.15	2.16	2.16	2.32
Market-to-book	1.29	1.29	1.29	1.29	1.29	1.31	1.31	1.29	1.29
Liquidity	1.32	1.32	1.32	1.32	1.32	1.32	1.32	1.35	1.37
Return-on-Equity	1.35	1.35	1.35	1.35	1.35	1.35	1.35	1.35	1.36
Growth	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.10
Leverage	1.41	1.42	1.42	1.41	1.42	1.43	1.44	1.43	1.44
Acquirer leverage	1.17	1.16	1.16	1.16	1.16	1.16	1.17	1.17	1.16
CAPEX	1.17	1.17	1.17	1.17	1.17	1.29	1.24	1.30	1.32
Dividend yield	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.14
Cross border	1.18	1.18	1.18	1.18	1.19	1.18	1.18	1.18	1.17
Competing	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Cash	1.45	1.45	1.45	1.46	1.45	1.45	1.45	1.45	1.47
Horizontal	1.12	1.12	1.12	1.12	1.11	1.12	1.11	1.11	1.12
μ-VIF	**1.62**	**1.59**	**1.59**	**1.58**	**1.61**	**1.58**	**1.58**	**1.58**	**1.77**

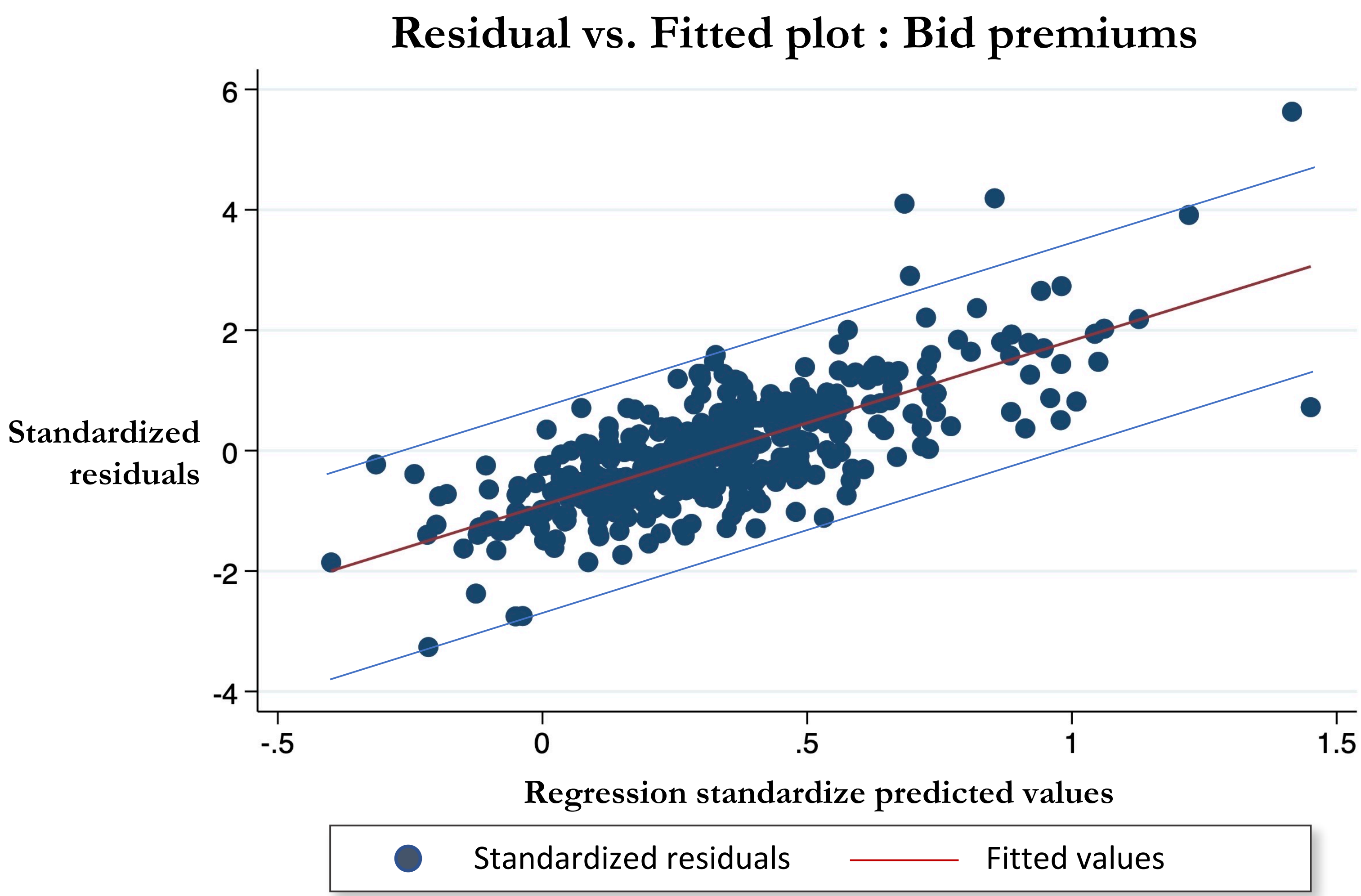
Appendix D.4: Matrix of correlations

Matrix of correlations

Table 21.

Variables	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**	**(10)**	**(11)**	**(12)**	**(13)**	**(14)**	**(15)**	**(16)**	**(17)**	**(18)**	**(19)**	**(20)**	**(21)**
(1) Bid premium	1.000																				
(2) Runup	0.569	1.000																			
(3) Deal size	-0.060	0.061	1.000																		
(4) Target size	-0.247	-0.016	0.819	1.000																	
(5) Acquirer size	0.049	0.154	0.506	0.591	1.000																
(6) Market-to-Book	-0.013	-0.051	0.144	0.192	0.169	1.000															
(7) Liquidity	0.076	-0.019	-0.041	-0.139	-0.046	0.042	1.000														
(8) Return-on-Equity	-0.078	-0.018	0.280	0.320	0.169	0.380	0.010	1.000													
(9) Growth	-0.039	0.041	0.014	0.029	0.028	-0.014	0.009	0.119	1.000												
(10) Target lev.	0.033	0.076	0.132	0.084	0.013	0.085	-0.378	-0.058	-0.022	1.000											
(11) Acquirer lev.	-0.066	0.037	0.092	0.115	0.036	0.040	-0.214	-0.023	0.052	0.335	1.000										
(12) CAPEX	-0.092	-0.041	-0.142	-0.142	-0.131	-0.191	-0.068	-0.168	0.134	0.146	0.064	1.000									
(13) Dividend yield	-0.066	-0.084	-0.009	0.037	-0.065	-0.034	-0.235	0.033	-0.142	0.071	0.054	-0.089	1.000								
(14) Cross-border	0.100	0.084	-0.131	-0.059	0.072	0.079	-0.001	-0.060	-0.074	-0.114	-0.086	-0.106	0.082	1.000							
(15) Competing	0.141	0.114	0.056	-0.007	-0.025	0.039	-0.015	0.047	-0.055	-0.042	0.038	0.016	-0.034	0.025	1.000						
(16) Cash	0.200	0.100	-0.176	-0.154	0.262	0.043	0.064	-0.006	-0.090	-0.160	-0.070	-0.166	-0.022	0.287	0.054	1.000					
(17) Horizontal	-0.022	-0.083	-0.016	-0.043	-0.238	0.031	-0.020	-0.007	-0.046	0.061	0.031	0.048	0.029	0.048	-0.052	-0.152	1.000				
(18) TQEP	-0.055	0.025	0.276	0.428	0.237	0.011	-0.162	0.085	-0.061	0.014	0.004	-0.094	0.114	0.102	0.046	0.019	-0.072	1.000			
(19) AQEP	0.068	0.109	0.192	0.260	0.542	0.096	-0.008	0.033	-0.011	-0.017	-0.048	-0.088	0.041	0.206	-0.040	0.165	-0.110	0.257	1.000		
(20) TCO_2EP	0.019	-0.003	-0.115	-0.118	-0.133	-0.209	0.009	-0.166	-0.009	0.109	0.019	0.351	0.039	0.037	-0.018	-0.072	0.104	-0.017	-0.011	1.000	
(21) Green score	-0.026	0.015	0.117	0.225	0.076	-0.140	-0.110	-0.056	-0.051	0.087	0.016	0.180	0.109	0.100	0.020	-0.037	0.022	0.708	0.177	0.694	1.000

