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Chapter 1

Introduction

The last 20 years have been characterized by the increasing importance of environmental, social, and governance (ESG) issues, which gradually became a top priority among companies worldwide.

The history of ESG starts in 2004, when the term was included in a report by 20 financial institutions in response to a call from Kofi Anon, Secretary-General of the United Nations. In 2005, the United Nations Environment Program Finance Initiative published a report which assumed that environmental, social and governance issues can be applied to financial valuations. This kind of report stimulated the creation of the Principles for Responsible Investing (PRI) in 2006 and led to the creation of the Sustainable Stock Exchange in 2009 by the UN Environment Program Finance Initiative and the Principles for Responsible Investing, the UN Global Compact and the UN Conference on Trade and Development (Caiazza et al. 2021).

The enduring importance of ESG has reached its peak in 2019, when sustainable funds in the United States attracted new assets at a record pace, accounting for \$20.6 billion for the year only in the American country. That's nearly 4 times the previous annual record for net flows set in 2018 (Hale 2020). Nevertheless, Europe continues to dominate the space, housing 76% of the global sustainable offerings and 81% of the assets. As a result of the COVID-19 market shock, global green funds saw their assets fell by 12%, but they also showed resilience during the coronavirus pandemic market sell-off (Morningstar 2020) enhancing the popularity of ESG indicators.

Nowadays several countries are more concerned about sustainability than in the past. This tendency is reflected into policies that have greatly impacted the sustainable investing and, in general, the financial services industry. A relevant example is the Paris Agreement, which is a legally binding international treaty on climate change that entered into force in 2016. The Agreement has the goal to limit global warming to well below 2°C, preferably to 1.5°C, compared to pre-industrial levels. The Paris Agreement has been the driving force of many state-based legislations to limit greenhouse gas emissions and set net zero emission targets (Global Sustainable Investment Alliance 2021).

Countries have also embraced the Sustainable Development Goals (SDGs), which contain 17 globally set goals proposed by the United Nations to achieve a better and more sustainable future for all by 2030 and they were adopted by all United Nations Member States in 2015. There are a total of 231 indicators and 169 targets that recognise ending poverty and other deprivations must go hand-in-hand with strategies that improve health and education, reduce inequality, and spur economic growth, together with the goal of tackling climate change and working to preserve oceans and forests (Global Sustainable Investment Alliance 2021).

Although these agreements and frameworks were established at state-level, investors, asset owners, asset managers and businesses are increasingly looking to align their portfolios and strategic decisions to these sustainability goals.

Indeed, according to Hale (2020), about 300 American mutual funds systematically integrate environmental, social and governance factors into their investment decision processes, pursue sustainability-related investment themes or seek measurable sustainable impact alongside financial returns.

Companies may assume environmental responsibility not only to bring spill-over benefits to the global community but also to achieve its own strategic goals. Indeed, the increasing level of disclosure required by governments and market will lead the organizations to include targets for sustainable performance together with financial indicators and ratios. Mergers and acquisitions can be employed to facilitate the achievement of these requirements. In this framework, Gangi and Varrone (2018) outlined that agency problems exist between savers that engage ESG criteria to decide in which fund to invest and between the fund and the management of the target company, which tries to obtain additional investments by appearing more sustainable. Indeed, the authors found that companies selected by social responsible funds exhibit worse corporate social responsibility (CSR) performance than companies selected by conventional funds.

However, even if some of the world's largest institutional investors integrate sustainability into their investment decision processes (Bernow et al. 2017), only 11% of M&A executives surveyed by Bain & Company in 2022 affirms that they extensively assess ESG in the deal-making process on a regular basis and suggesting that firms still do not consider sustainability targets as a driver for M&A activity.

Despite extensive research efforts on M&A activity there is little attention paid to the investigation of sustainable aspects in M&A decisions and only a little has studied decisions concerning ex-ante acquisition, given that a great majority of research focuses on the consequences on performance and sustainability after the transaction. Two examples on this type of research are provided by Caiazza et al. (2021) and Tampakoudis and Anagnostopoulou (2020). Both papers analyse the effect of ESG on the long-term performance of acquirer companies and they support the corporate value-enhancing nature of corporate sustainability.

It is important to examine ESG in the M&A framework for several reasons. Firstly, because bidders can better assess the value of a sustainable target. In academic research, the relation be-

tween CSR performance and firm value is unclear. While Eccles and Serafeim (2013), Gomes and Marsat (2018) and Tampakoudis and Anagnostopoulou (2020) proved a positive relationship, La Torre et al. (2020) and Luo (2022) demonstrated the opposite. The different results obtained can be explained by the intangible nature of attributes often associated with CSR, such as corporate reputation, culture, and employee's knowledge and capabilities (Gomes and Marsat 2018). Given that bidders perform an extensive due diligence, obtaining information that is not available to the public, they are better able to analysed intangibles related to ESG. Therefore, the impact of ESG performance on the value assigned to firms by M&A bidders is more reliable than the value assigned by market investors. Indeed, outside M&A framework, academic results are not so supportive of the idea that more sustainable companies also perform better. Precisely, the authors cited before, Luo (2022) and La Torre et al. (2020), find negative or no relationship between stock returns and ESG. Instead, inside M&As, where bidders have superior information respect to the market, Caiazza et al. (2021) and Tampakoudis and Anagnostopoulou (2020) observe a positive relationship between ESG and corporate performance after acquisition.

Secondly, M&A constitutes the most important external growth corporate strategy, allowing firms to expand to new markets, gain access to resources, and increase efficiency, thereby creating corporate value.

Thirdly, many companies often choose to acquire firms with superior ESG performance in order to enhance their own corporate value, and consequently their corporate performance. This induce to think that companies may also engage in an M&A activity to draw the market attention, because they want to signal their financial results and increase transparency, with the consequence of extending ESG coverage to them.

The purpose of the thesis is to investigate how ESG ratings influence some M&A decisions contributing to the discussion on the effect of ESG on the deal premium and on the choice of the target. The results support the conclusion that the level of deal premium is influenced by considerations about sustainability. While, if matching procedures are employed, also the choice of the target seems to be affected by ESG scores.

Subsequently, it follows a digression about the probability of being covered by the ESG rating after acquisitions as increasing disclosure requirements are expected to force organizations to change. Their relationships with the banking sector and financial markets will be affected by targeting key performance indicators and ratios in compliance with the directive taxonomy. M&A activity may play an active role in achieving these targets. Barros et al. (2022) have already provided evidence that M&A activity can be a driver for better ESG performance. The improvement in the ESG score is not attained immediately after the acquisition, but only in two years following the M&A deal.

Therefore, in order to understand the existence of a correlation between M&A activity and the probability of being rated, it is important to consider not only bidders' feature, but also targets' and deals' characteristics. This analysis differs from the work of Barros et al. (2022), because

they focus only on bidders that were already rated in the years prior to acquisition, while I am interested in companies that do not have any ESG score before M&A. From my analysis, it seems that the pre-acquisition ESG score of the target does not increase the probability of being covered by the ESG rating, but a significant relationship with acquisitions exists.

The rest of the work is structured as follows. Chapter 2 provides a brief literature review on M&As and ESG performance and describes how the two topics are linked through the hypothesis development. Chapter 3 provides a detailed explanation of the methodology, variables, models, dataset, and sampling. In Chapter 4, I present the empirical results along with the related interpretations and discussions. Finally, Chapter 5 concludes.

Chapter 2

Literature review and hypothesis development

2.1 ESG Literature

ESG factors have become of greater importance for public policies, customers and firms in the last decades. This term is often used as a synonym of Corporate Social Responsibility (CSR) even if they are not quite the same. ESG refers to how corporations and investors integrate environmental, social and governance concerns into their business models. CSR traditionally has referred to corporations' activities with regard to being more socially responsible, to being a better corporate citizen. One difference between the two terms is that ESG includes governance explicitly and CSR includes governance issues indirectly as they relate to environmental and social considerations. Thus, ESG tends to be a more expansive terminology than CSR (Gillan et al. 2021).

There are several different ESG rating agencies that compute and publish these ratings based on reported information in environmental, social and governance pillars (e.g., Sustainalytics' ESG Risk Ratings, MSCI ESG Ratings, Bloomberg ESG Disclosure Scores, Thomson Reuters ESG Scores). According to Amel-Zadeh and Serafeim (2018), the most frequent motivation for practitioners' use of ESG data is its relevance to investment performance and appraisal, followed by clientele demand, fund strategy, and ethical considerations.

On the other hand, these authors also report several limitations in using ESG information, such as the lack of reporting standards and, consequently, the lack of comparability amongst different agencies. Nevertheless, these scores are a commonly used measure of corporate sustainability in academic empirical research and in financial markets.

According to Bernow et al. (2017), some of the world's largest institutional investors are now integrating sustainability into their investment decision processes. However, it is also pointed out that, although an even larger amount of investors have adopted approaches that consider ESG factors in portfolio selection and management, others refuse to do that because they believe sustainable investing produces lower returns than conventional strategies.

This twofold way of thinking among investors derives from two opposing theoretical views that have been corroborated in the literature.

As explained by Gangi and Varrone (2018) and Glossner (2019), the first and traditional view, established during the 70s, focuses on shareholders and it is associated with Friedman. This theory treats investing in social performance as an agency problem. According to this view, managers spend money on value-destroying CSR projects, for example, to create the popular image of a socially responsible manager. Moreover, from a capital market perspective, stringent ethical and social criteria limit the diversification of the fund, thus violating a pillar of modern portfolio theory of Markowitz. In conclusion, the costs of ESG initiatives, which benefit stakeholders and society, do not translate into better financial performance.

The second perspective, developed from the 80s, instead highlights the positive outcomes of responsible investments related criteria, arguing that these benefits are greater than the screening costs, in accordance with stakeholder theory established by Freeman and the resource-based view of Barney. It is often argued that CSR does not only further social goals, but also enhance shareholder value. Certainly, CSR reduces the risk of incidents, strengthens the strategic market position of a firm, and attracts socially responsible stakeholders who are willing to exchange money for moral value.

The stakeholders view has become dominant over time, as roughly 90% of studies find a non-negative relationship between ESG rating and corporate financial performance. More importantly, the large majority of studies reports positive findings (Gillan et al. 2021).

However, the discussion is still open, given that there are some contrasting results on several aspects concerning ESG. As a proof, the link between ESG and firm financial performance and value, which the most debated topic, is still not well established. In this type of studies, performance and value are measured in several ways, such as operating performance, short- or long-run stock returns, and Tobin's q . The lack of convergence in measuring performance leads researchers to have different results and interpretations, continuing to feed a literature infused with contradictory outcomes.

For example, Eccles and Serafeim (2013) analysed the trade-offs between ESG performance and financial performance and suggested sustainable strategies to enhance both performances simultaneously. The opposite is shown by Luo (2022). Examining UK stocks from 2003 to 2020, she found that firms with lower ESG earn higher returns than those with higher ESG. However the latter still trade at premium, because of liquidity considerations. More precisely, ESG-sensitive investors are reluctant to hold stocks of low ESG firms. Thus, such stocks can be neglected and yield higher expected returns than high ESG stocks. It follows that liquidity helps explain the ESG premium due to the greater demands of high ESG stocks.

So far, the discussion has highlighted, that ESG negatively or positively influences financial performance. Therefore, when analysing a company's performance and value, ESG cannot be omitted because of its significant effect and its ability to explain financial variables.

2.1. ESG LITERATURE

Greater ESG/CSR performance can also increase firm value, enhancing shareholder wealth or maximizing shareholder utility (Gillan et al. 2021). The former is achieved by increasing cash flows (e.g. customers want to buy from firms that have good reputations, employees are more productive, etc.) or by decreasing the discount rate (e.g. affecting the cost of capital through risk reduction) with the result of influencing the price paid in an hypothetical acquisition. Instead, the latter is obtained because shareholders value the environmental or social goods produced by high ESG/CSR profile firms in addition to the cash flows they produce. Under this alternative, shareholders receive more utility by owning responsible firms, even if the cash flows are the same as those of irresponsible firms.

While examining the prevalent literature about value creation, Gillan et al. (2021) discovered that some authors found a significant negative relationship between changes in firms' ESG/CSR scores and changes in ROA or stock returns, measured across 3 years. They interpret these results to suggest that "any benefits to stakeholders from social responsibility come at the direct expense of firm value."

Generally, high ESG firms are believed to be more sustainable and transparent, and have better quality, so they attract more investors, compared to low ESG firms. Of the same view is Khan (2022), who sustained that companies engage in ESG activities in order to achieve higher financial returns and to signal compliance in the market.

Although ESG engagement helps to build a sound public reputation for firms, if sustainability performance is associated with the potential decline in economic benefits, as suggested by the shareholders' view, it means that ESG may also increase operational risk for companies (He et al. 2022).

It follows that ESG/CSR, through a variety of different channels, can affect many types of risk, including systematic risk, regulatory risk, supply chain risk, product and technology risk, litigation risk and reputational risk (Gillan et al. 2021). However, the literature has not found a unique correlation between company risk and ESG. Indeed, companies which engage in ESG activity are perceived to be less risky, because of the low probability that certain events resulting from a lack of ESG practices in their regular operations occur, such as accidents, lawsuits, or government intervention into management practices (Gomes and Marsat 2018; Khan 2022).

On the completely opposite opinion, La Torre et al. (2020) affirmed that ESG scores do not adopt a forward-looking approach and consequently do not provide a risk assessment. Analysing the performance of companies included in the Eurostoxx50 index over the 2010-2018 period, they found that Eurostoxx50 companies' performance does not seem to be affected by their efforts in terms of ESG commitments. According to them, ESG information is not timely received by the market for most of the companies, and therefore the variability of stock prices is driven by other risk factors.

Another relevant subject of discussion is about whether responsible investments or companies with high ESG commitment are more resilient to economic downturn.

Luo (2022) sustained that during the economic uncertainty and liquidity shortage, high-ESG firms comfort investors from unfavourable economic shocks, given that investors can achieve high liquidity when holding high ESG stocks. This can be helpful during crisis, when the market tries to “fight-to-liquidity” and “fight-to-quality”.

Indeed, with reference to the most recent global crisis, Gillan et al. (2021) sustain that high CSR firms performed better than low CSR firms during the 2008-2009 financial crisis, which is consistent with the resiliency argument. Moreover, for what concerns the COVID-19 crisis, Morningstar (2020) has reported that investors turned to responsible investment for resiliency not only during, but also post-pandemic.

However, Folger-Laronde et al. (2022) analysed the differences and relationship between the financial returns of exchange-traded funds (ETFs) and their Eco-fund ratings during the COVID-19 pandemic-related financial market crash. They showed that the sustainability performance of investments cannot alone be used to determine financial performance. Further, sustainability performance of ETFs does not guarantee investments will be resilient during a crisis-induced market downturn.

To conclude, this discussion was aimed to prove that ESG literature is becoming increasingly important for countries, investors and businesses. However, it is a relatively new theme and authors do not have a wide understanding about the consequences of ESG commitment on financial markets and inside the company’s operating performance. All the topics analysed, such as financial performance, firm value, risk assessment and resiliency during crises, are relevant for a potential bidder when deciding the most suitable target and they could explain why an acquirer chooses or not a target with high ESG scores or why it pays more or less for sustainable companies.

2.2 M&A Literature

The second field of literature to discuss concerns mergers and acquisitions. After the description of the reason to engage in an M&A transaction and how the acquirer intends to increase value, I include the theoretical frameworks that are useful to conduct the empirical analysis of the following chapters.

While M&A activity brings value to the target’s shareholders, this is not a rule of thumb for the acquirer. Indeed, a study carried out by McKinsey on large acquisitions shown that, on average, one-third of the deals created value for the buyer, one-third did not and for the remaining one-third the results were inconclusive. However, it found that value creation accrued to the shareholders of the target company, since they are generally receiving a premium over their stock price (Koller et al. 2020, p. 630). On the contrary earlier studies, including both public and private targets and acquirers, display average acquirer shareholder positive abnormal returns of about 1%-1.5%. Nevertheless, given the small return, even the earlier studies fail to

2.2. M&A LITERATURE

explain why tens of thousands of M&A are reported annually worldwide and why the number and size of M&A continues to grow (DePamphilis 2019, p. 24).