Appendix D.5: Residual vs. Fitted plot



Appendix E: Model testing – Dependent variable & variables of interest

Appendix E.1: Country fixed effects – variables of interest

Table 22: Model 1 - Variables of interest	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
VARIABLES	**H1**	**H2a**	**H2b**	**H3a**	**H3b**	**H4**	**H5a**	**H5b**	**H6**
γ_i: ***Bid premium***									
TQEP	0.002								
	(0.009)								
EP increasing		-0.033							
		(-0.057)							
EP decreasing			0.031						
			(0.054)						
QEPu increasing				-0.025					
				(-0.034)					
QEPd decreasing					0.042				
					(0.079)				
TCO_2EP						0.012			
						(0.043)			
CO_2EP increasing							0.033		-0.006
							(0.062)		(-0.010)
CO_2EP decreasing								-0.054**	
								(-0.092)	
(2) TQEP									-0.006
									(-0.011)
(3) TQEP									0.034
									(0.047)
(4) TQEP									-0.086
									(-0.097)
(2) TQEP × CO_2EP inc.									0.094
									(0.113)
(3) TQEP × CO_2EP inc.									0.026
									(0.025)
(4) TQEP × CO_2EP inc.									0.113
									(0.079)
Constant	0.324***	0.339***	0.307***	0.332***	0.305***	0.291***	0.314***	0.344***	0.319***
Observations	391	391	391	391	391	391	391	391	391
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	No	No	No	No	No	No	No	No	No
Industry fixed effects	No	No	No	No	No	No	No	No	No
Within R-squared	6.08e-05	0.00321	0.00287	0.00100	0.00608	0.00166	0.00363	0.00767	0.0201
Adjusted within R-squared	-0.00268	0.000475	0.000141	-0.00174	0.00335	-0.00107	0.000899	0.00495	0.000983
F test	0.0236	1.208	1.085	0.436	2.297	0.846	1.282	3.919	1.013
Prob>F	0.878	0.272	0.298	0.510	0.131	0.358	0.258	0.0485	0.421

Robust normalized beta coefficients in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Appendix E.2: Country and year fixed effects – variables of interest

Table 23: Model 2 - Variables of interest	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
VARIABLES	**H1**	**H2a**	**H2b**	**H3a**	**H3b**	**H4**	**H5a**	**H5b**	**H6**
γ_i: ***Bid premium***									
TQEP	-0.003								
	(-0.011)								
EP increasing		-0.029							
		(-0.053)							
EP decreasing			0.028						
			(0.050)						
QEPu increasing				-0.065*					
				(-0.090)					
QEPd decreasing					0.051*				
					(0.099)				
TCO_2EP						0.008			
						(0.028)			
CO_2EP increasing							0.059*		-0.003
							(0.116)		(-0.006)
CO_2EP decreasing								-0.053*	
								(-0.091)	
(2) TQEP									-0.051
									(-0.087)
(3) TQEP									-0.008
									(-0.012)
(4) TQEP									-0.109*
									(-0.116)
(2) TQEP × CO_2EP inc.									0.153*
									(0.192)
(3) TQEP × CO_2EP inc.									0.106
									(0.099)
(4) TQEP × CO_2EP inc.									0.097
									(0.067)
Constant	0.333***	0.337***	0.309***	0.338***	0.300***	0.303***	0.301***	0.342***	0.325***
Observations	312	312	312	312	312	312	312	312	312
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	No	No	No	No	No	No	No	No	No
Within R-squared	0.000116	0.00286	0.00259	0.00786	0.0110	0.000772	0.0140	0.00827	0.0436
Adjusted within R-squared	-0.00376	-0.00100	-0.00128	0.00401	0.00718	-0.00310	0.0102	0.00443	0.0170
F test	0.0458	0.704	0.645	3.034	2.726	0.264	3.495	3.749	1.504
Prob>F	0.831	0.402	0.423	0.0828	0.100	0.608	0.0627	0.0539	0.166

Robust normalized beta coefficients in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Appendix E.3: Country, year, and industry fixed effects – Variables of interest

Table 24: Model 3 - Variables of interest	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
VARIABLES	**H1**	**H2a**	**H2b**	**H3a**	**H3b**	**H4**	**H5a**	**H5b**	**H6**
γ_i: ***Bid premium***									
TQEP	-0.031 (-0.117)								
EP increasing		0.066 (0.123)							
EP decreasing			-0.066 (-0.123)						
QEPu increasing				-0.107 (-0.129)					
QEPd decreasing					-0.040 (-0.083)				
TCO_2EP						0.095 (0.384)			
CO_2EP increasing							0.106* (0.222)		
CO_2EP decreasing								-0.137** (-0.255)	
(2) TQEP									-0.042 (0.083)
(3) TQEP									0.013 (0.058)
(4) TQEP									-0.055 (0.074)
(2) TQEP × CO_2EP inc.									0.048 (0.140)
(3) TQEP × CO_2EP inc.									-0.176* (0.096)
(4) TQEP × CO_2EP inc.									0.027 (0.109)
Constant	0.371***	0.302***	0.368***	0.329***	0.344***	0.006	0.261***	0.355***	0.264***
Observations	123	123	123	123	123	123	123	123	123
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Within R-squared	0.0133	0.0160	0.0160	0.0200	0.00734	0.0349	0.0296	0.0395	0.0593
Adjusted within R-squared	-0.000396	0.00237	0.00237	0.00639	-0.00645	0.0215	0.0161	0.0262	0.0364
F test	1.479	0.955	0.955	2.600	0.490	2.774	3.790	4.915	.
Prob>F	0.228	0.332	0.332	0.111	0.486	0.100	0.0555	0.0298	.

Robust normalized beta coefficients in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Appendix E.4: Complete output – Model 1