However, the literature helps explain that the acquirers continue to engage in M&A activities for several reasons. Cox (2006) points out that the causes of mergers refers to investment theory, where the target firm to be acquired is a profitable investment in a capital budgeting sense with a positive net present value. The target can deliver returns above the required level, if it is under-priced in the stock market. This under-pricing may be due to an information asymmetry between investors and the firm. Other sources of value creation may come from the management of the acquirer that is more efficient than the management of the target company.

Another path of increased worth may be derived from synergies due to the amortization of fixed costs on a greater volume level and, therefore, lowering the average cost per unit. Furthermore, the synergy may come from economics of scale or scope or both. Horizontal merger creates economies of scale, because when two firms combine and become larger, this may enable the organization to choose a different technology or organization structure that is of lower per unit cost when the quantity produced is great. While congeneric merger is more likely to produce economies of scope. Congeneric merger is defined by Cox (2006) as a merge between two firms that are allied-in-nature, in other words, it occurs when the two companies are in the same or related industries but have different business lines or products. Another source of value may come also from tax considerations with unused tax loss carry forwards, underutilized depreciation tax shields and interest expense tax deductions.

A market power reason for a horizontal merger is when the acquirer gains a dominating market share in the product market that the firm sells in. Because of the lesser competition, the firm has influence if not control (for a monopoly) over market prices and therefore can better manage its profits. This concentration of power, however, is hindered by the government and its regulatory agencies. Vertical integration mergers are another form of market power, either upstream or downstream in the supply chain, giving more control to the firm to affect prices at which distribution channel point the profit is made so as to provide fiercer competition where needed.

Diversification reasons for mergers are instead at the heart of conglomerate mergers, which try to reduce the variance of cash flows. Large conglomerates may also provide an internal capital market for funds at a lower cost of capital compared to securing money from the external market.

Another advantage of external growth through M&A is that the timeframe is much shorter and costs are relatively known with respect to internal growth. Simultaneously, an acquisition eliminates a competitor whereas internal growth gives notice to competitors of a firm's intentions. In addition, acquisitions can be used to acquire strategic assets, such as a patent or a license, or to get privileged access to natural resources.

A pointless rationale to effect a merger is the follow-the-herd argument, that leads to merger waves. This can be explained by the fact that, by replicating the actions of others, a company

may mirror their average performance and not be below average achievement. Looking at the real option field of literature, also this strategy can create value. It could happen that the actual current merger appears to have no value given that a net present value analysis calculates a negative figure. Nevertheless, this acquisition gives the firm growth options to expand at a subsequent date. These call options have value now and possibly more in the future.

Taking inspiration from the agency theory, it is possible to find other causes of mergers. The agency theory denotes the conflict between the interests of stockholders to that of managers. Managers of large firms, on average, earn higher compensation. For this reason, they are motivated to boost the firm size, without taking into consideration profitability and risk.

A new approach of creating value could be focusing on ESG issues. Indeed, ESG strategy may help companies gain share by improving their brand image, manage costs by reducing waste and attract and retain top talent (Bain & Company 2022).

Sustainability concerns influence not only the value creation, but also the deal premium and the probability of becoming a target.

The deal premium is largely investigated in the literature and it focuses, according to the authors' needs, on different topics, such as size of target (Alexandridis et al. 2013), cross-country determinants (Rossi and Volpin 2004), CSR-oriented bidder (Krishnamurti et al. 2019) and shareholders' protection (Rossi and Volpin 2004; Gomes and Marsat 2018). The deal premium represents how much the acquirer has paid the target relatively to its market share price. We refer to premium and not to discount, because the buyer usually pays more than the market value for two reason:

- i. value of control, which consists in all the benefits deriving from full control of the company, such as the power to choose the board of directors, hire and fire the CEO, approve budgets and spending, influence strategy and long-term planning, pay dividends and change capital structure;
- ii. value of synergies, which is the difference between the combined value produced by the two entities together and the sum of the value of the two separate entities; in other words it represents the value of improvements that the acquirer has planned to obtain from the target.

The literature about the probability of takeover targets has developed following the model used to predict bankruptcy. However, the difference between the prediction of bankruptcy victims and takeover targets is that, in the case of the former, anticipatory share price movements are likely to be primarily based on an interpretation of the firm's past financial performance and an extrapolation of this into the future. In the case of the latter, they are more likely to be the result of insider dealing and based on rumour (Barnes 1998).

As the time passes, these models have become more sophisticated, changing the sample methodology to better describe the real world and finding different alternatives for the calculation of the

cut-off probability, that is the point in which the probability distribution of being a non-target equals that of being a target. If the model predicts that a company has a probability of being acquired higher than the cut-off probability, then it would be considered as a target. In addition, some empirical models place side by side accounting ratios with market ratios, that are more forward-looking. Although these models perform better than chance, they do not perform sufficiently well, considering that the overall results are not sufficiently sensitive to be statistically significant.

Moreover, there is some uncertainty about the variables to be included in the model. Firstly, it is unclear which variables are related to the probability of acquisition where the market for M&A is motivated at different times by different factors. Secondly, not only there are a number of alternative accounting ratios available as proxies for a particular variable, but it is often unclear which is the best where the alternatives are not so much substitutes as having overlapping information content (Barnes 1999). However, if all the available ratios were used, this would lead to multicollinearity in the estimation data and mis-specification of, and bias in, the statistical model estimated.

Several studies typically started with a large number of financial ratios and then, simply on a step-wise basis, let statistical significance determine whether which ratios were retained. On the contrary, some authors decide to formulate a certain number of hypotheses of acquisition likelihood and usually chose a single representative accounting ratio. The most popular hypotheses, which are described by Barnes (1999), are:

- i. Inefficient management. It is often suggested that mergers are a market mechanism by which resources are transferred from inefficient managers to efficient ones. As the principal measure of their efficiency is profitability, this implies that a firm with less than average profits is vulnerable to takeover whereas one with higher than average profits is not. Further, shareholders, whose main concern is their dividends, may also be more likely to agree to a merger bid, if they consider their dividend and its growth over recent years to have been not satisfactory.
- ii. Undervaluation. Another aspect of the inefficient management hypothesis relates to the attractiveness of a firm that is undervalued on the stock market relative to its value. In this case, an acquirer who may be able to “break up” the company or sell off some of its assets thereby making a quick profit. Thus, the lower the valuation ratio of a firm, the more is its attractiveness to potential buyers.
- iii. Growth-resource mismatch. A further aspect of the inefficient management hypothesis is the notion of both low-growth/resource-rich and high-growth/resource-poor firms being natural acquisition targets. For instance, a target’s managers may not be fully utilizing its resources. On the contrary, the prospects of a high growth firm may be spoiled if it has inadequate financial support.

- iv. Inefficient financial structure. An additional aspect of the resources mismatch traditionally relates to the extent to which the firm has taken advantage of the benefits of leverage. Low leverage may signal unused debt capacity which may be attractive to a potential acquirer.
- v. Size. Growth maximization theory suggests that managers would prefer larger rather than smaller acquisitions.

This field of literature is interesting because there are lots of possible improvements to be made. Indeed, in order to increase the predictive power of the model, a potential solution is to include ESG score as an explanatory variable. This variable could help better explaining why a company is acquired instead of others because of the increasing attention given to sustainability issues in M&A decisions.

2.3 Hypothesis development

The CSR literature, which is a component of the broader ESG literature, states that the relation between CSR performance and firm value is still unclear because of the intangible nature of attributes often associated with CSR (Gomes and Marsat 2018). These attributes, which include corporate reputation, culture, and employee's knowledge and capabilities, can be a source of competitive advantage because they are difficult to create or replicate. However, these intangible assets are also extremely hard to value.

The stakeholders view, which is the dominant view nowadays, sustains that ESG can boost value creation. Indeed, according to Henisz et al. (2019), ESG is linked to cash flow, therefore to valuation, into five important ways:

- i. facilitating revenues growth, as it will be easier entering in new markets or expanding the existing ones. Moreover, ESG sensitive customers may be willing to pay a higher price to companies with higher ESG scores;
- ii. reducing costs through the reduction of energy use, water use and waste created during the production process;
- iii. minimizing regulatory and legal intervention and as a consequence reducing the risk of lawsuits or adverse government actions;
- iv. increasing employee productivity, enhancing motivation and instilling a sense of purpose;
- v. optimizing investment and capital expenditure by allocating capital to more promising and more sustainable opportunities.

From the aforementioned discussion, we can conclude that companies with high ESG ratings perform better financially, because ESG initiatives may create a competitive advantage, which

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can raise profits and value creation. Therefore, good ESG performance of the target might increase the return of the acquirer following an M&A, positively impacting the deal premium. In other words, I expect that companies' ESG rating will positively influence the deal premium paid in an acquisition.

Hypothesis 1: Target companies with high ESG ratings receives higher deal premium than companies with low ESG ratings.

There are several reasons why an acquirer would choose a target with high ESG score, as explained by Krishnamurti et al. (2019). First, acquirers may prefer targets with the ability to cope with environmental and social risks, because firms with strong ESG practices engage less in earnings management and are less likely to hide bad news from investors. Second, acquirers could learn from target's ESG practices and experiences. Third, increased social and environmental performance potentially increases a firm's efficiency, employee and customer satisfaction, generate new opportunities and signal market quality. Finally, research carried out by Caiazza and Volpe (2015) and Lu (2018) highlights the essential role played by culture in determining successful post-merger integration. Since CSR and ESG can be seen as an organizational culture marker, target with high social and environmental ratings are more likely to be chosen.

Based on these arguments, I expect that acquirers will choose more often ESG-oriented targets in order to minimize social and environmental risks and exploit the target's higher perceived quality.

Hypothesis 2: Target companies with high ESG ratings are more likely to be acquired than companies with low ESG ratings.

The more urgent attention to sustainability and environmental issues could lead M&A to be a driver to achieve ESG targets and thus to be more appealing to the society. Indeed, Barros et al. (2022) found that large firms, which engaged in M&A activity, are associated with higher ESG ratings in all the three pillars that form ESG score. Therefore, engaging in an M&A activity with a target owning an ESG rating could be beneficial for the acquirer, firstly because the buyer could learn from target's sustainable practices and experiences and secondly because it will receive the ESG score itself, satisfying information and transparency market requirements. This suggests the following two relationships:

Hypothesis 3: Acquirer companies start to be covered by ESG rating after the acquisition of targets with ESG score.

This third research question differs from the second one, as with the latter, I want to investigate whether, among a group of targets with similar characteristics, the bidder will choose the one with a high rating (e.g. acquirer engages in an M&A transaction for reasons different from environmental and social issue, but ESG score plays an important role for the final decision). Instead the former is the starting point of a discussion about a bigger research question, that is

whether ESG can be interpreted as a reason to make an acquisition. Although this topic is not investigated, some considerations are developed.

The contributions of this work are twofold. For what concerns the M&A literature, it firstly tries to better understand what drives deal premium and target choice adding ESG as an explanatory variable. Secondly, it also contributes to the relatively new and not so developed ESG literature. Indeed, the majority of the empirical research focuses on whether ESG can increase the financial performance, without considering how this factor can affect the major corporate investment decision (M&As).

Moreover, a great part of the literature examines CSR instead of ESG. Existing studies have mainly focused on the impact of CSR on market valuation (La Torre et al. 2020), firm risk (He et al. 2022), financial performance (Folger-Laronde et al. 2022) and asset allocation choices (Gangi and Varrone 2018). A few authors have tried to study ESG, more specifically within the framework of mergers and acquisitions.

Chapter 3

Research design

3.1 Data sources and sampling procedure

Data on takeovers are collected from Refinitiv Eikon M&A database and the sample includes only completed deals announced between 2001 and 2021, where the target is publicly-listed. To maximize the sample size, the acquirer is either public or private.

Minority stake purchases might be affected by cross-country differences in disclosure requirements (Rossi and Volpin 2004), potentially interacting with the disclosure component of ESG scores. Thus, selecting only purchases after which the acquirer owns more than 50% of the target minimizes this cross-border disclosure bias. It follows that I neglect acquisition of partial interests and acquisition of remaining interests in the target.

Repurchases deals, Self-tender and Recapitalization deals are omitted and following Ung and Urfe (2021) and Alexandridis et al. (2013) the deal value should be at least \$1 million to exclude low priced securities.

This query yields a total of 18,924 deals. Then, I exclude all acquiring and target firms from the financial sector due to the highly regulated nature of the industry. This is a standard practice followed by several authors, such as Barros et al. (2022) and Tampakoudis and Anagnostopoulou (2020). I also remove firms with “government and agencies” as their macro industry.

The information on ESG is again retrieved from Refinitiv Eikon, which offers one of the most comprehensive ESG databases in the industry, covering over 80% of the global market cap, across more than 630 different ESG metrics, with history dating back to 2002 (Refinitiv 2022). In recent years, the ESG score from this database has been used intensively in the academic literature (Barros et al. 2022). However, the lack of data on sustainability issues leads the sample to count only on 933 deals.

For each testing hypothesis, the sample is different according to the availability of financial and market data necessary to run the regression. Further details about the final sample size for a specific hypothesis are described in the following sections.

The common sample selection stages are summarized below, in Table 3.1.

Table 3.1: *Sample selection*

Filters	Number of deals
Initial sample: Public target, announcement date 2001-2021, completed deals in which the acquirer owns more than 50% after transaction, deal value higher than \$1 million, no acquisition of remaining and partial interests	18,924
Remove acquirer and target with “Financials” as Macro Industry	(8,601)
Remove acquirer and target with “Government and Agencies” as Macro Industry	(9)
Remove acquirer and target without identifier	(258)
Number of deals before adding ESG score	10,054
Remove target without ESG score	(8,764)
Remove target without ESG score one year prior to announcement	(357)
Number of deals before specific company data cleaning	933

Source: Refinitiv.

3.1.1 Deal premium

In order to analyse the deal premium, I should have data for each firm for a minimum of one year before the announcement. After the elimination of 288 deals due to the lack of deal premium and financial data, the final sample is composed by 645 observations. It covers the period from 2004 to 2021 and involves 45 countries between target and acquirer nations and 22 economic sectors according to the NAICS classification.

I have included a breakdown of the number of deals by NAICS industry in Table 3.2 and by announcement year in Table 3.3.

Looking at the industry, Manufacturing is the most active sector with 260 deals due to the variety of subcategories and companies operating in this field. On the other hand, Education & Social Assistance and Construction are the least dynamic and have the lowest mean deal premium. Retail trade has instead the highest premium because of the presence of three extreme values. The distribution of observations is relatively even among target’s and acquirer’s NAICS industry, suggesting that most of deals are industry related.

Moreover, most of the deals in the sample are recent, explained by the increase in the ESG coverage over the years. Indeed, more than half of observations are from 2016 until 2021. There is also an increasing trend in the mean deal premium over time.

3.1. DATA SOURCES AND SAMPLING PROCEDURE

Table 3.2: Deals by NAICS Industry

NAICS Industry	Number of Targets	Number of Acquirers	Mean Premium
Agriculture, Fishing & Mineral industries (11-21)	71	70	24.59%
Utilities (22)	37	36	37.89%
Construction (23)	15	20	25.60%
Manufacturing (31-33)	260	295	37.92%
Wholesale trade (42)	22	16	31.50%
Retail trade (44-45)	19	18	72.49%
Transportation and Warehousing (48)	36	32	32.60%
Information (51)	47	47	38.61%
Finance, Insurance & Real Estate (52-53)	18	24	38.69%
Professional Services (54-56)	84	52	31.89%
Education & Social Assistance (61-62)	12	14	16.55%
Entertainment, Food & Other Services (71-81)	24	21	25.62%

Source: Refinitiv. The mean premium for the entire sample of 645 deals is 35.10%.