Table 25: Model 1 - Complete	**C**	**H1**	**H2a**	**H2b**	**H3a**	**H3b**	**H4**	**H5a**	**H5b**	**H6**
TQEP		0.026**								
		(0.097)								
Deal size	0.058***	0.057***	0.057***	0.057***	0.057***	0.058***	0.059***	0.059***	0.063***	0.057***
	(0.325)	(0.317)	(0.319)	(0.319)	(0.316)	(0.324)	(0.332)	(0.326)	(0.349)	(0.319)
Runup	0.749***	0.748***	0.750***	0.749***	0.753***	0.749***	0.748***	0.750***	0.746***	0.747***
	(0.512)	(0.511)	(0.512)	(0.512)	(0.514)	(0.511)	(0.511)	(0.512)	(0.510)	(0.510)
Target size	-0.102***	-0.109***	-0.103***	-0.103***	-0.103***	-0.102***	-0.103***	-0.101***	-0.105***	-0.107***
	(-0.529)	(-0.565)	(-0.538)	(-0.539)	(-0.534)	(-0.533)	(-0.534)	(-0.527)	(-0.545)	(-0.560)
Market-to-Book	0.001	0.001	0.001	0.001	0.001	0.001	0.002	0.001	0.002	0.002
	(0.013)	(0.017)	(0.015)	(0.015)	(0.012)	(0.014)	(0.019)	(0.013)	(0.025)	(0.019)
Liquidity	0.009	0.008	0.009	0.009	0.009	0.009	0.008	0.007	0.008	0.008
	(0.054)	(0.052)	(0.056)	(0.056)	(0.055)	(0.054)	(0.050)	(0.046)	(0.049)	(0.050)
Return-on-Equity	-0.013	-0.013	-0.016	-0.017	-0.014	-0.013	-0.010	-0.011	-0.012	-0.015
	(-0.012)	(-0.012)	(-0.015)	(-0.015)	(-0.013)	(-0.012)	(-0.009)	(-0.010)	(-0.011)	(-0.013)
Growth	-0.019	-0.012	-0.017	-0.016	-0.015	-0.019	-0.018	-0.024	-0.014	-0.018
	(-0.015)	(-0.009)	(-0.013)	(-0.013)	(-0.012)	(-0.014)	(-0.013)	(-0.018)	(-0.010)	(-0.014)
Target leverage	0.070	0.063	0.072	0.072	0.069	0.070	0.062	0.063	0.050	0.053
	(0.049)	(0.044)	(0.051)	(0.051)	(0.049)	(0.049)	(0.044)	(0.044)	(0.035)	(0.037)
CapEx	-0.122	-0.129	-0.127	-0.127	-0.122	-0.123	-0.159*	-0.160*	-0.176*	-0.162
	(-0.053)	(-0.056)	(-0.056)	(-0.056)	(-0.053)	(-0.054)	(-0.070)	(-0.070)	(-0.077)	(-0.071)
Dividend yield	0.090	0.030	0.101	0.103	0.089	0.086	0.032	0.048	-0.021	-0.054
	(0.008)	(0.003)	(0.009)	(0.009)	(0.008)	(0.008)	(0.003)	(0.004)	(-0.002)	(-0.005)
Acquirer size	0.015	0.015	0.018	0.018	0.017	0.015	0.015	0.015	0.016	0.015
	(0.086)	(0.089)	(0.105)	(0.105)	(0.100)	(0.091)	(0.087)	(0.091)	(0.095)	(0.090)
Acquirer leverage	-0.116	-0.113	-0.120	-0.120	-0.119	-0.117	-0.111	-0.111	-0.104	-0.109
	(-0.070)	(-0.068)	(-0.072)	(-0.072)	(-0.071)	(-0.070)	(-0.066)	(-0.066)	(-0.062)	(-0.065)
Cross border	-0.026	-0.030	-0.025	-0.025	-0.025	-0.025	-0.028	-0.029	-0.031	-0.035
	(-0.048)	(-0.056)	(-0.047)	(-0.047)	(-0.048)	(-0.047)	(-0.053)	(-0.055)	(-0.058)	(-0.065)
Competition	0.067	0.063	0.067	0.067	0.068	0.067	0.067	0.065	0.068	0.058
	(0.069)	(0.064)	(0.069)	(0.069)	(0.069)	(0.068)	(0.069)	(0.067)	(0.070)	(0.060)
Cash	0.062**	0.061**	0.062**	0.062**	0.060**	0.062**	0.062**	0.061**	0.059**	0.057*
	(0.118)	(0.114)	(0.116)	(0.116)	(0.114)	(0.117)	(0.117)	(0.114)	(0.112)	(0.108)
Horizontal	0.026	0.027	0.027	0.027	0.027	0.026	0.023	0.024	0.022	0.028
	(0.045)	(0.047)	(0.047)	(0.047)	(0.047)	(0.045)	(0.040)	(0.042)	(0.037)	(0.049)
EP increasing			0.024							
			(0.042)							
EP decreasing				-0.025						
				(-0.043)						
QEP increasing					0.037					
					(0.049)					
QEP decreasing						-0.006				
						(-0.011)				
TCO2EP							0.016			
							(0.058)			
CO2EP increasing								0.030		0.017
								(0.055)		(0.031)
CO2EP decreasing									-0.063**	
									(-0.108)	
(2) TQEP										0.022
										(0.037)
(3) TQEP										0.074**
										(0.104)
(4) TQEP										0.028
										(0.032)
(2) TQEP × CO2EP inc.										0.009
										(0.011)
(3) TQEP × CO2EP inc.										0.016
										(0.015)
(4) TQEP × CO2EP inc.										0.043
										(0.030)
Constant	0.641***	0.709***	0.619***	0.642***	0.635***	0.640***	0.590***	0.615***	0.628***	0.711***
Observations	391	391	391	391	391	391	391	391	391	391
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	No	No	No	No	No	No	No	No	No	No
Industry fixed effects	No	No	No	No	No	No	No	No	No	No
Within R-squared	0.456	0.462	0.457	0.457	0.458	0.456	0.458	0.458	0.465	0.468
Adjusted within R-squared	0.431	0.436	0.431	0.431	0.431	0.429	0.432	0.432	0.439	0.432
F test	17.26	16.71	16.86	16.89	16.55	16.30	16.36	16.41	16.38	13.10

Robust normalized beta coefficients in parentheses, *** $p<0.01$, ** $p<0.05$, * $p<0.1$