Table 3.3: Deals by Announcement Year

Announcement Year	Number of Deals	Percentage of Total	Mean Premium
2004	2	0.3%	18.17%
2005	6	0.9%	11.41%
2006	14	2.2%	20.42%
2007	25	3.9%	26.82%
2008	20	3.1%	19.41%
2009	18	2.8%	44.00%
2010	26	4.0%	32.18%
2011	31	4.8%	34.30%
2012	30	4.7%	40.80%
2013	14	2.2%	38.26%
2014	42	6.5%	24.32%
2015	63	9.8%	38.87%
2016	64	9.9%	34.02%
2017	61	9.5%	40.48%
2018	72	11.2%	23.86%
2019	66	10.2%	30.02%
2020	42	6.5%	66.35%
2021	49	7.6%	43.58%

Source: Refinitiv.

3.1.2 Probability of being acquired

The sample selection for testing the takeover probability is much lower than the deal premium sample due to the large amount of financial information required. Proceeding with the data cleaning, the final subset is composed of 389 successfully acquired companies.

Data for non-acquired companies are retrieved from the Industry App included in Refinitiv Eikon, which provided several information on TRBC Economic Sector (Refinitiv business classification). Furthermore, I have deleted companies that were already contained in the initial sample of acquired companies regardless of their inclusion in the regressions.

The final sample for non-acquired companies is composed of 4,421 firms that satisfied all the information requirements for at least one year. Some companies are used for several years, leading to 32,836 observations.

The overall sample is composed of a total of 33,225 observations, of which 389 belong to successfully acquired firms and the remaining belongs to non-target in the period under consideration (2001-2021). This huge discrepancy is highly representative of the real world, as the set of potential targets is much higher than the actual acquired companies.

In Table 3.4 and Table 3.5 a breakdown of the target companies is provided by industry and by year of acquisition. In this case, I have considered TRBC Economic Sector, instead of NAICS to be coherent with the information collected for non-acquired companies.

As before, the majority of acquisitions occurs between 2016 and 2021 and this can explained why Technology is among the most active industries. One third of the deals belongs to Consumer Cyclical and Industrials, which are the most populated sectors. Few deals instead take place in Real Estate, mainly due to lack of data and in Academic & Educational services.

Table 3.4: *Target distribution by Industry*

TRBC Economic Sector	Number of Deals	Percentage of Total
Academic & Educational Services	1	0,26%
Basic Materials	46	11,83%
Consumer Cyclical	72	18,51%
Consumer Non-Cyclical	40	10,28%
Energy	38	9,77%
Healthcare	30	7,71%
Industrials	63	16,20%
Real Estate	7	1,80%
Technology	60	15,42%
Utilities	32	8,23%

Source: Refinitiv. The subsample for targets is composed of 389 observations.

Table 3.5: *Target distribution by Announcement Year*

Announcement Year	Number of Deals	Percentage of Total
2004	2	0,51%
2005	5	1,29%
2006	11	2,83%
2007	13	3,34%
2008	15	3,86%
2009	14	3,60%
2010	19	4,88%
2011	20	5,14%
2012	18	4,63%
2013	7	1,80%
2014	25	6,43%
2015	43	11,05%
2016	38	9,77%
2017	43	11,05%
2018	37	9,51%
2019	28	7,20%
2020	23	5,91%
2021	28	7,20%

Source: Refinitiv.

3.1.3 ESG coverage

For the ESG coverage sample, I start with the number of deals before cleaning for ESG score. At a first sight, among 10,054 deals, acquirers with ESG score the year before acquisition are 2,476. The remaining 7,578 do not have the score. However, 694 of the latter start to be covered by the rating the year after the M&A, while 908 after two years from the acquisition.

Given that I want to investigate whether ESG coverage is essentially driven by M&A or it is influenced by the target having the ESG score, I am interesting only in acquirers that have at least a score in the period under consideration. In other words, the buyer has had the score in the past or it will be rated in the future. Removing all the observations in which the acquirer identifier is not included in the ESG database and in which the acquirers have already the score the year prior to acquisitions, the sample is reduced to 1,669 observations. The lack of financial information reduces the sample to the final number of 1,392 observations.

At the end, the acquirer remains without a score in 683 observations, in 499 there is ESG coverage after one year from acquisition and in 682 after two years.

3.2 Description of variables

3.2.1 Dependent variables

Deal Premium

The deal premium is the dependent variable used in the first and main analysis. It is gathered from the Refinitiv Eikon database and measured four weeks before the announcement date to eliminate the effect of any takeover rumours or insider trading.

Given that these two factors have an impact on the price, several authors decide to take share prices before the announcement. However, there is no convergence on the most appropriate time to use. Barnes (1998, 1999) uses prices two months before announcement, while Alexandridis et al. (2013) and Rossi and Volpin (2004) measure the price four weeks before.

In addition, the time horizon must be limited to avoid accidentally including effects of fundamental factors which impact the share price in the longer term. Thus, I use a premium calculated from the share price four weeks prior to the acquisition announcement.

$$\text{Deal premium}(\%) = \frac{(\text{Deal value excluded Liabilities})/(\text{Shares Acquired})}{(\text{Share Price 4 Weeks before Announcement})} - 1 \quad (3.1)$$

The mean premium of the original sample is 35.1%, with a standard deviation of 56.8%, which is really high mainly due to the presence of some outliers, especially in the right side of the distribution (see Figure 3.1). For this reason, I winsorize at the 1% and 99% levels to minimize the influence of all the outliers inside the sample. After winsorizing, the premium paid ranges from -76.4% to 230.3% with an updated mean of 33.2% and a standard deviation of 40.4%, in line with the articles reviewed.

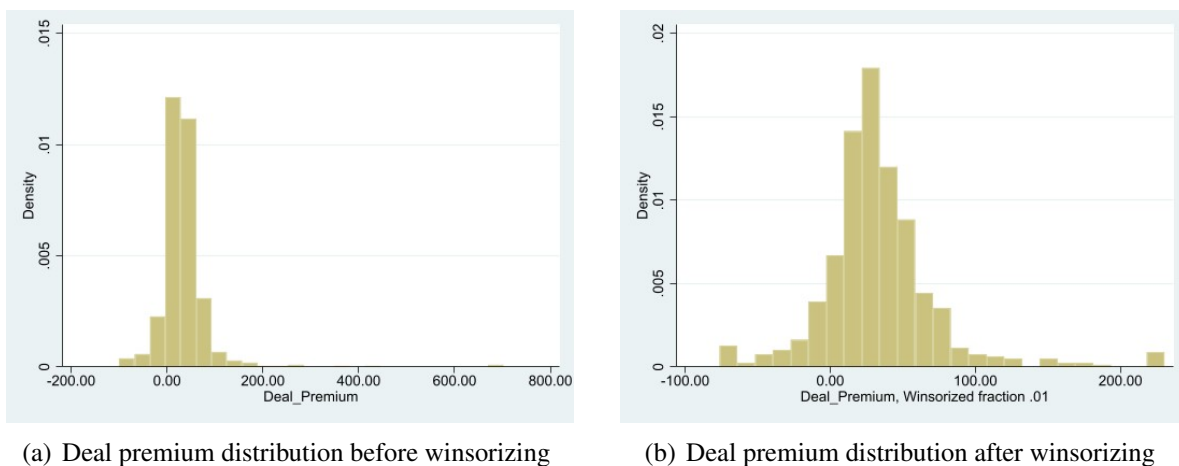


Figure 3.1: *Deal premium distribution*

Although not statistically significant, bidders that are covered by ESG rating the year prior to the acquisition announcement pay on average a lower premium (34.7% vs 36.4%). This con-

3.2. DESCRIPTION OF VARIABLES

firms what proved by Krishnamurti et al. (2019), who show that CSR-oriented bidders are more likely to pay lower bid premiums than bidders not covered by CSR rating.

Probability of being acquired

The probability of becoming a target is investigated in the second hypothesis. It could be possible that ESG is used only as a lever in negotiating the terms of a deal once the target is picked, rather than actually driving target choice (Gomes 2019). Thus, focusing on target choice rather than price paid allows us to determine whether ESG influences the strategic decision of picking a target.

ESG coverage

ESG coverage represents the probability for the acquirer of receiving the rate from Refinitiv one or two years following the acquisition.

3.2.2 Explanatory variables

Target ESG-scores

The scores provided by Refinitiv Eikon are not absolute values, but they are based on relative performance of ESG factors within the company's sector (for environmental and social) and country of incorporation (for governance). The latter is because governance practices are more consistent across countries than industries (Ung and Urfe 2021). Thus, firms might increase their score more by focusing on categories or pillars with poor peer performance. Scoring based on percentile allows to have a score range between 0 and 100 and to minimize the effects of outliers.

Thus, the ESG scores are composed by three pillar scores (environmental, social and corporate governance), which are split into several categories. The ESG pillar score is a relative sum of the category weights, which vary per industry for the environmental and social categories, whilst for governance, the weights remain the same across all industries.

Refinitiv also provides an overall ESG combined score, which is discounted for significant ESG controversies impacting the corporations. Information on ESG controversies are captured from global media sources. The main objective of this score is to discount the ESG performance score based on negative media stories.

If controversies score is higher than or equal to ESG score, then the combined score is equal to ESG score. On the other hand, if controversies scores is lower than ESG score, then the combined score is the average of the two scores.

For the regressions, I use the scores from one year prior to the deal announcement year, since the score from subsequent years might be influenced by efforts to look more ESG friendly to attract more attention from prospective bidders. Additionally, acquiring firms might also implement measures in their targets that affect ESG during and after the integration process (Ung and Urfe

2021). I decide not to use the ESG scores from the announcement year, as they could not be available for the acquirer at the time of the announcement.

Therefore, the mean score from the year prior to the deal announcement related to entire dataset before any eliminations (933 observations) is 36.3 for targets and 52.4 for acquirers. Both have significant variation, with values ranging from about 1 to over 93 points for both parties. The standard deviation is close to 20% for both.

On the other hand, while testing the third hypothesis, the target ESG score becomes a dummy variable, which takes the value of one if the target has a rating one year before acquisition.

3.2.3 Control variables

This section describes the set of control variables that I have included for each model, the mechanism through which the variables can influence the dependent variable and the expected sign.

Deal premium

The variables used to analyse the deal premium can be categorized into deal-specific, market, financial and ownership structure variables.

Deal-specific variables

Relative Deal Size. Deal value divided by acquiror total assets. The effect of this variable on the deal premium is ambiguous as it depends on the target and buyer sizes. Small bidders are more likely to generate more positive abnormal returns than larger sized firms (Krishnamurti et al. 2019), thus they could be willing to pay a higher premium. However, they often have limited resources. Nevertheless, Alexandridis et al. (2013) show that the deal size negatively affects the premium. High value at stake, for instance, can result in more accurate valuations or can make managers and their boards more hesitant to offer substantial premiums. It can also motivate acquirers to hire more reputable financial advisors that, in turn, may provide better advice or negotiate better deals. In conclusion, this variable can influence the premium in several and not univocally ways.

Cash payment. A dummy variable with the value of one if the deal is financed with cash only as the payment method, otherwise zero. A wholly cash payment, which implies a prominent tax effect, should increase the premium significantly.

Stock payment. A dummy variable with the value of one if the deal is financed with stock only as the payment method, otherwise zero. In this case, the target assumes a portion of the risk of capturing synergies and paying too much. Therefore, the effect on the deal premium is not well defined.

Cross-border. A dummy variable with the value of one if the deal is international. The reference country was given by the headquarter of the company. The distinction between domestic and cross-border deals is important given the increased complexity of cross-border M&As,

3.2. DESCRIPTION OF VARIABLES

which embed greater information asymmetry and a higher risk of improper evaluation compared with domestic operations. However, cultural distance is considered to have both positive and negative effect, because it may cause cultural conflict but also create possibility of cultural complementarity (Lu 2018). Indeed, according to the resource-based view of the firm, cross-border M&As are realized to use existing resources for achieving a competitive advantage in the destination market or to obtain new resources imperfectly mobile across countries to reinforce firm competitiveness in the home country (Caiazza and Volpe 2015). Following this discussion, the expected sign is not certain, because this variable captures information asymmetries and governance issue, but also cultural fit and potential synergies.

Industry Relatedness. A dummy variable with the value of one if the transaction parties are in the same 2-digit NAICS industry. The horizontal/vertical nature of deals can be expected to impact bargaining power and potential takeover synergies. Industry-related deals are associated with lower information asymmetries because the market knowledge of the acquirer is relatively better (Gomes and Marsat 2018). However, the acquirer still bear several risks, such as overconfidence and antitrust risk. Nevertheless, in these deals, economies of scale and scope are easier to realize and information asymmetries are reduced, thus I expect a positive effect on deal premium.

Hostile. A dummy variable with the value of one if the transaction is defined as hostile by Refinitiv Eikon. A hostile takeover often implies the use of antitakeover defences and usually commands a higher premium. Thus, the expected sign on deal premium is positive.

Multiple bid. A dummy variable with the value of one if there are multiple bidders. The presence of more than one potential buyer creates competition that could increase the premium that the target could obtain from the buyer.

Market variables

Size. Natural logarithm of target's market capitalization four weeks prior to the acquisition announcement. Krishnamurti et al. (2019) explains that acquirers experience greater losses when acquiring large targets because they are more likely to overpay. This is explained by overconfident managers, who often pay huge premia for large firms since they often grant particularly high private benefits. Nevertheless, as explained in the relative deal size section, high value at stake can result in more accurate valuations, in being more hesitant to offer substantial premiums and in hiring more reputable financial advisors. Moreover, the complexity of integrating large firms can make expected synergies from the combination more uncertain and therefore leading to lower premia. In conclusion, given that this variable takes into account both synergy hypothesis and increased complexity, the expected sign on deal premium is ambiguous.

Market to Book (M/B). Market capitalization four weeks prior to the acquisition announcement divided by book value of equity. As suggested by Rossi and Volpin (2004), acquirer of glamour firms (measured by high market-to-book ratios) may tend to overestimate the ability to

create synergies in the target and should therefore be willing to pay more for them than for value firms (measured by low market-to-book ratios). However, the relation between Market to Book ratio and deal premium is more complicated. A negative relation can be found if a low Market to Book ratio illustrates the undervaluation of the target, whereas a positive relation should be seen if a low ratio signals restricted investment opportunities (Gomes and Marsat 2018). Due to growth potential and misvaluation, the expected relationship is ambiguous.

Financial variables

Following Caiazza et al. (2021) financial variables are one year lagged to reduce the endogeneity problem due to simultaneity. I do not use data from the announcement year, because not already available for the acquirer and also to have information that are consistent with ESG measures. These set of variables are the following:

Growth 2 years. Growth in revenues over last 2 years prior to the announcement. Buyers may be interested in targets that perform poorly because of the gains that could be realized if the current managers were replaced. In this case, the relation between the performance of the target and the premium should be negative. However, poor performance is often associated with fragile financial health and is therefore likely to hinder the target's ability to negotiate. In this case, the relation between performance and the premium should be positive (Gomes and Marsat 2018).

Current ratio. Current assets divided by current liabilities, which is considered to be a proxy of liquidity. Liquidity gives information about the target's financial position and could therefore affect premiums (Gomes and Marsat 2018). In particular, this ratio is used in order to consider both working capital and cash holdings, highly stressed in the corporate governance literature. Precisely, cash holdings are considered a proxy for agency costs because of the potential over-investment in capital expenditure and acquisitions due to holding excess cash (Barros et al. 2022). The expected relationship is not well established.

Return on Equity (ROE). Ratio of net income to common equity for the most recent fiscal year prior to the announcement of the transaction. Bidders could be expected to offer higher premiums for high-earning firms. However, strong earnings could also reduce potential gains insofar as takeover gains can come from the replacement of inefficient management. This, in turn, would point toward a negative association between ROE and premiums (Gomes and Marsat 2018). Again, the relationship between ROE and deal premium is ambiguous.

Investment Rate. Capital expenditures (Capex) divided by total assets. The intensity of capital expenditures can be expected to impact potential takeover synergies. For example, higher Capex might increase the potential for cost-cutting by removing duplicate investments (Ung and Urfe 2021). However, the relationship between investment rate and deal premium is not clear.

D/E. Book value of debt divided by book value of equity. A target that has considerable debt is less attractive, and the premium paid to obtain it should be lower.

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Ownership structure variables

The majority of research consider ownership structure relevant both for the determination of the deal premium and for the success of the deal. The most common ownership structure variables are blockholder, institutional shareholdings and executive shareholdings. However, because of the lack of data, only blockholder can be analysed.

Blockholder. A dummy variable with the value of one if the bidder held more than 5% of the target's shares before deal announcement, otherwise zero. This variable measures the effect of information asymmetry since acquirors can monitor the target. Monitoring also allows them to mitigate mispricing risk, which reduces premiums (Ung and Urfe 2021). Blockholder is also a proxy for the bidder's bargaining power. Therefore the higher the percentage held by the acquirer before the announcement, the lower the deal premium. The expected sign for the deal premium is negative.

Probability of being acquired

The variables used to analyse the takeover probability can be summarized into inefficient management, undervaluation, growth-resource mismatch, inefficient financial structure and size variables.

Inefficient management

EBIT margin. Profit before tax divided by sales. It is often suggested that mergers are a market mechanism by which resources are transferred from inefficient managers to efficient ones. As the principal measure of their efficiency is profitability, this implies that a firm with less than average profits is more vulnerable to takeover.

EBIT growth 3 years. Growth of profit before tax over last three years prior to the announcement. As before, this measure relates to inefficient management and again, the expected sign is negative.

Return on Equity (ROE). Ratio of net income to common equity for the most recent fiscal year prior to the announcement of the transaction. The relationship between ROE and probability of being acquired is negative because low profitability will attract companies more efficient in allocating resources.

Price to Earnings (P/E). Ratio of a firm's stock price per share to its earnings per share. It is not so rare that companies that have high price-earnings ratios may seek to acquire other companies that have low P/E ratios in order to achieve higher earnings per share and a higher share price. This hypothesis is based on the assumption that the market will price the shares of the combined firm at the higher P/E of the acquirer prior to the acquisition (Walter 1994). A second hypothesis is that a company having a low P/E ratio (relative to firms within its industry) is undervalued, which increases its acquisition likelihood, given that it is widely believed that undervalued companies do not remain undervalued. Under both hypotheses, a negative rela-

tionship is expected between P/E ratio and acquisition likelihood.

Average dividend 3 years/Equity. Shareholders, whose main concern is their dividends, are likely to agree to a takeover bid, if they consider their dividend and its growth over recent years to have been disappointing due to inefficient management (Barnes 1999). Lower dividends increase the probability of being a target.

Dividend growth 2 years. For the same considerations explained in “Average dividend 3 years/Equity”, the expected sign is negative.

Undervaluation

Market to Book (M/B). Market capitalization four weeks prior to the acquisition announcement divided by book value of equity. Market to book ratio is always associated with valuation, therefore, a low ratio may signify that the market has discounted a company’s share price because current management is not maximizing the earnings and cash flow potential of the assets. The possibility of earning higher returns by replacing incompetent management is believed to be the motivation for certain acquisitions (Walter 1994). From this discussion, the expected sign is negative.

Growth-resource mismatch

Asset turnover. Sales divided by total assets. Asset turnover is a measure of growth-resource mismatch given that a target’s managers may not be fully utilizing its resources. Therefore, firms with a low ratio may be attractive to ambitious management teams and this suggests a negative sign between asset turnover and the probability of a takeover.

Growth 2 years. Growth in revenue over last 2 years prior to the announcement. The growth rate of sales is a signal for growth-resources mismatch, which is important in the analysis of acquiring a potential target. Indeed, this ratio relates to the adequacy of finance for the firm. The prospects of a high growth firm may be spoiled if it has inadequate financial support and this type of target would be attractive only to a firm with enough resources available (Barnes 1999). From these considerations, the expected relationship on both the deal premium and the probability of being a target is not well defined.

Growth 3 years. Growth in revenue over last 3 years prior to the announcement. In the analysis of becoming a target, it is an habit to include in the model also 3 year growth rate in order to consider a longer perspective. As before, the expected relationship is not well defined.

Current ratio. Current assets divided by current liabilities, which is considered to be a proxy of liquidity. Excess liquidity may signal a lack of investment opportunities or a poor allocation of assets (growth-resources mismatch). An acquirer might be able to more profitably use a target firm’s excess liquidity (Walter 1994). The opposite case may also lead a takeover. A cash-rich acquirer may be attracted to a cash-starved target because it is a channel for the acquirer’s funds

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(Barnes 1999). According to these considerations, the expected sign between the level of liquidity and both deal premium and acquisition likelihood is not certain.

Tangibility. Ratio of property, plant, and equipment to total assets. This variable is included in the growth-resource mismatch set of ratios. This ratio may be considered either a proxy for the predicted importance of asset structure in determining debt capacity, or simply as a measure of whether the firm is relatively rich in real estate and production capacity. Ambrose and Megginson (1992) found that bidders look for asset-rich targets in order to achieve operating synergy. According to this, those industries where economies of scale in production are important determinants of success will witness numerous capacity-expanding mergers as firms compete to quickly achieve dominant market shares. This suggests targets are acquired primarily to increase production capacity and a positive sign of tangibility on the acquisition probability is expected.

Inefficient financial structure

Leverage. Book value of long-term debt divided by book value of assets. It is useful on the extent to which it expresses whether the financial structure is efficient or not. A negative sign is expected.

Interest coverage. Ratio of EBITDA on interest paid. This ratio is necessary to understand whether the company has enough cash to repay the interests, important in periods of high interest rates. If this ratio decreases, the target is more financially constrained. I thus, expect a positive sign.

D/E. Book value of debt divided by book value of equity. Measures of leverage have been hypothesized to be associated with acquisition likelihood. Low leverage may signal unused debt capacity, which a potential acquiring firm would find attractive (Walter 1994). Therefore, a negative relationship with acquisition likelihood is expected.

Cash Flow (CF). Operating cash flow over total assets. If this measure relates to growth-resources mismatch, the probability of being acquired is negatively influenced as there is no need to allocate resources already used in an efficient way. On the other hand, if it is connected to the financial structure, a higher ratio means that the company is less financially constrained and this could explain a positive relationship.

Size

Size. Natural logarithm of target's market capitalization four weeks prior to the acquisition announcement. For what concerns the likelihood of acquisition, Barnes (1998) suggested that it decreases with size mainly because of the size-related transaction costs and number of firms that are larger than the target decreases as its size increases. Therefore, I expect a negative relationship between size and the probability of being acquired.

ESG coverage

The variables used to analyse the probability of ESG coverage can be split into acquirer, target and deal-specific variables. Acquirer and target sets of variables refer to one year before acquisition.

Acquirer variables

Financial Buyer. A dummy variable with the value of one if the bidder is a financial buyer. The nature of the bidder influences the probability of receiving the ESG score, as financial buyers must satisfy a wide range of investors requirements, who pay even more attention in sustainability issues. As a consequence, to attract investors, they should not only to invest in green companies, but they also have to be believed concerned about society and environment. Obtaining the ESG score is a way to increase compliance with the market about these subjects. Therefore, I expect a positive relationship between Financial Buyer and the probability of receiving the score.

Serial Bidder. A dummy variable with the value of one if the bidder has made more than one acquisition in the period under consideration. Serial acquisitiveness is a proxy for managerial hubris, in line with Krishnamurti et al. (2019). A serial bidder attracts more attention in the market, and therefore it is more probable that it will receive the rating.

Total Assets of the Bidder. Natural logarithm of bidder's total assets. As before, large firms have more visibility in the market and a way of supervising them could be assign the ESG score, that signals investors whether the company is virtuous. Then larger firms have a higher probability of receiving a rating.

Investment Rate. Capital expenditures (Capex) divided by total assets. Firms that have high investment rates could have a higher probability of receiving the ESG score because more resources are deploy and investors may desire a higher level of transparency concerning operations.

Asset Turnover. Sales divided by total assets. Less efficient companies should be expected to be monitored also through ESG rates, but at the same time a higher level of sales attract investors attention. The expected sign is uncertain.

Target variables

Total Assets of the Target. Natural logarithm of target's total assets. Large acquired firms have more visibility in the market. This means that they have a higher probability of receiving a rating.

Deal-specific variables

Relative Deal Size. Deal value divided by acquiror total assets. Large deal values have the

same consequence of acquiring a large target.

Deal Premium. The calculation of deal premium can be found in equation (3.1). The same considerations developed in “Relative Deal Size” are true also for deal premium.

3.2.4 Fixed Effects

This section describes the fixed effects (FE) included in the model. Several works describe the importance of country in the determination of different level of ESG engagement. Cai et al. (2016) found that country factors beyond economic development, such as institutions and culture, play important roles in explaining differences in corporate social performance (CSP) ratings among countries. In particular, CSP ratings are high in countries whose laws encourage competition, in countries with strong civil liberties and political rights, and in cultures oriented toward harmony and autonomy. Likewise the Global Sustainable Investment Alliance (2021) confirmed different trends for different regions, demonstrating the impact of country in ESG performance.

Despite these arguments, country fixed effects were disregarded, to remain in line with papers whose primary focus was on M&A. Indeed, country fixed effects were considered only in research that analysed the effect of ESG on the company’s financial performance, disregarding any impact due to M&A activity. Therefore, in line with the previous literature, the fixed effects concern:

Industry. There are sectors, by nature, more environmentally friendly. However, environmental and social scores of Eikon are relative measure based on the company’s sector. It follows that, the industry FE consider only the different level of governance applied in distinct sectors and the fact that some industries are more prone to acquisitions. Industry FE is thus an industry specific dummy that will capture the effects of unobservable and time invariant factors that are common in the same industry.

Year. Year fixed effects take into account different economic development phases, macroeconomics factors, political aspects, interests rate levels and negative or positive investors’ expectations which are expected to influence and originate the merger waves. In other words, year FE control for factors that are common to all companies for a given year.

In the Appendix, Table A.1, Table A.2 and Table A.3 summarize the variables taken into consideration for every regression, the units of denomination, the researchers that have examined these variables in their previous studies and the expected sign. To my knowledge, no previous papers have analysed the third research question, then it was no possible to include researchers who have already studied this subject.

3.3 Model specification

3.3.1 Deal premium

To analyse the effect of ESG scores on premiums, I employ OLS regression. The model can be described by the equation below:

$$\begin{aligned} Deal\ Premium = & \\ & \alpha + \beta_1 ESG_i + \beta_2 Fin_j + \beta_3 ESG_i \cdot Fin_j + \beta_4 DS_i + \beta_5 M_i + \beta_6 F_i + \beta_7 OS_i + \delta_i + \theta_t + \varepsilon_i \end{aligned} \quad (3.2)$$

ESG is the ESG score or ESG combined score of the target; *Fin_j* is a dummy variable that takes value of 1 if the acquirer *j* is a financial buyer; *DS* is a vector of deal-specific variables; *M* and *F* are vector of target market and financial characteristics, respectively; *OS* is the ownership structure variable; δ is the industry fixed effects, while θ is the time fixed effects.

I include the term $ESG_i \cdot Fin_j$ in order to investigate whether an interaction effect exists, in other words if the effect of the ESG on deal premium changes, depending on the acquirer being a financial buyer or not.

Following several authors, such as Ung and Urfe (2021), Gomes and Marsat (2018), and Tampakoudis and Anagnostopoulou (2020), Deal premium, Market variables and Financial variables are winsorized at the 1% level in order to deal with outliers and to enhance the robustness of the results.

To test the robustness of the model, an Instrumental Variable (IV) regression is conducted. Results confirm that ESG measure positively affect the deal premium.

3.3.2 Probability of being acquired

To better assess the impact of ESG on M&A likelihood, I employ a logistic regression (logit) analysis. The dependent variable is a binary variable taking the value 1 if a firm becomes a target, and 0 otherwise.

Following Barnes (1998, 1999) and Walter (1994), all the variables are expressed as industry relative ratios, i.e. a firm's ratios are divided by the relevant industrial averages for that given year. The only exceptions are the variables Market Capitalization, which is a measure of size and ESG score, which is an industry relative measure by construction. The model can be described by the equation below:

$$\ln(p_i/(1 - p_i)) = \beta_1 ESG_i + \beta_2 Man_i + \beta_3 UVal_i + \beta_4 GRM_i + \beta_5 FinSt_i + \beta_6 Size_i + \delta_i + \theta_t + \varepsilon_i \quad (3.3)$$

p_i is the probability of a bid for firm *i*; *ESG* is the ESG score or ESG combined score of the target; *Man*, *UVal*, *GRM_i*, *FinSt* and *Size* are vector of target inefficient management, under-valuation, growth-resource mismatch, inefficient financial structure and size, respectively; δ is the industry fixed effects, while θ is the time fixed effects.

Data about industrial averages used to calculate the ratios used in the regression, as well as non-acquired companies, are retrieved from the Industry App of Refinitiv Eikon. To better investigate the research question, I run the regression with the entire dataset composed by 33,225 observations and then only with observations obtained using a matching procedure, which is described in Chapter 4.

The main reason to include ESG score inside the logit model is that, better than accounting measures, ESG could be able to catch the target's growth opportunities, given that sustainability has become a strategic issue.

3.3.3 ESG coverage

A logistic regression (logit) is employed, where ESG coverage one year and two years after acquisitions are investigated separately. The dependent variable is a binary variable taking the value 1 if a firm becomes covered by ESG rating one or two years after M&A according to the model employed, and 0 otherwise.

$$\ln(p_i/(1 - p_i)) = \beta_1 ESG_{ij} + \beta_2 Acquirer_i + \beta_3 Target_j + \beta_4 Deal_{ij} + \delta_i + \theta_t + \varepsilon_i \quad (3.4)$$

p_i is the probability of receiving the ESG score for firm i ; ESG , in this case, is a dummy variable with value of one if the target j associated to the bidder i has the ESG score one year prior to acquisition; $Acquirer$, $Target$ and $Deal$ represent Acquirer, Target and Deal-specific variables; δ is the industry fixed effects, while θ is the time fixed effects.

For the sake of clarity, Table 3.6 summarizes, for each research question, the procedures used and the summary statistics of dependent and explanatory variables.

Table 3.6: *Summary statistics*

<i>Deal Premium without winsor</i>					
Variable	Obs	Mean	Std. Dev.	Min	Max
Deal Premium	645	35.099	56.826	-99.687	701.706
ESG	645	36.891	18.798	0.625	92.024
ESG Combined	645	35.123	17.343	0.625	86.552
<i>Deal Premium with winsor</i>					
Variable	Obs	Mean	Std. Dev.	Min	Max
Deal Premium	645	33.192	40.367	-76.358	230.319
ESG	645	36.891	18.798	0.625	92.024
ESG Combined	645	35.123	17.343	0.625	86.552
<i>Takeover Probability without matching</i>					
Variable	Obs	Mean	Std. Dev.	Min	Max
Prob Acquisition	33225	0.012	0.108	0	1
ESG	33225	45.339	22.016	0.027	95.246
ESG Comb	33225	43.796	20.91	0.027	93.914
<i>Takeover Probability with matching</i>					
Variable	Obs	Mean	Std. Dev.	Min	Max
Prob Acquisition	14177	0.027	0.163	0	1
ESG	14177	44.461	21.203	0.039	94.51
ESG Comb	14177	43.324	20.43	0.039	93.914
<i>ESG Coverage</i>					
Variable	Obs	Mean	Std. Dev.	Min	Max
ESG Coverage 1Y	1392	0.358	0.48	0	1
ESG Coverage 2Y	1392	0.491	0.5	0	1
Target ESG Cov 1Y	1392	0.029	0.169	0	1

Chapter 4

Results

4.1 Hypothesis 1: Deal Premium

The dominant view in the literature is the stakeholders view, which claims that sustainable companies deliver superior financial performance, more value for shareholders and stakeholders and they are subject to a lower level of risk. These elements exert influence on the deal premium. The link to investigate is whether ESG positively determined the premium paid in an acquisition. The rest of the section provides descriptive statistics, regression results and robustness checks to increase the reliability of results.