Appendix E.5: Complete output – Model 2

Table 26: Model 2 - Complete	C	H1	H2a	H2b	H3a	H3b	H4	H5a	H5b	H6
TQEP		0.011								
		(0.042)								
Deal size	0.063***	0.060***	0.060***	0.060***	0.061***	0.062***	0.064***	0.064***	0.068***	0.059***
	(0.354)	(0.342)	(0.340)	(0.340)	(0.347)	(0.353)	(0.362)	(0.362)	(0.385)	(0.336)
Runup	0.710***	0.711***	0.711***	0.711***	0.712***	0.710***	0.708***	0.706***	0.707***	0.700***
	(0.527)	(0.528)	(0.528)	(0.528)	(0.529)	(0.527)	(0.526)	(0.524)	(0.525)	(0.520)
Target size	-0.108***	-0.110***	-0.109***	-0.109***	-0.109***	-0.109***	-0.109***	-0.109***	-0.111***	-0.108***
	(-0.583)	(-0.593)	(-0.587)	(-0.587)	(-0.585)	(-0.584)	(-0.587)	(-0.587)	(-0.599)	(-0.579)
Market-to-Book	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
	(0.057)	(0.056)	(0.060)	(0.060)	(0.057)	(0.058)	(0.058)	(0.058)	(0.062)	(0.064)
Liquidity	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.003	0.004	0.005
	(0.033)	(0.033)	(0.036)	(0.036)	(0.034)	(0.033)	(0.031)	(0.021)	(0.030)	(0.034)
Return-on-Equity	-0.040	-0.038	-0.042	-0.043	-0.040	-0.040	-0.037	-0.036	-0.038	-0.040
	(-0.038)	(-0.036)	(-0.040)	(-0.041)	(-0.038)	(-0.038)	(-0.035)	(-0.035)	(-0.036)	(-0.038)
Growth	-0.040	-0.038	-0.033	-0.033	-0.039	-0.039	-0.041	-0.052	-0.038	-0.052
	(-0.033)	(-0.031)	(-0.028)	(-0.027)	(-0.032)	(-0.033)	(-0.034)	(-0.044)	(-0.032)	(-0.043)
Target leverage	0.057	0.055	0.062	0.062	0.057	0.057	0.052	0.039	0.033	0.040
	(0.042)	(0.040)	(0.045)	(0.046)	(0.042)	(0.042)	(0.038)	(0.029)	(0.024)	(0.029)
CapEx	-0.194*	-0.195*	-0.209**	-0.207**	-0.196*	-0.195*	-0.218**	-0.271**	-0.251**	-0.257**
	(-0.091)	(-0.091)	(-0.097)	(-0.096)	(-0.091)	(-0.091)	(-0.101)	(-0.126)	(-0.117)	(-0.120)
Dividend yield	0.063	0.023	0.027	0.031	0.050	0.059	0.018	0.022	-0.056	-0.129
	(0.006)	(0.002)	(0.003)	(0.003)	(0.005)	(0.006)	(0.002)	(0.002)	(-0.005)	(-0.012)
Acquirer size	0.019*	0.020**	0.024**	0.024**	0.021*	0.020*	0.020*	0.022**	0.023**	0.022**
	(0.123)	(0.127)	(0.150)	(0.151)	(0.131)	(0.126)	(0.126)	(0.137)	(0.143)	(0.142)
Acquirer leverage	-0.075	-0.073	-0.083	-0.084	-0.076	-0.076	-0.071	-0.058	-0.056	-0.058
	(-0.047)	(-0.046)	(-0.053)	(-0.053)	(-0.048)	(-0.048)	(-0.045)	(-0.037)	(-0.036)	(-0.037)
Cross border	0.005	0.004	0.005	0.006	0.005	0.005	0.002	-0.005	-0.002	-0.002
	(0.009)	(0.007)	(0.010)	(0.011)	(0.010)	(0.010)	(0.004)	(-0.009)	(-0.003)	(-0.004)
Competition	0.072	0.071	0.071	0.072	0.072	0.072	0.071	0.065	0.072	0.064
	(0.079)	(0.078)	(0.079)	(0.079)	(0.079)	(0.079)	(0.078)	(0.072)	(0.079)	(0.071)
Cash	0.026	0.024	0.025	0.025	0.024	0.026	0.026	0.020	0.021	0.013
	(0.051)	(0.047)	(0.049)	(0.049)	(0.047)	(0.050)	(0.051)	(0.039)	(0.040)	(0.026)
Horizontal	0.028	0.029	0.031	0.031	0.028	0.028	0.026	0.021	0.021	0.028
	(0.049)	(0.051)	(0.055)	(0.055)	(0.050)	(0.050)	(0.045)	(0.037)	(0.037)	(0.050)
EP increasing			0.035							
			(0.063)							
EP decreasing				-0.035						
				(-0.063)						
QEP increasing					0.016					
					(0.022)					
QEP decreasing						-0.003				
						(-0.006)				
TCO2EP							0.010			
							(0.036)			
CO2EP increasing								0.060**		0.029
								(0.117)		(0.057)
CO2EP decreasing									-0.071***	
									(-0.120)	
(2) TQEP										-0.004
										(-0.007)
(3) TQEP										0.036
										(0.052)
(4) TQEP										-0.058
										(-0.062)
(2) TQEP × CO2EP inc.										0.047
										(0.059)
(3) TQEP × CO2EP inc.										0.069
										(0.065)
(4) TQEP × CO2EP inc.										0.067
										(0.046)
Constant	0.592***	0.620***	0.558***	0.590***	0.593***	0.591***	0.550***	0.542***	0.540***	0.573***
Observations	312	312	312	312	312	312	312	312	312	312
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	No	No	No	No	No	No	No	No	No	No
Within R-squared	0.490	0.491	0.493	0.493	0.490	0.490	0.491	0.502	0.502	0.515
Adjusted within R-squared	0.456	0.456	0.458	0.458	0.455	0.454	0.455	0.467	0.467	0.467
F test	13.17	12.46	13.28	13.32	12.45	12.89	12.44	13.42	12.73	10.24

Robust normalized beta coefficients in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Appendix E.6: Complete output – Model 3

Table 27: Model 3: Complete	C	H1	H2a	H2b	H3a	H3b	H4	H5a	H5b	H6
TQEP		-0.039								
		(-0.151)								
Deal size	0.053	0.056	0.049	0.049	0.056	0.053	0.072	0.069	0.047	0.060
	(0.316)	(0.335)	(0.295)	(0.295)	(0.335)	(0.319)	(0.431)	(0.416)	(0.285)	(0.355)
Runup	0.762***	0.772***	0.753***	0.753***	0.759***	0.767***	0.721***	0.762***	0.760***	0.792***
	(0.600)	(0.608)	(0.593)	(0.593)	(0.598)	(0.604)	(0.568)	(0.600)	(0.598)	(0.624)
Target size	-0.103	-0.089	-0.101	-0.101	-0.096	-0.103	-0.123*	-0.116**	-0.096	-0.099
	(-0.615)	(-0.532)	(-0.603)	(-0.603)	(-0.571)	(-0.618)	(-0.737)	(-0.692)	(-0.574)	(-0.594)
Market-to-Book	0.013	0.013	0.014	0.014	0.013	0.013	0.016	0.016	0.013	0.020
	(0.146)	(0.141)	(0.160)	(0.160)	(0.150)	(0.146)	(0.180)	(0.173)	(0.144)	(0.211)
Liquidity	-0.003	-0.003	-0.003	-0.003	-0.002	-0.002	0.002	-0.002	0.004	0.001
	(-0.022)	(-0.022)	(-0.024)	(-0.024)	(-0.017)	(-0.019)	(0.021)	(-0.018)	(0.035)	(0.009)
Return-on-Equity	-0.139	-0.148	-0.136	-0.136	-0.141	-0.142	-0.144	-0.176*	-0.152	-0.195*
	(-0.157)	(-0.167)	(-0.154)	(-0.154)	(-0.159)	(-0.161)	(-0.163)	(-0.199)	(-0.171)	(-0.222)
Growth	-0.056	-0.028	-0.044	-0.044	-0.061	-0.061	-0.057	-0.074	-0.042	-0.022
	(-0.053)	(-0.026)	(-0.041)	(-0.041)	(-0.057)	(-0.057)	(-0.054)	(-0.070)	(-0.040)	(-0.083)
Target leverage	0.053	0.089	0.049	0.049	0.051	0.052	0.061	-0.003	0.049	0.053
	(0.042)	(0.071)	(0.038)	(0.038)	(0.040)	(0.041)	(0.048)	(-0.002)	(0.039)	(0.043)
CapEx	-0.379	-0.382	-0.379	-0.379	-0.429	-0.378	-0.402	-0.469*	-0.368	-0.416*
	(-0.196)	(-0.197)	(-0.196)	(-0.196)	(-0.222)	(-0.196)	(-0.208)	(-0.242)	(-0.190)	(-0.215)
Dividend yield	0.925	1.216	0.728	0.728	1.105	0.978	1.262	1.441	1.241	1.804
	(0.089)	(0.117)	(0.070)	(0.070)	(0.106)	(0.094)	(0.121)	(0.138)	(0.119)	(-0.174)
Acquirer size	0.019	0.015	0.022	0.022	0.007	0.018	0.027	0.023	0.024	0.015
	(0.128)	(0.101)	(0.146)	(0.146)	(0.046)	(0.123)	(0.183)	(0.154)	(0.162)	(0.101)
Acquirer leverage	-0.107	-0.142	-0.086	-0.086	-0.178	-0.108	-0.099	-0.041	-0.086	-0.075
	(-0.070)	(-0.093)	(-0.056)	(-0.056)	(-0.117)	(-0.071)	(-0.065)	(-0.027)	(-0.057)	(-0.046)
Cross border	-0.015	-0.028	-0.009	-0.009	-0.017	-0.018	-0.010	-0.017	-0.014	-0.029
	(-0.030)	(-0.056)	(-0.017)	(-0.017)	(-0.033)	(-0.036)	(-0.019)	(-0.033)	(-0.028)	(-0.047)
Competition	0.044	0.059	0.041	0.041	0.051	0.044	0.020	0.021	0.053	0.030
	(0.046)	(0.061)	(0.042)	(0.042)	(0.053)	(0.045)	(0.021)	(0.022)	(0.056)	(0.031)
Cash	-0.002	0.012	-0.004	-0.004	0.014	-0.003	-0.021	-0.025	-0.026	-0.007
	(-0.005)	(0.025)	(-0.007)	(-0.007)	(0.030)	(-0.006)	(-0.043)	(-0.052)	(-0.055)	(0.014)
Horizontal	0.037	0.031	0.033	0.033	0.043	0.038	0.041	0.031	0.043	0.024
	(0.066)	(0.055)	(0.059)	(0.059)	(0.077)	(0.068)	(0.074)	(0.056)	(0.077)	(0.044)
EP increasing			0.042							
			(0.078)							
EP decreasing				-0.042						
				(-0.078)						
QEP increasing					-0.091					
					(-0.110)					
QEP decreasing						0.010				
						(0.022)				
TCO2EP							0.096*			
							(0.388)			
CO2EP increasing								0.154**		0.165
								(0.323)		(0.337)
CO2EP decreasing									-0.119**	
									(-0.221)	
(2) TQEP										-0.021
										(-0.007)
(3) TQEP										0.012
										(0.052)
(4) TQEP										-0.124
										(-0.062)
(2) TQEP × CO2EP inc.										0.046
										(0.059)
(3) TQEP × CO2EP inc.										-0.100
										(0.065)
(4) TQEP × CO2EP inc.										-0.191
										(0.046)
Constant	0.697**	0.576*	0.663**	0.705**	0.760**	0.705**	0.240	0.502	0.604*	0.511
Observations	123	123	123	123	123	123	123	123	123	123
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Within R-squared	0.549	0.563	0.554	0.554	0.558	0.549	0.575	0.601	0.573	0.634
Adjusted within R-squared	0.422	0.430	0.418	0.418	0.424	0.412	0.446	0.480	0.443	0.634
F test	3.590	3.610	3.488	3.488	3.564	3.411	3.813	4.589	3.893	10.24