4.1.1 Descriptive statistics

Table 4.1 displays descriptive statistics concerning the variables used to test whether ESG influences the deal premium. The following table shows Deal premium, Market and Financial variables already winsorized. However, the appendix provides the descriptive statistics of the raw variables (Table B.1) and the correlation matrix for both raw data (Table B.2) and winsorized data (Table B.3).

When inspecting the correlation between the combined ESG score and the three pillar scores, the correlations are very high. This imply that results would be very comparable if ESG is replaced with one of the pillar scores in the models. Therefore, I have decided to focus only on aggregate measures such as ESG and ESG combined scores to better investigate controversies overlay.

After winsorizing, the premium paid ranges from -76.4% to 230.3% with a mean of 33.2% and a standard deviation of 40.4%, in line with the articles reviewed. ESG combined, instead has a lower mean and standard deviation than ESG, by construction. Indeed, it is the lowest between the ESG score and the average of ESG and controversies scores.

Table 4.1: *Descriptive Statistics of Deal Premium*

Variable	Mean	Std. Dev.	Min	Max
Deal Premium	33.192	40.367	-76.358	230.319

ESG	36.891	18.798	0.625	92.024
ESG Combined	35.123	17.343	0.625	86.552
Financial Buyer	0.074	0.263	0	1
Cross Border	0.636	0.482	0	1
Cash Payment	0.416	0.493	0	1
Stock Payment	0.237	0.426	0	1
Industry Relatedness	0.602	0.49	0	1
Relative Deal Size	6.21	126.918	0.002	3211.009
Hostile	0.008	0.088	0	1
Multiple Bid	0.095	0.293	0	1
Size	7.759	1.504	3.705	11.05
Market to Book	3.127	7.356	-31.329	45.564
Growth Rate	12.049	44.042	-68.424	295.088
Investment Rate	0.052	0.059	0	0.325
ROE	6.103	39.957	-141.243	216.782
Current Ratio	2.206	2.099	0.307	13.938
Debt to Equity	1.06	1.702	0	10.934
Blockholder	0.091	0.289	0	1

4.1.2 Regression results

ESG score

The ESG effect on deal premium is always positive, even if it is not so powerful to explain the takeover premium by its own. However, regressions (2), (3) and (4) confirm research Hypothesis 1, because ESG is significant. Increasing ESG by one point, the deal premium increases by 0.27%. This result suggests that ESG initiatives are valuable, consistent with the stakeholder view.

Financial buyer has a negative influence, but not significant. Without the ability of exploiting operating synergies, the price a private equity fund is willing to pay is probably lower compared to the willingness to pay of an industrial buyer. Adding the interaction effect, Financial Buyer almost double. A possible explanation for this behavior is that when considering the nature of the buyer, financial bidders include more ESG considerations in the determination of the deal premium than industrial buyers, because the former are more sensitive to sustainability issues. Indeed, the study conducted by Bain & Company (2022) suggests that corporate buyers are not accounting for ESG in M&A process yet. However, the coefficient of Financial Buyer continues to remain not significant.

With the inclusion of the Financial Buyer indicator variable and the interaction with the ESG score, the significance of ESG decreases, indicating the presence of omitted variables that could influence both the financial buyer and the explanatory variable.

4.1. HYPOTHESIS 1: DEAL PREMIUM

The presence of omitted variables are investigated in the Robustness section through the adoption of instrumental variable technique.

The signs of controls are mostly consistent with expectations. Even though research has shown ambiguous effects on premiums from most variables, results are coherent with intuition, the majority of scholars, and the theory discussed earlier.

Both cross border and stock payment have a negative and significant coefficient on deal premium, meaning that increased complexity of cross-border M&As and greater information asymmetry lead acquirer to be more prudent in their valuation. While stock payment is negative because target's shareholders can still benefit from synergies created by the deal.

Cash payment does not reflect the expected sign and it is contrasting with the majority of the literature opinion. Thus, results do not provide support for the tax compensation effect. Instead, it appears that there is a premium discount associated with cash payments. Even if the coefficient is not significant, also Alexandridis et al. (2013) found a negative correlation between cash payment and deal premium.

Industry relatedness is positive, because it is easier exploit economies of scale and scope when the M&A occurs between related companies.

Results show that hostile acquisitions, that are very rare, are associated with significantly larger takeover premiums and this is the most considerable absolute effect on premia ranging from 17.7% to 19.3%. Unsurprisingly, multiple bids yield a significantly positive effect on premia and close to the magnitude of hostile.

Both relative deal size and size metrics impact premium significantly but with negative effects, while market to book ratio is not significant as documented by Alexandridis et al. (2013) and Ung and Urfe (2021).

Among the financial variables, the only measures that are significant are growth rate and current ratio, with both positive coefficients.

Blockholder has a positive sign, in contrast with expectations. However, if the acquirer decides to make an acquisition, it could be willing to pay more to obtain the control in a company in which it owns more than 5%, rather than in a company in which it has invested less because of higher level of uncertainty and information asymmetries.

Even if the majority of variables are significant, the model has a R-squared of less than 14%, meaning that the model is able to explain only 14% of the variability of the data. However, this R-squared is not so distant from the rest of the literature, having values ranging between 5% of Rossi and Volpin (2004) and 31% of Gomes and Marsat (2018). In addition, except for regression (1), the F-Statistic is significant, meaning that the R-Squared does not equal zero and the correlation between the model and dependent variable is statistically significant.

Table 4.2: Regression Analysis of ESG Score on Deal Premiums

	<i>Dependent variable: Deal premium</i>			
	(1)	(2)	(3)	(4)
ESG	0.040 (0.130)	0.276** (0.138)	0.274* (0.139)	0.261* (0.151)
Financial Buyer			-7.071 (4.606)	-13.253 (11.224)
Financial Buyer \times ESG				0.180 (0.280)
Cross Border		-7.711* (4.219)	-7.667* (4.199)	-7.742* (4.208)
Cash Payment		-4.702 (4.640)	-4.670 (4.603)	-4.633 (4.601)
Stock Payment		-11.363** (5.399)	-11.204** (5.389)	-11.023** (5.453)
Industry Relatedness		5.853** (2.737)	5.871** (2.727)	5.820** (2.718)
Relative Deal Size		-0.065*** (0.003)	-0.063*** (0.004)	-0.063*** (0.004)
Hostile		17.713* (9.799)	18.679** (8.429)	19.275** (8.610)
Multiple Bid		17.174*** (6.195)	16.369*** (6.143)	16.485*** (6.216)
Size		-4.598*** (1.730)	-4.730*** (1.761)	-4.712*** (1.768)
Market to Book		0.083 (0.419)	0.049 (0.419)	0.044 (0.418)
Growth Rate		0.094* (0.055)	0.094* (0.056)	0.093* (0.056)
Investment Rate		21.547 (28.362)	22.364 (28.455)	21.025 (28.882)
ROE		-0.072 (0.057)	-0.074 (0.058)	-0.074 (0.058)
Current Ratio		2.331*** (0.832)	2.341*** (0.827)	2.323*** (0.830)
Debt to Equity		0.623 (1.545)	0.782 (1.565)	0.782 (1.561)
Blockholder		2.322 (6.991)	1.532 (7.088)	1.479 (7.110)
Constant	31.718*** (4.789)	55.275*** (14.489)	56.810*** (14.757)	57.280*** (14.893)
Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
R-Squared	0.000	0.136	0.138	0.139
F-Statistic	0.0948	56.74***	54.22***	51.92***

Note: ***, ** and * denote significance at the 1%, 5% and 10% levels, respectively.

ESG Combined score

The analysis on the ESG Combined score shows that this explanatory variable has the same behaviour of ESG score. This effect is always significant at 5% level. Increasing the ESG Combined score of one point makes the deal premium rise of about 0.34%. In addition, this unitary growth leads the deal premium to increase of about 0.07% more than a unitary increase in the ESG score. The effect of ESG Combined on deal premium is bigger, meaning that reputation has a strong impact in the process of decision-making during an M&A activity.

Indeed, if a scandal occurs, the company involved is penalised. The impact of the event may still be seen in the following year if there are new developments related to the negative event, such as lawsuits, ongoing legislation disputes or fines. This influences the controversies score, which is inside the ESG Combined grading, reflecting a lower deal premium in case of an acquisition. The controversies score also addresses the market cap bias from which large-cap companies suffer, as they attract more media attention than smaller-cap companies.

The control variables manifest the same behaviour and the same level of significance. The only exception is Hostile, which present a lower level of significance in regression (3) and (4) and no significance in regression (2). This may indicate that reputation influences both the response to hostile deals and the ESG Combined score.

Table 4.3: Regression Analysis of ESG Combined Score on Deal Premiums

	<i>Dependent variable: Deal premium</i>			
	(1)	(2)	(3)	(4)
ESG Combined	0.106 (0.146)	0.348** (0.152)	0.345** (0.153)	0.337** (0.164)
Financial Buyer			-6.625 (4.510)	-10.633 (12.038)
Financial Buyer \times ESG Combined				0.125 (0.325)
Cross Border		-7.885* (4.188)	-7.849* (4.168)	-7.893* (4.172)
Cash Payment		-5.022 (4.621)	-4.987 (4.586)	-4.946 (4.587)
Stock Payment		-11.293** (5.323)	-11.138** (5.318)	-11.014** (5.389)
Industry Relatedness		5.822** (2.716)	5.846** (2.707)	5.826** (2.707)
Relative Deal Size		-0.065*** (0.003)	-0.063*** (0.004)	-0.063*** (0.004)
Hostile		15.436 (9.541)	16.412* (8.335)	16.701* (8.592)
Multiple Bid		17.196*** (6.080)	16.448*** (6.023)	16.509*** (6.087)
Size		-4.587*** (1.665)	-4.704*** (1.692)	-4.695*** (1.697)
Market to Book		0.095 (0.420)	0.062 (0.420)	0.057 (0.421)
Growth Rate		0.096* (0.055)	0.095* (0.056)	0.095* (0.056)
Investment Rate		24.924 (28.596)	25.611 (28.692)	24.945 (29.156)
ROE		-0.079 (0.058)	-0.081 (0.059)	-0.080 (0.059)
Current Ratio		2.301*** (0.835)	2.310*** (0.830)	2.305*** (0.832)
Debt to Equity		0.697 (1.547)	0.844 (1.566)	0.859 (1.560)
Blockholder		1.770 (7.004)	1.035 (7.106)	1.011 (7.124)
Constant	29.471*** (5.145)	53.244*** (14.388)	54.712*** (14.650)	54.949*** (14.803)
Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
R-Squared	0.002	0.141	0.143	0.143
F-Statistic	0.523	51.51***	49.25***	46.60***

Note: ***, ** and * denote significance at the 1%, 5% and 10% levels, respectively.

4.1.3 Robustness checks

In order to prove the lack of multicollinearity, the correlations of Table B.3 together with the variance inflation factor (VIF) can be used. Correlations lower than 80% and VIF less than 10 indicate the absence of multicollinearity.

VIF is a statistical concept that indicates the increase in the variance of a regression coefficient as a result of collinearity. Mathematically, it is equal to the reciprocal of tolerance, which correspond with one minus R-Squared for that independent variable. In case of multiple regressions, VIF must be calculated for each independent variable. A VIF above 10 indicates that the associated independent variable is highly collinear with the other variables in the model. The estimated models show variance-inflation factors between 1.0 and 1.48, indicating the absence of multicollinearity.

To account for possible heteroskedasticity, robust standard errors are clustered at year-industry level. Moreover, to alleviate heteroscedasticity concerns, I apply the method of transforming variables using the logarithms of the values rather than the actual values (e.g., natural logarithm of market capitalization as a proxy for firm size).

In order to increase the robustness of results, I have run additional regressions. Comparing regressions (5) and (6) of Table 4.4 and Table 4.5 with regression (2) of Table 4.2 and Table 4.5, ESG and ESG Combined scores start to be significant when accounting variables are included in the model and the coefficient of the two explanatory variables increases of 0.11 and 0.12, respectively. Consistent with Ung and Urfe (2021), the introduction of accounting characteristics increases the predictive validity of ESG scores. When controlling for financial and deal-specific variables, some unexplained variation in premiums is explained by the ESG score of the target. This evidence supports the work of Gillan et al. (2021), as greater ESG performance increases the firm value by improving liquidity and financials and therefore enhancing the shareholders' wealth. Another possible explanation is that ESG rating can act as a form of assurance about the reliability of financial data, which can be inflated. Indeed, the literature proved that ESG performance can reduce information asymmetries and mitigate risks.

The following considerations are true for both ESG and ESG Combined regressions, as they show the same behaviour. Regressions (7) and (8) show that ESG scores remain significant even deleting one or both fixed effects. Firstly, I have run a regression controlling only for industry and not year fixed effects. From a comparison with regression (7) and (4), the coefficient of Financial Buyer becomes negatively significant. Not controlling for year FE disregards that private equity funds and other financial buyers' activity have surged in the second decade of this century. Therefore, the sample is composed by more deals in which the buyer is financial in the last years and very few or none in the first years of observations. Therefore, controlling only for industry FE leads Financial Buyer to be significant, but at the same time we ignore that in the last years they have become more powerful, with lots of resources and more possibilities to make acquisitions.

Table 4.4: Regression Analysis of ESG Score on Deal Premiums

	<i>Dependent variable: Deal premium</i>			
	(5)	(6)	(7)	(8)
ESG	0.016 (0.123)	0.164 (0.147)	0.188** (0.094)	0.181** (0.090)
Financial Buyer			-23.804* (13.363)	
Financial Buyer \times ESG			0.367 (0.335)	
Cross Border	-8.556* (4.413)	-7.939* (4.195)	-8.414** (3.307)	-8.190** (3.292)
Cash Payment	-1.408 (4.099)	-4.641 (4.511)	-2.541 (3.793)	-0.486 (3.724)
Stock Payment	-8.988* (5.243)	-10.963** (5.326)	-12.563*** (4.170)	-11.759*** (4.091)
Industry Relatedness	7.604** (2.951)	5.637** (2.842)	5.832* (3.372)	7.000** (3.124)
Relative Deal Size	-0.065*** (0.003)	-0.065*** (0.003)	-0.018 (0.014)	-0.003 (0.012)
Hostile	27.405*** (8.958)	22.702** (9.335)	12.690 (17.660)	6.047 (17.383)
Multiple Bid	18.598*** (5.880)	16.585*** (5.905)	16.539*** (5.311)	17.221*** (5.236)
Size		-4.859*** (1.708)	-4.930*** (1.160)	-4.361*** (1.141)
Market to Book		0.063 (0.419)	-0.114 (0.250)	-0.181 (0.241)
Growth Rate			0.089** (0.036)	0.088** (0.036)
Investment Rate			6.303 (29.770)	-10.986 (26.864)
ROE			-0.110*** (0.042)	-0.109*** (0.041)
Current Ratio			2.370*** (0.784)	1.925** (0.769)
Debt to Equity			1.152 (1.017)	1.208 (1.003)
Blockholder			-4.655 (5.410)	-4.643 (5.327)
Constant	34.620*** (6.015)	69.494*** (12.780)	63.251*** (10.676)	58.323*** (10.384)
Year FE	Yes	Yes	No	No
Industry FE	Yes	Yes	Yes	No
R-Squared	0.078	0.104	0.139	0.124
F-Statistic	109.6***	191.6***	5.440***	5.542***

Note: ***, ** and * denote significance at the 1%, 5% and 10% levels, respectively.

4.1. HYPOTHESIS 1: DEAL PREMIUM

Table 4.5: Regression Analysis of ESG Combined Score on Deal Premiums

	<i>Dependent variable: Deal premium</i>			
	(5)	(6)	(7)	(8)
ESG Combined	0.084 (0.138)	0.228 (0.157)	0.225** (0.101)	0.215** (0.096)
Financial Buyer			-22.497* (13.633)	
Fin Buyer \times ESG Comb			0.360 (0.366)	
Cross Border	-8.419* (4.415)	-8.028* (4.161)	-8.391** (3.301)	-8.162** (3.285)
Cash Payment	-1.350 (4.091)	-4.917 (4.515)	-2.827 (3.794)	-0.731 (3.725)
Stock Payment	-9.006* (5.253)	-10.914** (5.262)	-12.666*** (4.168)	-11.836*** (4.088)
Industry Relatedness	7.491** (2.963)	5.568* (2.832)	6.030* (3.366)	7.172** (3.120)
Relative Deal Size	-0.065*** (0.003)	-0.065*** (0.003)	-0.019 (0.014)	-0.004 (0.012)
Hostile	25.389*** (8.748)	20.651** (9.117)	11.924 (17.655)	5.387 (17.381)
Multiple Bid	18.512*** (5.816)	16.581*** (5.809)	16.717*** (5.302)	17.418*** (5.227)
Size		-4.949*** (1.624)	-4.862*** (1.140)	-4.304*** (1.120)
Market to Book		0.073 (0.422)	-0.117 (0.249)	-0.184 (0.240)
Growth Rate			0.089** (0.036)	0.089** (0.036)
Investment Rate			8.907 (29.780)	-9.262 (26.895)
ROE			-0.113*** (0.042)	-0.111*** (0.041)
Current Ratio			2.370*** (0.782)	1.923** (0.767)
Debt to Equity			1.218 (1.018)	1.254 (1.003)
Blockholder			-4.659 (5.406)	-4.675 (5.323)
Constant	32.241*** (6.149)	68.410*** (12.541)	61.553*** (10.731)	56.857*** (10.441)
Year FE	Yes	Yes	No	No
Industry FE	Yes	Yes	Yes	No
R-Squared	0.079	0.108	0.141	0.125
F-Statistic	104.1***	183.4***	5.497***	5.615***

Note: ***, ** and * denote significance at the 1%, 5% and 10% levels, respectively.

ROE, like Financial Buyer, becomes significant at 1% level without year FE, while the coefficients of relative deal size and hostile lose their significance, meaning that they are strongly influenced by year effects.

Regression (8) shows similar consequences of regression (7) denoting that the differences with the main regression results are due to year fixed effects.

To make sure ESG measure does not proxy for other unobserved variables, I estimate an instrumental variable regression. For the choice of instruments, I base my work on Gomes and Marsat (2018) and Cheng et al. (2014) which show that a firm's CSR/ESG performance is impacted by a time-invariant component associated with its membership in the country-industry pair. In other words, a firm's ESG performance is impacted by the ESG performance of other firms within the same industry-country pair. I use the country-industry mean of ESG scores computed using the constituents of a certain industry retrieved from Refinitiv Eikon. Results of stage one and stage two are reported in Table 4.6 for both ESG and ESG Combined scores. In conclusion, results do not suffer from endogeneity issues.

4.1. HYPOTHESIS 1: DEAL PREMIUM

Table 4.6: ESG scores and Deal premiums using 2SLS

	<i>Dependent variable:</i>			
	(1) ESG	(2) Deal premium	(1) ESG Combined	(2) Deal premium
Av Country-Sector	0.162*** (0.058)		0.136** (0.061)	
ESG/ESG Combined		1.295* (0.690)		1.528* (0.882)
Financial Buyer	0.455 (2.787)	-10.771** (4.722)	-0.610 (2.350)	-9.309** (4.584)
Cross Border	-4.718*** (1.443)	-2.961 (4.609)	-4.102*** (1.266)	-2.809 (4.949)
Cash Payment	0.645 (1.528)	-1.656 (3.952)	1.687 (1.422)	-3.364 (4.120)
Stock Payment	3.024 (2.009)	-15.387*** (5.253)	2.903 (1.864)	-15.891*** (5.394)
Industry Relatedness	0.744 (1.333)	5.934* (3.402)	-0.160 (1.345)	7.159* (3.658)
Hostile	13.960* (7.566)	-7.452 (14.027)	14.985* (7.759)	-12.189 (17.488)
Multiple Bid	3.415 (2.663)	13.369** (6.410)	1.907 (2.460)	14.858** (6.253)
Relative Deal Size	0.004*** (0.001)	-0.003 (0.002)	0.004*** (0.001)	-0.004 (0.003)
Size	4.050*** (0.443)	-9.203*** (3.094)	3.152*** (0.428)	-8.737*** (3.047)
Market to Book	-0.257** (0.128)	0.119 (0.448)	-0.210* (0.124)	0.103 (0.473)
Growth Rate	-0.056*** (0.012)	0.150** (0.073)	-0.052*** (0.011)	0.157** (0.078)
Investment Rate	-48.549*** (10.683)	37.827 (41.927)	-48.868*** (9.976)	49.857 (51.014)
ROE	0.025 (0.021)	-0.134** (0.064)	0.032 (0.020)	-0.151** (0.069)
Current Ratio	-0.866** (0.416)	2.946*** (1.017)	-0.720* (0.395)	2.919*** (1.068)
Debt to Equity	-0.370 (0.438)	1.684 (1.791)	-0.508 (0.424)	1.983 (1.907)
Blockholder	0.909 (2.331)	-7.463 (5.091)	0.867 (2.133)	-7.572 (5.218)
Constant	6.803 (4.234)	48.171*** (17.174)	12.691*** (3.923)	37.639* (22.100)
Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Chi-Statistic	20.13***	96.52***	18.10***	88.64***

Note: ***, ** and * denote significance at the 1%, 5% and 10% levels, respectively.

4.2 Hypothesis 2: Takeover Probability

The deal premium is actually influenced by ESG scores. However, the impact of ESG in M&A transactions could be deeper. Indeed, it can influence the choice of the target, making sustainable companies more attractive to potential buyers. The next sections describe the methodology used to find non-acquired companies that are comparable to actual targets, the summary statistics and the main results.

4.2.1 Matching procedure

Before starting the analysis of the ESG effect on the takeover probability, it is important to define the logical steps followed. Firstly, I run regressions on the entire sample composed of 33,225 observations. Descriptive statistics and regression results are included in the Appendix. The observations were so wide that have values with huge variability, compromising the significance level of the variables. Indeed, the effect of ESG and ESG Combined scores were so small that were not able to explain the probability of acquisition and they were almost close to zero.

Therefore, I decided to implement a matching procedure, following the majority of the literature. Actually, a potential buyer decides to buy a certain target because it possesses certain characteristics. For example, a target must belong to a specific industry, which is a relevant constraint for industrial buyers and it must not exceed a certain dimension threshold, because the bidder has limited resources.

However, there is no convergence in the matching methods. The procedure used to create the control group (non-acquired companies) may involve a random matching, for example in the case of Ambrose (1990) or multi-dimensional matching, used by Gomes (2019). However, the former method does not guarantee that matched companies are similar, while the latter is difficult to implement and it does not guarantee the presence of some comparables. Therefore, the most preferred matching method is often based on a single variable such as size. Its drawback is that dimension-by-dimension matching may potentially not yield good ex-ante matches.

As consequence, I matched the 389 successfully acquired companies, with non-acquired firms based on the market capitalization, year and industry following the method used by Barnes (1998). After the elimination of duplicates, the final sample is composed of 14,177 observations, 13,788 of which were not acquired in the period under consideration. The descriptive statistics and regression results presented in the next sections belong to these 14,177 observations.

4.2.2 Descriptive statistics

This section analyses the relationship between ESG and ESG Combined score and the probability of being acquired. The takeover probability is studied together with the deal premium, because target firms may have certain characteristics that not only increase the deal premium, but also influence the probability of being acquired. These two M&A aspects are therefore

4.2. HYPOTHESIS 2: TAKEOVER PROBABILITY

strictly related. Summary statistics concerning Hypothesis 2 are shown at aggregate level in Table 4.7 and control and treatment group separately in Table 4.8.

Analysing the summary statistics of control group and treatment group, we can immediately notice that the averages of ESG and ESG Combined are higher for non-acquired companies (treatment group). This is counteractive if we want to prove that higher ESG scores positively influence the probability of being acquired. Indeed, for the treatment group, the mean is 44.54 for ESG and 43.43 for ESG Combined, while for acquired companies the means are 41.78 and 39.49 for ESG and ESG Combined, respectively. However, the standard deviation is 3 points higher for non-acquired companies, because there are extreme values.

Table 4.7: *Descriptive Statistics of Takeover Probability with matching*

Variable	N	Mean	Std. Dev.	Min	Max
Prob Acquisition	14177	0.027	0.163	0	1
ESG	14177	44.461	21.203	0.039	94.51
ESG Combined	14177	43.324	20.43	0.039	93.914
EBIT Margin	14177	-0.809	21.242	-500.648	697.484
EBIT Growth	14177	0.806	6.502	-358.959	173.243
ROE	14177	2.593	267.184	-26500	15218.645
P/E	14177	0.874	3.372	0	228.267
Dividend/Equity	14177	0.732	6.689	-210.655	561.388
Dividend Growth	14177	0.581	14.892	-47.298	1137.76
Market to Book	14177	1.287	9.718	-35.011	642.69
Asset Turnover	14177	0.97	0.71	0.001	10.658
Sales Growth 2Y	14177	0.813	14.429	-645.05	401.845
Sales Growth 3Y	14177	0.578	9.781	-488.612	320.239
Current Ratio	14177	0.811	0.689	0.013	31.695
Tangibility	14177	1.015	0.745	-1.054	4.887
LT Debt to Assets	14177	4.735	28.846	0	1007.472
Interest Coverage	14177	0.8	14.471	-72.533	929.32
Debt to Equity	14177	0.925	3.755	0	337.23
Cash Flow/Assets	14177	1.063	1.321	-29.182	20.271
Market Cap	14177	8.308	1.169	2.04	13.16

ROE and the ratio between average dividend and equity is higher for acquired companies, consistent with the desire of the potential buyer to obtain financial resources from the target in form of dividends. Indeed, only in case of earnings, the buyer can distribute dividends to himself.

Sales growth is negative for control group, instead it is positive for treatment group. This is probably due to the fact that buyers want to purchase companies that are not performing well in the last 2 and 3 years, but they have enough resources to overcome the crisis. Indeed, as explained before, ROE is higher and also Market to Book ratio is slightly higher for control group, meaning that the market believes they have better future perspective.

The last considerations are about long term debt to assets and interest coverage ratio. Acquired companies are mainly financed through debt, as total debt is 1.4 times shareholders' equity,

which is more than for non-acquired firms. The presence of a great portion of debt categorized as long term and smaller size with reference to total assets for acquired companies help explaining the huge number for the ratio between long-term debt and assets. At the same time, this explains why interest coverage ratio is very low.

Table 4.8: *Descriptive Statistics of Takeover Probability with matching by group*

Variable	N	Mean	Std. Dev.	Min	Max
Prob Acquisition = 0					
ESG	13788	44.537	21.262	0.039	94.51
ESG Combined	13788	43.432	20.503	0.039	93.914
EBIT Margin	13788	-0.822	21.243	-500.648	697.484
EBIT Growth	13788	0.822	6.560	-358.959	173.243
ROE	13788	0.98	6.053	-186.391	282.683
P/E	13788	0.892	3.402	0	228.267
Dividen/Equity	13788	0.714	6.696	-210.655	561.388
Dividend Growth	13788	0.602	15.087	-47.298	1137.76
Market to Book	13788	1.276	9.479	-35.011	642.69
Asset Turnover	13788	0.968	0.707	0.001	10.658
Sales Growth 2Y	13788	0.866	14.166	-645.05	401.845
Sales Growth 3Y	13788	0.632	9.472	-488.612	320.239
Current Ratio	13788	0.812	0.694	0.013	31.695
Tangibility	13788	1.01	0.743	-1.054	4.842
LT Debt to Assets	13788	1.009	0.737	0	4.88
Interest Coverage	13788	0.823	14.673	-72.533	929.32
Debt to Equity	13788	0.911	3.516	0	337.23
Cash Flow/Assets	13788	1.061	1.295	-29.182	16.329
Market Cap	13788	8.315	1.160	4.232	12.573
Prob Acquisition = 1					
ESG	389	41.775	18.813	0.625	92.024
ESG Combined	389	39.493	17.241	0.625	86.552
EBIT Margin	389	-0.352	21.206	-197.396	195.512
EBIT Growth	389	0.236	3.865	-17.384	40.249
ROE	389	59.768	1613.551	-26479.1	15218.645
P/E	389	0.241	1.984	0	35.558
Dividend/Equity	389	1.377	6.399	-26.905	101.806
Dividend Growth	389	-0.159	3.626	-47.298	17.888
Market to Book	389	1.689	16.057	-11.707	314.675
Asset Turnover	389	1.048	0.827	0.002	8.55
Sales Growth 2Y	389	-1.044	21.737	-351.618	106.757
Sales Growth 3Y	389	-1.319	17.427	-262.038	47.907
Current Ratio	389	0.76	0.509	0.032	4.27
Tangibility	389	1.193	0.815	0.019	4.887
LT Debt to Assets	389	136.83	111.329	0	1007.472
Interest Coverage	389	0.005	0.033	-0.001	0.474
Debt to Equity	389	1.416	8.707	0	171.066
Cash Flow/Assets	389	1.147	2.037	-12.177	20.271
Market Cap	389	8.043	1.438	2.04	13.16

4.2.3 Regression results

ESG score

Regression results are shown in Table 4.9. The first regression exhibits a positive coefficient of ESG and significant at 10% level, meaning that ESG score influence the takeover probability. The odds ratio (computed by exponentiating the logit coefficient) is 1.00799. The interpretation is that for each unit-increase in ESG score, the estimated odds of being subjected to an M&A

4.2. HYPOTHESIS 2: TAKEOVER PROBABILITY

attempt increases by 0.799%. Results support the idea that ESG attributes of target firms matter for acquiring firms and that acquiring firms look for targets that feature good ESG capabilities. This confirms the stakeholders view, because bidders will buy firms that are able to generate more value in the future. The attitude of buying companies with ESG rating can be explained by cost savings linked to energy efficiency, revenue growth from sales of more sustainable products or increased reputation and customer loyalty (Gomes 2019). Increased transparency associated with high governance standards, e.g., increased earnings quality and lower level of earnings management, leads to reduced information asymmetry and reduced risk, potentially making high-quality governance firms more appealing to prospective buyers. Strong social attributes reduce the probability of future labor unrest, which could make potential buyers more comfortable regarding post-acquisition outcomes. Finally, strong environmental attributes decrease the probability of negative outcomes such as pollution-related hazards, thereby reducing potential future claims, litigation costs, and reputation damages.

For what concern the inefficient management hypothesis, EBIT growth, P/E and ratio of average dividend on equity are significant at 1%, 5% and 5% respectively. The expected signs are compliant with the literature. This indicates that target companies have low profitability with respect to average of the sector, therefore the market undervalues them. Indeed, the hypothesis under which buyers purchase companies with lower P/E in order to achieve higher earnings per share is not corroborate by data, given that targets of the sample have on average higher P/E. This leads to the second explanation, that is companies with low P/E are more likely to be undervalued and therefore they are good takeover targets. The acquisition probability increases in case of inefficient management, because of the lack of the ability to deliver a certain profitability and as consequence an appropriate level of dividends.