Robust normalized beta coefficients in parentheses, *** $p<0.01$, ** $p<0.05$, * $p<0.1$

Appendix F: Robustness Checks

Appendix F.1: Winsorized at p = 0.01

Table 28: Model 1_w VARIABLES	(1) **H1**	(2) **H2a**	(3) **H2b**	(4) **H3a**	(5) **H3b**	(6) **H4**	(7) **H5a**	(8) **H5b**	(9) **H6**
γ_i: ***Bid premium_w***									
TQEP	0.025**								
EP increasing		0.022							
EP decreasing			-0.022						
QEP increasing				0.036					
QEP decreasing					-0.003				
TCO_2EP						0.015			
CO_2EP increasing							0.029		0.016
CO_2EP decreasing								-0.061**	
(2) TQEP									0.024
(3) QEP									0.075**
(4) TQEP									0.021
(2) TQEP × CO_2EP inc.									0.010
(3) TQEP × CO_2EP inc.									0.013
(4) TQEP × CO_2EP inc.									0.052
Deal size_w	0.053***	0.053***	0.053***	0.053***	0.054***	0.056***	0.055***	0.059***	0.054***
Runup_w	0.770***	0.770***	0.770***	0.774***	0.770***	0.769***	0.771***	0.767***	0.769***
Target size_w	-0.107***	-0.101***	-0.101***	-0.101***	-0.100***	-0.101***	-0.099***	-0.103***	-0.106***
Market-to-Book_w	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.002	0.001
Liquidity_w	0.009	0.009	0.009	0.009	0.009	0.008	0.008	0.008	0.008
Return-on-Equity_w	-0.012	-0.014	-0.014	-0.012	-0.011	-0.009	-0.010	-0.011	-0.014
Growth_w	-0.005	-0.009	-0.009	-0.007	-0.011	-0.009	-0.016	-0.005	-0.010
Target leverage_w	0.077	0.086	0.086	0.083	0.084	0.077	0.077	0.064	0.066
CapEx_w	-0.097	-0.095	-0.095	-0.091	-0.090	-0.126	-0.129	-0.144	-0.129
Dividend yield_w	0.075	0.154	0.156	0.143	0.141	0.088	0.101	0.029	-0.014
Acquirer size_w	0.015	0.018*	0.018*	0.017*	0.015	0.015	0.016	0.017*	0.016
Acquirer leverage_w	-0.135*	-0.140*	-0.140*	-0.140*	-0.137*	-0.133*	-0.132*	-0.125*	-0.131*
Cross border	-0.029	-0.024	-0.024	-0.024	-0.024	-0.027	-0.028	-0.029	-0.033
Competition	0.063	0.067	0.067	0.067	0.067	0.067	0.065	0.068	0.058
Cash	0.056**	0.057**	0.057**	0.056**	0.058**	0.058**	0.056**	0.055*	0.053*
Horizontal	0.026	0.027	0.026	0.026	0.025	0.023	0.023	0.021	0.028
Constant	0.729***	0.641***	0.661***	0.655***	0.661***	0.613***	0.635***	0.647***	0.728***
Observations	391	391	391	391	391	391	391	391	391
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	No	No	No	No	No	No	No	No	No
Industry fixed effects	No	No	No	No	No	No	No	No	No
Within R-squared	0.459	0.453	0.453	0.454	0.452	0.455	0.455	0.462	0.465
Adjusted within R-squared	0.432	0.427	0.427	0.428	0.426	0.428	0.428	0.435	0.429
F test	16.56	16.37	16.39	16.40	16.07	16.31	16.19	16.43	12.90
Prob>F	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

*** p<0.01, ** p<0.05, * p<0

Appendix F.2: Winsorized at P=0.025

Table 29: Model 1_ww	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
VARIABLES	**H1**	**H2a**	**H2b**	**H3a**	**H3b**	**H4**	**H5a**	**H5b**	**H6**
γ_i: $\boldsymbol{Bid\ premium\_ww}$									
TQEP	0.025**								
EP increasing		0.018							
EP decreasing			-0.019						
QEP increasing				0.040					
QEP decreasing					-0.001				
TCO_2EP						0.013			
CO_2EP increasing							0.028		0.012
CO_2EP decreasing								-0.058**	
(2) TQEP									0.023
(3) QEP									0.075**
(4) TQEP									0.018
(2) TQEP × CO_2EP inc.									0.016
(3) TQEP × CO_2EP inc.									0.016
(4) TQEP × CO_2EP inc.									0.062
Deal size_ww	0.054***	0.054***	0.054***	0.053***	0.055***	0.056***	0.055***	0.058***	0.054***
Runup_ww	0.827***	0.828***	0.828***	0.833***	0.828***	0.827***	0.830***	0.825***	0.826***
Target size_ww	-0.109***	-0.103***	-0.103***	-0.103***	-0.102***	-0.102***	-0.101***	-0.104***	-0.108***
Market-to-Book_ww	0.000	-0.000	-0.000	-0.000	-0.000	0.000	-0.000	0.001	0.000
Liquidity_ww	0.009	0.010	0.010	0.010	0.010	0.009	0.008	0.009	0.009
Return-on-Equity_ww	0.002	0.001	0.001	0.003	0.004	0.004	0.005	0.001	-0.002
Growth_ww	0.020	0.014	0.014	0.018	0.011	0.016	0.008	0.022	0.019
Target leverage_ww	0.091	0.100	0.100	0.098	0.098	0.092	0.091	0.080	0.081
CapEx_ww	-0.077	-0.073	-0.073	-0.070	-0.069	-0.101	-0.107	-0.122	-0.106
Dividend yield_ww	0.188	0.293	0.295	0.282	0.272	0.221	0.225	0.145	0.097
Acquirer size_ww	0.017*	0.019*	0.019*	0.019*	0.017	0.017*	0.018*	0.018*	0.017*
Acquirer leverage_ww	-0.139*	-0.144*	-0.144*	-0.144*	-0.142*	-0.138*	-0.137*	-0.131*	-0.137*
Cross border	-0.028	-0.023	-0.023	-0.023	-0.023	-0.026	-0.027	-0.028	-0.032
Competition	0.069	0.073*	0.073*	0.073*	0.073*	0.073*	0.071	0.075*	0.064
Cash	0.052*	0.053*	0.053*	0.051*	0.054*	0.054*	0.052*	0.051*	0.049*
Horizontal	0.027	0.027	0.027	0.027	0.026	0.024	0.024	0.022	0.029
Constant	0.712***	0.625***	0.643***	0.636***	0.644***	0.601***	0.617***	0.629***	0.711***
Observations	391	391	391	391	391	391	391	391	391
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	No	No	No	No	No	No	No	No	No
Industry fixed effects	No	No	No	No	No	No	No	No	No
Within R-squared	0.462	0.457	0.457	0.458	0.456	0.458	0.458	0.464	0.469
Adjusted within R-squared	0.436	0.430	0.431	0.432	0.430	0.431	0.432	0.438	0.434
F test	16.80	16.42	16.44	16.70	16.23	16.58	16.42	16.64	12.94
Prob>F	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

*** p<0.01, ** p<0.05, * p<0

Appendix F.3: Winsorized at P = 0.05

Table 30: Model 1_www VARIABLES	(1) **H1**	(2) **H2a**	(3) **H2b**	(4) **H3a**	(5) **H3b**	(6) **H4**	(7) **H5a**	(8) **H5b**	(9) **H6**
γ_i: ***Bid premium_www***									
TQEP	0.021*								
EP increasing		0.013							
EP decreasing			-0.013						
QEP increasing				0.029					
QEP decreasing					-0.002				
TCO_2EP						0.011			
CO_2EP increasing							0.028		0.013
CO_2EP decreasing								-0.055**	
(2) TQEP									0.023
(3) QEP									0.064*
(4) TQEP									0.006
(2) TQEP × CO_2EP inc.									0.012
(3) TQEP × CO_2EP inc.									0.009
(4) TQEP × CO_2EP inc.									0.077
Deal size_www	0.047**	0.048**	0.048**	0.047**	0.048**	0.049**	0.048***	0.051***	0.048**
Runup_www	0.822***	0.823***	0.823***	0.826***	0.823***	0.823***	0.824***	0.822***	0.820***
Target size_www	-0.101***	-0.095***	-0.095***	-0.096***	-0.095***	-0.095***	-0.094***	-0.096***	-0.100***
Market-to-Book_www	0.000	0.000	0.000	-0.000	-0.000	0.001	-0.000	0.001	0.001
Liquidity_www	0.009	0.010	0.010	0.010	0.009	0.009	0.008	0.008	0.009
Return-on-Equity_www	0.003	0.003	0.002	0.005	0.006	0.005	0.008	0.002	-0.001
Growth_www	0.036	0.030	0.030	0.033	0.028	0.033	0.025	0.040	0.038
Target leverage_www	0.098	0.105	0.105	0.104	0.104	0.099	0.097	0.087	0.089
CapEx_www	-0.067	-0.062	-0.062	-0.061	-0.059	-0.090	-0.100	-0.112	-0.096
Dividend yield_www	0.305	0.408	0.411	0.398	0.388	0.336	0.333	0.249	0.230
Acquirer size_www	0.014	0.016	0.016	0.016	0.014	0.014	0.015	0.015*	0.015
Acquirer leverage_www	-0.159**	-0.162**	-0.162**	-0.162**	-0.161**	-0.158**	-0.156**	-0.150**	-0.156**
Cross border	-0.026	-0.023	-0.022	-0.023	-0.023	-0.025	-0.026	-0.028	-0.031
Competition	0.062	0.065	0.065	0.065	0.065	0.066	0.064	0.067*	0.058
Cash	0.049*	0.050**	0.050**	0.049*	0.050**	0.050**	0.049*	0.048*	0.046*
Horizontal	0.023	0.022	0.022	0.023	0.022	0.020	0.020	0.018	0.024
Constant	0.745***	0.670***	0.683***	0.678***	0.683***	0.644***	0.656***	0.668***	0.734***
Observations	391	391	391	391	391	391	391	391	391
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	No	No	No	No	No	No	No	No	No
Industry fixed effects	No	No	No	No	No	No	No	No	No
Within R-squared	0.447	0.442	0.442	0.443	0.442	0.443	0.444	0.451	0.455
Adjusted within R-squared	0.420	0.415	0.415	0.416	0.415	0.416	0.417	0.424	0.418
F test	18.21	17.51	17.54	17.79	17.21	17.59	17.44	17.70	14.01
Prob>F	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

*** p<0.01, ** p<0.05, * p<0

Appendix F.4: Geographical test - United States

Table 31: United States subsample	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
VARIABLES	**H1**	**H2a**	**H2b**	**H3a**	**H3b**	**H4**	**H5a**	**H5b**	**H6**
γ_i: ***Bid premium***									
TQEP	0.015								
EP increasing		0.030							
EP decreasing			-0.031						
QEP increasing				-0.001					
QEP decreasing					-0.023				
TCO_2EP						0.023			
CO_2EP increasing							0.040		0.039
CO_2EP decreasing								-0.098***	
(2) TQEP									0.035
(3) QEP									0.034
(4) TQEP									0.021
(2) TQEP × CO_2EP inc.									-0.024
(3) TQEP × CO_2EP inc.									0.046
(4) TQEP × CO_2EP inc.									0.004
Deal size	0.133***	0.132***	0.132***	0.138***	0.137***	0.141***	0.135***	0.143***	0.131***
Runup	0.740***	0.748***	0.747***	0.744***	0.744***	0.738***	0.740***	0.727***	0.736***
Target size	-0.167***	-0.163***	-0.163***	-0.166***	-0.168***	-0.169***	-0.161***	-0.170***	-0.164***
Market-to-Book	0.006	0.006	0.006	0.006	0.006	0.007	0.006	0.007	0.006
Liquidity	-0.004	-0.004	-0.004	-0.005	-0.004	-0.004	-0.005	-0.003	-0.004
Return-on-Equity	-0.023	-0.028	-0.028	-0.024	-0.022	-0.019	-0.023	-0.022	-0.026
Growth	-0.057	-0.049	-0.048	-0.058	-0.052	-0.057	-0.068	-0.050	-0.067
Target leverage	-0.013	-0.004	-0.003	-0.010	-0.004	-0.026	-0.022	-0.052	-0.029
CapEx	-0.123	-0.133	-0.132	-0.128	-0.125	-0.182	-0.196	-0.210*	-0.184
Dividend yield	0.593	0.693	0.703	0.663	0.617	0.537	0.596	0.472	0.409
Acquirer size	0.019	0.022	0.022	0.017	0.022	0.020	0.020	0.023	0.022
Acquirer leverage	-0.195**	-0.201**	-0.202**	-0.196**	-0.200**	-0.188*	-0.200**	-0.184*	-0.200*
Cross border	-0.010	-0.005	-0.005	-0.006	-0.004	-0.014	-0.014	-0.016	-0.019
Competition	0.020	0.015	0.016	0.018	0.019	0.014	0.014	0.030	0.013
Cash	0.041	0.042	0.042	0.043	0.043	0.042	0.037	0.035	0.034
Horizontal	0.006	0.009	0.009	0.005	0.007	0.001	0.002	-0.002	0.011
Constant	0.438**	0.369**	0.396**	0.393**	0.387**	0.302*	0.350**	0.333**	0.403**
Observations	193	193	193	193	193	193	193	193	193
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	No	No	No	No	No	No	No	No	No
Industry fixed effects	No	No	No	No	No	No	No	No	No
Within R-squared	0.547	0.547	0.547	0.545	0.546	0.551	0.549	0.568	0.555
Adjusted within R-squared	0.503	0.503	0.503	0.500	0.502	0.507	0.506	0.526	0.495
F test	11.96	12.59	12.64	11.85	12.82	12.21	11.87	12.78	9.227
Prob>F	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