However, undervaluation as an assumption for acquisition is not confirmed by the regression result. Indeed, not only the sign of Market to Book is positive, but the coefficient is significant at 1% level. A possible explanation is that buyers buy asset-rich companies that are correctly valued by the market, with the purpose of downsizing or have enough resources to restructure the debt. This is confirmed by a higher tangibility ratio for acquired companies.

The growth-resources mismatch is partially confirmed, because the asset turnover shows a positive sign and it is significant. Acquirers prefer targets that are efficient in the production, approximated by the asset turnover, but suffer a reduction in the sales growth. This can be consistent with the idea of product portfolio and product mix replacement. Indeed, changing the types of products manufactured by the target it is possible to increase sales and profitability. The positive coefficient for current ratio may signal a lack of investment opportunities or a poor allocation of assets. An acquirer might be able to more profitably use a target firm's excess liquidity leading to an increase in the takeover probability.

A lower level of debt to equity increases the probability of being acquired. Low leverage may signal unused debt capacity, but this is not the case because targets have a huge long-term

debt to assets ratio. Isolating the coefficient of this ratio, it seems that acquirers prefer buying companies with high level of debt. However, at the same time target companies are able to produce enough cash flow to cover the debt repayment. Bidders may prefer companies with long-term debt, because they can implement changes in operations before the repayment or they are willing to put additional resources in the company. Finally the sign of market cap confirms the size hypothesis of acquisition.

It is not possible to compute conventional R-squared with logit as the explained variable takes on only two values. As is usual with logit, the goodness of fit of the equation in terms of the relationship between the estimated and observed value of the dependent variable and its chi-square was used to test the relationship between the two variables (Barnes 1999). Here the chi-square shows that such a relationship exists and the model has a high measure of fit.

ESG Combined score

The results for ESG Combined score are similar to those found for ESG score. The odds ratio for ESG Combined score is 1.00771. Therefore for a unitary increase in ESG Combined score, the probability of acquisition increases by 0.771%. However, even if the coefficient is positive, ESG Combined is not significant. This is reasonable if we consider that companies with bad reputation can be more attractive if their operation are performing well and they can be acquired at a lower price. Moreover, this disruptive events could let investors change idea about its reputation. This theory is supported by the positive coefficient of EBIT margin and its significance at 5% level.

Also in this regression, the chi-square shows that relationships between independent variables and takeover probability exist and the model has a high measure of fit.

4.2. HYPOTHESIS 2: TAKEOVER PROBABILITY

Table 4.9: Regression Analysis of ESG and ESG Combined scores on Takeover Probability with matching

	<i>Dependent variable: Takeover Probability</i>	
	(1)	(2)
ESG/ESG Combined	0.0080* (0.0046)	0.0077 (0.0060)
EBIT Margin	0.0062 (0.0044)	0.0062** (0.0027)
EBIT Growth	-0.0171*** (0.0060)	-0.0171*** (0.0059)
ROE	0.0002 (0.0002)	0.0003 (0.0002)
P/E	-0.0800** (0.0354)	-0.0822 (0.0563)
Dividend/Equity	-0.0403** (0.0164)	-0.0371*** (0.0126)
Dividend Growth	-0.0060 (0.0046)	-0.0058 (0.0177)
Market to Book	0.0146*** (0.0027)	0.0142*** (0.0032)
Asset Turnover	0.5437*** (0.0906)	0.5451*** (0.0893)
Sales Growth 2Y	-0.0109*** (0.0023)	-0.0109** (0.0048)
Sales Growth 3Y	-0.0028 (0.0028)	-0.0028 (0.0074)
Current Ratio	0.2162*** (0.0663)	0.2190** (0.1006)
Tangibility	-0.0728 (0.1706)	-0.0730 (0.1682)
LT Debt to Assets	0.0874*** (0.0013)	0.0877*** (0.0013)
Interest Coverage	-0.0115 (0.0119)	-0.0101 (0.0453)
Debt to Equity	-0.2203*** (0.0138)	-0.1573 (0.1468)
Cash Flow to Assets	0.2464** (0.1139)	0.2450*** (0.0705)
Market Cap	-0.4597*** (0.1453)	-0.4505*** (0.0992)
Year FE	Yes	Yes
Industry FE	Yes	Yes
Pseudo R-Squared	0.846	0.845
Chi-Squared Statistic	2529***	2526***

Note: ***, ** and * denote significance at the 1%, 5% and 10% levels, respectively.

4.3 Hypothesis 3: ESG Coverage

It was already proved that ESG increases the probability for a firms of being acquired. It could also happen that acquirers purchase a target with ESG rating because they want to gain market attention and extend the ESG coverage to them. The desire of being rated arises from the necessity to respond to market requirements of increased transparency and more attention to sustainability. The main reasons to look at sustainability are provided by the literature as virtuous companies can yield higher returns and deliver higher financial performance and more value.

4.3.1 Descriptive statistics

Table 4.10 shows that 35.8% of the sample is covered by ESG ratings after one year following the acquisition, corresponding to 499 observations. While 49.1% of the bidders are covered by ESG after two years for a total of 682 observations.

Looking at the bidder deal size, which is the ratio between deal value and bidder's assets, and the deal premium, we can conclude that deal specific variables are extremely variable in the sample.

Table 4.10: *Descriptive Statistics of ESG coverage*

Variable	N	Mean	Std. Dev.	Min	Max
ESG Coverage 1Y	1392	0.358	0.48	0	1
ESG Coverage 2Y	1392	0.491	0.5	0	1
Financial Buyer	1392	0.046	0.21	0	1
Serial Bidder	1392	0.58	0.494	0	1
Bidder Assets	1392	7	1.865	-7.547	13.263
Bidder CapEx	1392	0.063	0.089	0	1.158
Bidder Asset Turn.	1392	0.824	0.738	0	7.71
Target ESG Cov. 1Y	1392	0.029	0.169	0	1
Target Assets	1392	5.199	1.894	-9.282	11.264
Bidder Deal Size	1392	196.927	7322.66	0	273000
Deal Premium	1392	1325.373	42595.276	-100	1580000

Table 4.11 displays distinct descriptive statistics for observations that are covered by ESG after one year the M&A activity and observations that are not. The same is done for ESG coverage after two year in Table E.1 in the Appendix.

From a first analysis, mean value for serial bidder and bidder assets are higher for companies with ESG scores after a year from acquisitions. These acquirers have executed smaller deals in comparison to bidder's size and they have paid a lower deal premium.

Not surprisingly, the same behaviour is also observed for companies covered by ESG after two years following M&As, given that it comprehends the previous sample by construction.

4.3. HYPOTHESIS 3: ESG COVERAGE

Table 4.11: *Descriptive Statistics of ESG coverage by group*

Variable	N	Mean	St.Dev.	Min	Max
ESG Coverage 1 year = 0					
Financial Buyer	893	0.045	0.207	0	1
Serial Bidder	893	0.538	0.499	0	1
Bidder Assets	893	6.538	1.818	-7.547	11.405
Bidder CapEx	893	0.064	0.096	0	1.158
Bidder Asset Turn.	893	0.861	0.792	0	7.71
Target ESG Cov. 1Y	893	0.021	0.144	0	1
Target Assets	893	4.921	1.835	-9.282	10.741
Bidder Deal Size	893	306.575	9142.454	0	273205.53
Deal Premium	893	2038.781	53177.639	-100	1578350
ESG Coverage 1 year = 1					
Financial Buyer	499	0.048	0.214	0	1
Serial Bidder	499	0.655	0.476	0	1
Bidder Assets	499	7.826	1.653	2.161	13.263
Bidder CapEx	499	0.063	0.075	0	0.546
Bidder Asset Turn.	499	0.757	0.626	0	4.294
Target ESG Cov. 1Y	499	0.044	0.205	0	1
Target Assets	499	5.696	1.897	-0.265	11.264
Bidder Deal Size	499	0.705	5.879	0	129.753
Deal Premium	499	48.673	320.711	-100	7076.848

4.3.2 Regression results

Regression analysis in Table 4.12 demonstrates that bidder characteristics are important for increasing the probability of being covered by ESG indicators. Indeed, except for the type of buyers, e.g. financial or industrial, the other variables are significant. Serial bidders and bidder size display positive coefficients and significant at 5% and 1% level. This indicates that bigger companies and more acquisitions implemented attract the market attention, increasing the probability of receiving a rating. Instead, capital expenditure and asset turnover coefficients confirm the hypothesis that ESG scores can act as a form of control. Indeed, more investments and less efficient companies are more likely to receive a rating in the years after acquisitions. This reasoning could be true also for serial bidder, which is a proxy for managerial overconfidence.

On the other hand, target characteristics are not relevant, because bidders obtain the control of the target after the acquisition. Indeed, the sample is composed only by deals that grant the majority of the target company. Therefore, after M&A, the buyer has also the power to change the acquired firm.

Deal characteristics seem not to be important, as the coefficients are all closed to zero. Indeed, deal size and deal premium have a huge standard deviation. The only exception is the coefficient of deal premium for the first year following the acquisition. However, after two years the coefficient loses significance.

The pseudo R-squared is 17.6% and 19.1% for regression (1) and (2), respectively. The coefficient of determination of the model is low, because lots of variables are not taken under consideration, such as the ownership structure, reputation, scandals.

In addition, sample selection could suffer from biases, given that I have analysed only companies that have received a score at least one year between 2001 and 2021.

This analysis partially confirms Hypothesis 3, according to which buyers start to be covered by ESG rating after the acquisition of targets with ESG score. While ESG of the target one year prior to acquisition does not affect the probability of the buyer of receiving a rating the following years, interesting is the results for serial bidder, which relates to M&A. Indeed, there is the possibility that mergers and acquisitions can impact the probability to obtain a rating. This could mean that M&As can act as driver for obtaining ESG scores and fulfilling market requirements of more transparency. Even if the proof of this theory is out of scope of the thesis, lots of new research could be designed.

Table 4.12: *Regression Analysis on ESG Coverage*

	<i>Dependent variable: ESG Coverage</i>	
	(1) after 1Y	(2) after 2Y
Financial Buyer	0.0744 (0.3372)	-0.1582 (0.3203)
Serial Bidder	0.3151** (0.1549)	0.4445*** (0.1419)
Bidder Assets	0.5652*** (0.0585)	0.5835*** (0.0559)
Bidder CapEx	1.6156* (0.9044)	1.7566** (0.8177)
Bidder Asset Turn.	-0.2589** (0.1240)	-0.4158*** (0.1150)
Target ESG Cov. 1Y	-0.5901 (0.4928)	-0.5532 (0.4572)
Target Assets	0.0436 (0.0490)	0.0474 (0.0463)
Bidder Deal Size	0.0000 (0.0001)	0.0000 (0.0002)
Deal Premium	-0.0015* (0.0008)	-0.0000 (0.0000)
Year FE	Yes	Yes
Industry FE	Yes	Yes
Pseudo R-Squared	0.176	0.191
Chi-Squared Statistic	197.3***	245.1***

Note: ***, ** and * denote significance at the 1%, 5% and 10% levels, respectively.

Chapter 5

Conclusions

Through this study, I have explored the effects of ESG score on M&A deal premia. A positive relationship between ESG performance and premium was identified, consistent with extant literature.

To broaden the discussion I have investigated whether ESG scores influence acquisition probability. While ESG score is determinant in explaining the takeover, ESG Combined is not significant, meaning that reputation maybe is not considered in case of acquisition. Indeed, after the M&A, the buyer can decide the direction and changing target's reputation.

The above discussion leads to the thought that maybe ESG does not influence only premium and takeover probability, but also can have a deeper influence in M&A. This points the way to the third hypothesis. The increasing compliance and transparency requirements may force firms to pursue acquisitions of companies covered by ESG scores to extend the rating to them and fulfill these information requirements.

This thesis presents some limitations. ESG are relative scoring, which implies that firms who are only slightly better than average might receive a higher score than comparable firms. This might compromised the results since a component of the score is industry or country-dependent. Moreover, scoring a firm based on ESG initiatives might not necessarily capture the actual ESG performance of the firm in question. However, ESG scores are the best available proxy for the actual sustainability performance.

A common limitation for papers concerning ESG is the lack of convergence and consistency across the major providers. Thus, results are highly influenced by the Refinitiv ESG scores. The adoption of different data providers would have led to distinct firm coverage which implies that the sample would not be the same. The consequence is that results cannot provide a definitive conclusion.

In addition, to follow the M&A literature, country fixed effects were disregarded. Country factors, such as institutions and culture, play important roles in explaining differences in ESG ratings among countries and it was widely proved by the ESG literature.

Another limitation related to the takeover probability is the determination of characteristics on which control and target samples should be matched. Different matching procedures lead to different control group and as consequence this impacts the final results.

From this work, it is possible to outline additional opportunities for future research. The first is given by the study of the impact of each pillar and not only aggregate measure of ESG in the determination of deal premium and takeover probability. Moreover, given that ESG is influenced by the database used, there is the possibility to substitute ESG ratings with more objective measures taking indicators that quantify the actual level of pollution, such as CO₂ emissions, resource use and waste reduction.

In addition, as suggested by Ung and Urfe (2021), since a potential proxy of ESG is firm culture and ethics, an interesting avenue to explore would be the integration success rate and post-acquisition performance in the context of ESG.

About the deal premium, an area that has not been the focus in this work is whether the deal would have happened if the target did not have an ESG score. While for the probability of being acquired a complementary analysis could consist in applying the model to predict potential target using the deals successfully concluded in 2022, in order to verify the predictive accuracy of the model.

The last possibility could be analyse in depth whether ESG can be considered as a driver for M&As. Indeed, the effect of serial bidder on the probability of being covered by ESG score the years following acquisitions suggests that M&A may play a role in achieving sustainable and transparency requirements asked by the market.

This thesis shows that sustainability influences important decisions for businesses and wants to give a clearer view on how ESG impacts acquisition premiums and takeover probability. This work has also managerial implications for target shareholders as increasing ESG performance could increase potential takeover gains.