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

Appendix F.5: Geographical test - European Union

Table 32: European Union subsample	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
VARIABLES	**H1**	**H2a**	**H2b**	**H3a**	**H3b**	**H4**	**H5a**	**H5b**	**H6**
γ_i: $\textbf{\textit{Bid premium}}$									
TQEP	0.108***								
EP increasing		0.175*							
EP decreasing			-0.175*						
QEP increasing				0.182					
QEP decreasing					-0.127				
TCO_2EP						-0.153			
CO_2EP increasing							0.070		0.010
CO_2EP decreasing								0.154	
(2) TQEP									-0.024
(3) QEP									0.095
(4) TQEP									0.783***
(2) TQEP × CO_2EP inc.									0.080
(3) TQEP × CO_2EP inc.									0.308**
(4) TQEP × CO_2EP inc.									-0.545*
Deal size	0.071*	0.070*	0.070*	0.074*	0.078*	0.071	0.089**	0.081**	0.091***
Runup	0.689***	0.755***	0.755***	0.733***	0.742***	0.712***	0.732***	0.739***	0.718***
Target size	-0.115***	-0.104**	-0.104**	-0.108***	-0.106***	-0.108***	-0.111***	-0.111***	-0.132***
Market-to-Book	0.016**	0.020***	0.020***	0.016**	0.021***	0.019**	0.020***	0.020***	0.016*
Liquidity	0.017	0.009	0.009	0.016	0.009	0.013	0.006	0.013	0.017
Return-on-Equity	-0.299**	-0.353**	-0.353**	-0.328**	-0.345**	-0.255	-0.319**	-0.307**	-0.358**
Growth	-0.068	-0.065	-0.065	-0.081	-0.085	-0.104	-0.118*	-0.099	-0.107
Target leverage	-0.087	-0.228	-0.228	-0.147	-0.254	-0.320*	-0.308	-0.284	-0.049
CapEx	-0.004	-0.169	-0.169	-0.089	-0.136	-0.059	-0.174	-0.090	-0.110
Dividend yield	-0.432	-0.535	-0.535	-0.194	-0.355	0.578	0.088	0.403	-1.293
Acquirer size	0.019	0.036	0.036	0.028	0.033	0.027	0.018	0.021	0.029
Acquirer leverage	-0.417***	-0.318**	-0.318**	-0.352**	-0.308**	-0.295*	-0.277*	-0.274*	-0.357**
Cross border	-0.147*	-0.107	-0.107	-0.126	-0.092	-0.109	-0.128	-0.122	-0.177**
Competition	-0.072	-0.116	-0.116	-0.110	-0.108	-0.114	-0.119	-0.121	-0.067
Cash	0.170*	0.140*	0.140*	0.154	0.134	0.133	0.134	0.143	0.137
Horizontal	0.023	-0.020	-0.020	-0.010	0.006	-0.013	-0.018	-0.004	0.044
Constant	0.456	0.280	0.455	0.381	0.327	1.075	0.405	0.452	0.369
Observations	83	83	83	83	83	83	83	83	83
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	No	No	No	No	No	No	No	No	No
Industry fixed effects	No	No	No	No	No	No	No	No	No
Within R-squared	0.631	0.609	0.609	0.591	0.591	0.580	0.573	0.569	0.705
Adjusted within R-squared	0.525	0.496	0.496	0.474	0.473	0.459	0.450	0.445	0.577
F test	7.621	7.263	7.263	8.366	8.089	8.099	8.125	8.731	8.197
Prob>F	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

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

Appendix F.6: Geographical test - Rest of World

Table 33: Rest of World subsample VARIABLES	(1) **H1**	(2) **H2a**	(3) **H2b**	(4) **H3a**	(5) **H3b**	(6) **H4**	(7) **H5a**	(8) **H5b**	(9) **H6**
γ_i: ***Bid premium***									
TQEP	0.038								
EP increasing		0.050							
EP decreasing			-0.050						
QEP increasing				0.083					
QEP decreasing					0.002				
TCO2EP						0.020			
CO2EP increasing							-0.005		-0.020
CO2EP decreasing								-0.010	
(2) TQEP									-0.004
(3) QEP									0.125
(4) TQEP									0.089
(2) TQEP × CO2EP inc.									0.054
(3) TQEP × CO2EP inc.									-0.026
(4) TQEP × CO2EP inc.									-0.011
Deal size	0.044	0.043	0.043	0.043	0.043	0.044	0.043	0.043	0.051
Runup	0.759***	0.747***	0.747***	0.745***	0.751***	0.764***	0.749***	0.753***	0.739***
Target size	-0.086**	-0.076**	-0.076**	-0.077**	-0.073**	-0.076**	-0.073**	-0.074**	-0.090**
Market-to-Book	-0.002	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.002
Liquidity	0.017	0.017	0.017	0.016	0.017	0.016	0.017	0.016	0.017
Return-on-Equity	-0.144	-0.178	-0.178	-0.167	-0.158	-0.151	-0.160	-0.159	-0.173
Growth	0.022	0.018	0.018	0.030	0.023	0.021	0.025	0.023	0.008
Target leverage	-0.037	-0.030	-0.030	-0.035	-0.021	-0.028	-0.022	-0.024	-0.075
CapEx	-0.176	-0.178	-0.178	-0.151	-0.126	-0.177	-0.122	-0.139	-0.205
Dividend yield	-0.551	-0.560	-0.560	-0.520	-0.494	-0.543	-0.489	-0.508	-0.587
Acquirer size	-0.003	0.003	0.003	0.002	-0.003	-0.005	-0.002	-0.003	-0.002
Acquirer leverage	-0.062	-0.070	-0.070	-0.057	-0.076	-0.062	-0.079	-0.073	-0.058
Cross border	-0.048	-0.039	-0.039	-0.040	-0.039	-0.041	-0.039	-0.040	-0.058
Competition	-0.113	-0.087	-0.087	-0.100	-0.098	-0.092	-0.098	-0.098	-0.125
Cash	0.082	0.082	0.082	0.083	0.087	0.085	0.088	0.086	0.082
Horizontal	0.046	0.060	0.060	0.058	0.052	0.040	0.052	0.050	0.038
Constant	0.861**	0.670*	0.721**	0.723*	0.739*	0.740**	0.738**	0.751*	0.882**
Observations	110	110	110	110	110	110	110	110	110
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	No	No	No	No	No	No	No	No	No
Industry fixed effects	No	No	No	No	No	No	No	No	No
Within R-squared	0.457	0.454	0.454	0.455	0.449	0.452	0.449	0.449	0.462
Adjusted within R-squared	0.344	0.341	0.341	0.342	0.334	0.339	0.334	0.335	0.299
F test	7.542	7.369	7.369	7.679	7.576	8.049	7.551	7.626	5.935
Prob>F	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

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

Appendix F.7: Time period test - pre-2015 Paris agreement[12]

Table 34: Model pre-Paris agreement	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
VARIABLES	**H1**	**H2a**	**H2b**	**H3a**	**H3b**	**H4**	**H5a**	**H5b**	**H6**
γ_i: ***Bid premium***									
TQEP	0.011								
EP increasing		-0.030							
EP decreasing			0.030						
QEP increasing				0.026					
QEP decreasing					0.070*				
TCO_2EP						0.006			
CO_2EP increasing							0.017		0.008
CO_2EP decreasing								-0.088**	
(2) TQEP									0.005
(3) QEP									0.059
(4) TQEP									-0.029
(2) TQEP × CO_2EP inc.									-0.009
(3) TQEP × CO_2EP inc.									0.045
(4) TQEP × CO_2EP inc.									0.019
Deal size	0.021	0.023	0.023	0.022	0.021	0.023	0.023	0.031	0.021
Runup	0.849***	0.850***	0.850***	0.847***	0.856***	0.847***	0.845***	0.851***	0.854***
Target size	-	-	-	-	-	-	-	-	-
	0.117***	0.112***	0.112***	0.116***	0.105***	0.115***	0.115***	0.121***	0.107***
Market-to-Book	-0.001	-0.001	-0.001	-0.001	-0.002	-0.001	-0.001	0.001	-0.002
Liquidity	0.001	-0.000	-0.000	0.001	-0.002	0.000	-0.000	0.001	-0.000
Return-on-Equity	0.147*	0.159*	0.159*	0.143	0.162*	0.152*	0.151*	0.143	0.119
Growth	-0.057	-0.060	-0.060	-0.053	-0.061	-0.062	-0.064	-0.071	-0.082
Target leverage	0.068	0.068	0.068	0.068	0.063	0.068	0.067	0.044	0.038
CapEx	-0.016	-0.003	-0.003	-0.011	0.011	-0.020	-0.031	-0.086	-0.033
Dividend yield	-	-	-	-	-	-	-	-	-
	1.540***	1.547***	1.547***	1.527***	1.540***	1.550***	1.544***	1.686***	1.801***
Acquirer size	0.007	0.002	0.002	0.009	-0.006	0.007	0.007	0.010	0.005
Acquirer leverage	-0.107	-0.112	-0.112	-0.118	-0.124	-0.111	-0.107	-0.093	-0.089
Cross border	0.026	0.030	0.030	0.025	0.028	0.026	0.025	0.014	0.023
Competition	0.058	0.061	0.061	0.059	0.064	0.058	0.058	0.048	0.053
Cash	-0.007	-0.003	-0.003	-0.005	-0.003	-0.003	-0.005	-0.006	-0.006
Horizontal	0.027	0.025	0.025	0.028	0.027	0.027	0.027	0.015	0.029
Constant	1.572***	1.593***	1.563***	1.544***	1.615***	1.527***	1.531***	1.512***	1.495***
Observations	171	171	171	171	171	171	171	171	171
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	No	No	No	No	No	No	No	No	No
Industry fixed effects	No	No	No	No	No	No	No	No	No
Within R-squared	0.600	0.601	0.601	0.600	0.611	0.599	0.599	0.612	0.612
Adjusted within R-squared	0.550	0.551	0.551	0.550	0.563	0.549	0.550	0.564	0.544
F test	15.71	15.71	15.71	15.41	16.27	16.17	15.65	16.70	12.63
Prob>F	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

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

[12] The 2015-Paris agreement is a legally binding international treaty on climate change that was adopted by 196 countries at COP 21 in Paris on 12 December 2015 and the agreement entered into force on 04/11/2016 (UNFCCC, 2022).

Appendix F.8: Time period test - post-2015 Paris agreement[13]

Table 35: Model post-Paris agreement	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
VARIABLES	**H1**	**H2a**	**H2b**	**H3a**	**H3b**	**H4**	**H5a**	**H5b**	**H6**
γ_i: ***Bid premium***									
TQEP	0.038**								
EP increasing		0.057							
EP decreasing			-0.060						
QEP increasing				0.053					
QEP decreasing					-0.047				
TCO_2EP						0.013			
CO_2EP increasing							0.034		0.023
CO_2EP decreasing								-0.045	
(2) TQEP									0.040
(3) QEP									0.106*
(4) TQEP									0.087
(2) TQEP × CO_2EP inc.									0.040
(3) TQEP × CO_2EP inc.									-0.083
(4) TQEP × CO_2EP inc.									0.027
Deal size	0.117***	0.116***	0.116***	0.117***	0.117***	0.120***	0.118***	0.121***	0.123***
Runup	0.679***	0.691***	0.689***	0.694***	0.686***	0.685***	0.688***	0.679***	0.675***
Target size	-0.155***	-0.148***	-0.148***	-0.146***	-0.149***	-0.146***	-0.143***	-0.147***	-0.155***
Market-to-Book	0.005	0.006	0.007	0.005	0.007	0.006	0.006	0.006	0.007
Liquidity	0.010	0.010	0.011	0.011	0.010	0.011	0.010	0.011	0.008
Return-on-Equity	-0.075	-0.090	-0.091	-0.078	-0.082	-0.077	-0.080	-0.075	-0.075
Growth	0.037	0.033	0.035	0.026	0.029	0.029	0.023	0.034	0.033
Target leverage	0.169**	0.182**	0.184**	0.176**	0.185**	0.170**	0.169**	0.159*	0.165**
CapEx	-0.032	-0.061	-0.061	-0.040	-0.042	-0.074	-0.076	-0.079	-0.038
Dividend yield	0.974	0.997*	1.002*	1.073*	0.945	0.983	0.969	0.983	0.933
Acquirer size	0.009	0.015	0.016	0.012	0.016	0.010	0.010	0.011	0.003
Acquirer leverage	-0.132	-0.142	-0.145	-0.128	-0.145	-0.128	-0.124	-0.122	-0.126
Cross border	-0.050	-0.035	-0.034	-0.038	-0.035	-0.045	-0.047	-0.045	-0.053
Competition	0.035	0.043	0.044	0.045	0.037	0.042	0.038	0.043	0.026
Cash	0.096**	0.088**	0.088**	0.089**	0.090**	0.091**	0.090**	0.088**	0.098**
Horizontal	0.021	0.017	0.017	0.019	0.016	0.013	0.012	0.015	0.011
Constant	0.496***	0.350*	0.403**	0.386**	0.394**	0.340*	0.357*	0.380**	0.539**
Observations	213	213	213	213	213	213	213	213	213
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	No	No	No	No	No	No	No	No	No
Industry fixed effects	No	No	No	No	No	No	No	No	No
Within R-squared	0.502	0.498	0.499	0.494	0.497	0.493	0.494	0.496	0.511
Adjusted within R-squared	0.454	0.450	0.451	0.445	0.448	0.444	0.445	0.447	0.444
F test	12.82	12.94	12.99	12.46	13.07	13.15	12.92	13.09	10.39
Prob>F	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

*** p<0.01, ** p<0.05, * p<0

[13] The 2015-Paris agreement is a legally binding international treaty on climate change that was adopted by 196 countries at COP 21 in Paris on 12 December 2015 and the agreement entered into force on 04/11/2016 (UNFCCC, 2022).