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Appendix A

Variable Selection

Table A.1: *Deal premium variable selection*

Variables	Unit	Researcher	Expected sign
Deal Premium	Percent		
Target ESG-scores	Number		+
Deal-specific variables:			
Cross-border	Dummy	Gomes and Marsat (2018) Krishnamurti et al. (2019) Rossi and Volpin (2004) Ung and Urfe (2021)	+/-
Cash payment	Dummy	Alexandridis et al. (2013) Gomes and Marsat (2018) Krishnamurti et al. (2019) Ung and Urfe (2021)	+
Stock payment	Dummy	Alexandridis et al. (2013) Krishnamurti et al. (2019) Ung and Urfe (2021)	+/-
Industry Relatedness	Dummy	Alexandridis et al. (2013) Gomes and Marsat (2018) Krishnamurti et al. (2019) Ung and Urfe (2021)	+
Relative Deal Size	Deal Value/ Bidder Assets	Krishnamurti et al. (2019) Ung and Urfe (2021)	+/-
Hostile	Dummy	Alexandridis et al. (2013) Gomes and Marsat (2018) Rossi and Volpin (2004) Ung and Urfe (2021)	+
Multiple bid	Dummy	Alexandridis et al. (2013) Gomes and Marsat (2018) Krishnamurti et al. (2019) Rossi and Volpin (2004) Ung and Urfe (2021)	+

Market variables:			
Size	ln(MCap)	Alexandridis et al. (2013) Barros et al. (2022) Caiazza et al. (2021) Gomes and Marsat (2018) Krishnamurti et al. (2019) Rossi and Volpin (2004) Ung and Urfe (2021)	+/-
Market to Book	MCap/Equity	Alexandridis et al. (2013) Caiazza et al. (2021) Gomes and Marsat (2018) Krishnamurti et al. (2019) Ung and Urfe (2021)	+/-
Accounting variables:			
Growth	Percent	Gomes and Marsat (2018) Ung and Urfe (2021)	+/-
Investment Rate	CapEx/Assets	Barros et al. (2022) Gomes and Marsat (2018) Ung and Urfe (2021)	+/-
ROE	Net Income/Equity	Barros et al. (2022) Gomes and Marsat (2018)	+/-
Current Ratio	Current Assets/ Current Liabilities	Barros et al. (2022) Gomes and Marsat (2018)	+/-
D/E	Debt/Equity	Barros et al. (2022) Caiazza et al. (2021) Gomes and Marsat (2018) Krishnamurti et al. (2019) Ung and Urfe (2021)	-
Ownership structure:			
Blockholder	Dummy	Gomes and Marsat (2018) Ung and Urfe (2021)	-

Table A.2: *Probability of being acquired variable selection*

Variables	Unit	Researcher	Expected sign
Acquisition Prob	Number		
Target ESG-scores	Number		+
Inefficient management:			
EBIT margin	EBIT/Sales	Barnes (1998, 1999) Walter (1994)	-
EBIT growth 3 years	Percent	Ambrose (1990) Barnes (1998, 1999)	-
ROE	Net Income/Equity	Barnes (1998, 1999) Gomes (2019)	-

P/E	Price/Earnings	Ambrose (1990) Ambrose and Megginson (1992) Barnes (1998, 1999) Walter (1994)	-
Average dividend 3 years/Equity	Number	Barnes (1998, 1999) Walter (1994)	-
Dividend growth 2 years	Percent	Barnes (1998, 1999)	-
Undervaluation:			
Market to Book	MCap/Equity	Ambrose (1990) Ambrose and Megginson (1992) Barnes (1998, 1999) Gomes (2019) Krishnamurti et al. (2019) Walter (1994)	-
Growth-resource mismatch:			
Asset turnover	Sales/Assets	Barnes (1998, 1999) Walter (1994)	-
Sales growth 2 years	Percent	Barnes (1998, 1999)	+/-
Sales growth 3 years	Percent	Ambrose and Megginson (1992) Barnes (1998, 1999) Gomes (2019)	+/-
Current ratio	Current Assets/ Current Liabilities	Barnes (1998, 1999) Gomes (2019) Walter (1994)	+/-
Tangibility	PPE/Assets	Ambrose (1990) Ambrose and Megginson (1992) Gomes (2019)	+
Inefficient financial structure:			
Leverage	Long-term debt/Assets	Ambrose (1990) Ambrose and Megginson (1992) Barnes (1998, 1999) Gomes (2019) Krishnamurti et al. (2019) Walter (1994)	-
Interest coverage	EBITDA/interest paid	Barnes (1998, 1999)	+
D/E	Total debt/Equity	Barnes (1998, 1999)	-
CF	Operating CF/Assets	Ambrose (1990) Ambrose and Megginson (1992) Gomes (2019) Krishnamurti et al. (2019)	+
Size:			
Market Capitalization	ln(MCap)	Ambrose (1990) Barnes (1998, 1999) Krishnamurti et al. (2019) Ambrose and Megginson (1992) Gomes (2019) Walter (1994)	-

Table A.3: *ESG coverage variable selection*

Variables	Unit	Expected sign
ESG coverage	Number	
Target ESG-scores	Number	+
Acquirer variables:		
Financial Buyer	Dummy	+
Serial Bidder	Dummy	+
Total Assets of Bidder	ln(Assets)	+
Investment Rate	CapEx/Assets	+
Asset Turnover	Sales/Assets	+/-
Target variables:		
Total Assets of Target	ln(Assets)	+
Deal-specific variables:		
Relative Deal Size	Deal Value/Bidder Assets	+
Deal Premium	Percent	+

Appendix B

Deal Premium Summary Statistics

Table B.1: *Descriptive Statistics of Deal Premium without winsor*

Variable	Mean	Std. Dev.	Min	Max
Deal Premium	35.099	56.826	-99.687	701.706
ESG	36.891	18.798	0.625	92.024
ESG Combined	35.123	17.343	0.625	86.552
Acquiror ESG	52.594	21.787	4.178	93.539
Financial Buyer	0.074	0.263	0	1
Cross Border	0.636	0.482	0	1
Cash Payment	0.416	0.493	0	1
Stock Payment	0.237	0.426	0	1
Industry Relatedness	0.602	0.49	0	1
Relative Deal Size	6.21	126.918	0.002	3211.009
Hostile	0.008	0.088	0	1
Multiple Bid	0.095	0.293	0	1
Size	7.758	1.536	2.04	13.16
Market to Book	2.113	66.666	-1484.358	750.666
Growth Rate	28.771	347.771	-100	8543.4
Investment Rate	0.053	0.067	0	0.733
ROE	7.571	71.759	-549.219	835.741
Current Ratio	2.34	3.733	0.227	76.843
Debt to Equity	1.26	4.119	0	85.882
Blockholder	0.091	0.289	0	1

APPENDIX B. DEAL PREMIUM SUMMARY STATISTICS

Table B.2: Correlation Matrix of Deal Premium without winser

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	
(1) Deal Premium	1.000									
(2) ESG	0.013	1.000								
(3) ESG Combined	0.028	0.945***	1.000							
(4) Financial Buyer	-0.048	-0.023	-0.033	1.000						
(5) Cross Border	-0.112***	-0.088**	-0.092**	0.006	1.000					
(6) Cash Payment	0.052	-0.039	0.003	-0.011	-0.264***	1.000				
(7) Stock Payment	-0.068*	0.031	0.016	0.009	0.112***	-0.470***	1.000			
(8) Industry Relatedness	0.054	0.012	-0.014	0.014	0.055	-0.123***	0.052	1.000		
(9) Relative Deal Size	-0.007	0.007	0.012	0.139***	0.025	0.049	-0.023	0.034	1.000	
(10) Hostile	0.013	0.040	0.052	0.042	0.030	0.033	-0.049	0.000	-0.004	
(11) Multiple Bid	0.103***	0.036	0.016	-0.051	0.013	0.050	-0.118***	0.025	0.025	
(12) Size	-0.173***	0.341***	0.291***	-0.070*	0.043	-0.196***	0.009	-0.029	-0.015	
(13) Market to Book	-0.035	0.020	0.021	0.000	-0.051	0.016	-0.068*	0.057	0.000	
(14) Growth Rate	0.081**	-0.073*	-0.072*	-0.014	-0.058	-0.025	-0.017	0.033	-0.003	
(15) Investment Rate	-0.035	-0.153***	-0.167***	-0.044	-0.023	-0.084**	0.066*	0.016	0.010	
(16) ROE	-0.098**	0.063	0.069*	-0.040	0.012	-0.046	-0.038	0.066*	-0.007	
(17) Current Ratio	0.064*	-0.100**	-0.084**	0.012	0.018	0.093**	-0.057	0.009	-0.013	
(18) Debt to Equity	0.025	-0.024	-0.027	0.017	0.044	-0.068*	0.042	0.027	-0.007	
(19) Blockholder	-0.028	0.027	0.031	-0.069*	-0.006	0.093**	-0.063*	-0.038	-0.002	
Variables	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
(1) Deal Premium										
(2) ESG										
(3) ESG Combined										
(4) Financial Buyer										
(5) Cross Border										
(6) Cash Payment										
(7) Stock Payment										
(8) Industry Relatedness										
(9) Relative Deal Size										
(10) Hostile	1.000									
(11) Multiple Bid	-0.029	1.000								
(12) Size	-0.029	-0.021	1.000							
(13) Market to Book	-0.001	0.070*	0.084**	1.000						
(14) Growth Rate	-0.004	-0.021	-0.067*	-0.004	1.000					
(15) Investment Rate	0.039	0.005	-0.051	0.005	-0.008	1.000				
(16) ROE	-0.009	-0.026	0.145***	0.033	-0.037	0.005	1.000			
(17) Current Ratio	0.017	-0.045	-0.113***	0.004	0.071*	-0.101**	-0.056	1.000		
(18) Debt to Equity	-0.008	0.004	0.052	0.104***	-0.011	-0.003	0.120***	-0.067*	1.000	
(19) Blockholder	0.095**	0.044	-0.042	0.000	-0.016	0.064*	0.029	-0.059	-0.020	1.000

***, ** and * denote significance at the 1%, 5% and 10% levels, respectively.

Table B.3: Correlation Matrix of Deal Premium with winner

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
(1) Deal Premium	1.000								
(2) ESG	-0.002	1.000							
(3) ESG Combined	0.013	0.945***	1.000						
(4) Financial Buyer	-0.053	-0.023	-0.033	1.000					
(5) Cross Border	-0.120***	-0.088**	-0.092**	0.006	1.000				
(6) Cash Payment	0.111***	-0.039	0.003	-0.011	-0.264***	1.000			
(7) Stock Payment	-0.139***	0.031	0.016	0.009	0.112***	-0.470***	1.000		
(8) Industry Relatedness	0.073*	0.012	-0.014	0.014	0.055	-0.123***	0.052	1.000	
(9) Relative Deal Size	-0.008	0.007	0.012	0.139***	0.025	0.049	-0.023	0.034	1.000
(10) Hostile	0.022	0.040	0.052	0.042	0.030	0.033	-0.049	0.000	-0.004
(11) Multiple Bid	0.139***	0.036	0.016	-0.051	0.013	0.050	-0.118***	0.025	-0.011
(12) Size	-0.190***	0.343***	0.292***	-0.071*	0.050	-0.201***	0.017	-0.027	-0.016
(13) Market to Book	-0.062	-0.048	-0.043	-0.042	-0.032	0.018	0.000	0.027	-0.006
(14) Growth Rate	0.083**	-0.181***	-0.180***	-0.002	-0.029	-0.022	0.033	-0.046	-0.009
(15) Investment Rate	-0.021	-0.153***	-0.169***	-0.044	-0.024	-0.083**	0.082**	0.030	0.013
(16) ROE	-0.159***	0.101**	0.108***	-0.032	0.020	-0.069*	-0.031	0.036	-0.012
(17) Current Ratio	0.133***	-0.149***	-0.126***	0.028	0.004	0.095**	-0.065*	-0.006	-0.021
(18) Debt to Equity	-0.016	-0.028	-0.043	0.066*	0.033	-0.080**	0.068*	0.006	-0.012
(19) Blockholder	-0.025	0.027	0.031	-0.069*	-0.006	0.093**	-0.063*	-0.038	-0.002

Variables	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
(1) Deal Premium										
(2) ESG										
(3) ESG Combined										
(4) Financial Buyer										
(5) Cross Border										
(6) Cash Payment										
(7) Stock Payment										
(8) Industry Relatedness										
(9) Relative Deal Size										
(10) Hostile	1.000									
(11) Multiple Bid	-0.029	1.000								
(12) Size	-0.030	-0.023	1.000							
(13) Market to Book	-0.020	0.026	0.160***	1.000						
(14) Growth Rate	-0.001	-0.046	-0.045	0.014	1.000					
(15) Investment Rate	0.046	0.012	-0.051	-0.055	0.189***	1.000				
(16) ROE	-0.013	-0.036	0.238***	0.298***	-0.022	0.007	1.000			
(17) Current Ratio	0.035	-0.059	-0.143***	-0.004	0.076*	-0.132***	-0.170***	1.000		
(18) Debt to Equity	-0.008	0.023	0.047	0.424***	-0.019	-0.028	0.157***	-0.167***	1.000	
(19) Blockholder	0.095**	0.044	-0.037	-0.044	-0.002	0.070*	0.019	-0.085**	-0.011	1.000

***, ** and * denote significance at the 1%, 5% and 10% levels, respectively.

Appendix C

Takeover Probability Summary Statistics

Table C.1: *Descriptive Statistics of Takeover Probability without matching*

Variable	N	Mean	Std. Dev.	Min	Max
Prob Acquisition	33225	0.012	0.108	0	1
ESG	33225	45.339	22.016	0.027	95.246
ESG Combined	33225	43.796	20.91	0.027	93.914
EBIT Margin	33225	-1.098	22.447	-500.648	1740.253
EBIT Growth	33225	0.753	5.394	-358.959	173.243
ROE	33225	2	174.918	-26500	15218.645
P/E	33225	0.919	5.358	0	371.102
Dividend/Equity	33225	0.81	6.179	-210.655	561.388
Dividend Growth	33225	0.657	14.896	-106.708	1176.274
Market to Book	33225	1.577	13.011	-36.678	759.879
Asset Turnover	33225	0.956	0.767	-0.001	10.658
Sales Growth 2Y	33225	0.723	18.401	-828.846	740.021
Sales Growth 3Y	33225	0.599	7.07	-488.612	320.239
Current Ratio	33225	0.795	0.7	0.004	31.695
Tangibility	33225	0.965	0.779	-1.054	5.58
LT Debt to Assets	33225	2.589	18.94	0	1007.472
Interest Coverage	33225	1.564	44.134	-519.836	6507.491
Debt to Equity	33225	0.973	3.862	0	337.23
Cash Flow/Assets	33225	1.119	3.184	-105.764	121.757
Market Cap	33225	8.351	1.598	-0.668	14.881

Table C.2: *Descriptive Statistics of Takeover Probability without matching by group*

Variable	N	Mean	Std. Dev.	Min	Max
Prob Acquisition = 0					
ESG	32836	45.381	22.048	0.027	95.246
ESG Combined	32836	43.847	20.944	0.027	93.914
EBIT Margin	32836	-1.107	22.462	-500.648	1740.253
EBIT Growth	32836	0.759	5.409	-358.959	173.243
ROE	32836	1.315	12.399	-186.391	1904.537
P/E	32836	0.927	5.385	0	371.102
Dividend/Equity	32836	0.803	6.176	-210.655	561.388
Dividend Growth	32836	0.666	14.979	-106.708	1176.274
Market to Book	32836	1.576	12.971	-36.678	759.879
Asset Turnover	32836	0.955	0.766	-0.001	10.658
Sales Growth 2Y	32836	0.744	18.357	-828.846	740.021
Sales Growth 3Y	32836	0.622	6.851	-488.612	320.239
Current Ratio	32836	0.795	0.702	0.004	31.695
Tangibility	32836	0.962	0.778	-1.054	5.58
LT Debt to Assets	32836	0.999	0.715	0	5.848
Interest Coverage	32836	1.582	44.394	-519.836	6507.491
Debt to Equity	32836	0.968	3.767	0	337.23
Cash Flow/Assets	32836	1.119	3.195	-105.764	121.757
Market Cap	32836	8.355	1.600	-0.668	14.881
Prob Acquisition = 1					
ESG	389	41.775	18.813	0.625	92.024
ESG Combined	389	39.493	17.241	0.625	86.552
EBIT Margin	389	-0.352	21.206	-197.396	195.512
EBIT Growth	389	0.236	3.865	-17.384	40.249
ROE	389	59.768	1613.551	-26479.1	15218.645
P/E	389	0.241	1.984	0	35.558
Dividend/Equity	389	1.377	6.399	-26.905	101.806
Dividend Growth	389	-0.159	3.626	-47.298	17.888
Market to Book	389	1.689	16.057	-11.707	314.675
Asset Turnover	389	1.048	0.827	0.002	8.55
Sales Growth 2Y	389	-1.044	21.737	-351.618	106.757
Sales Growth 3Y	389	-1.319	17.427	-262.038	47.907
Current Ratio	389	0.76	0.509	0.032	4.27
Tangibility	389	1.193	0.815	0.019	4.887
LT Debt to Assets	389	136.83	111.329	0	1007.472
Interest Coverage	389	0.005	0.033	-0.001	0.474
Debt to Equity	389	1.416	8.707	0	171.066
Cash Flow/Assets	389	1.147	2.037	-12.177	20.271
Market Cap	389	8.043	1.438	2.04	13.16

Table C.3: Correlation Matrix of Takeover Probability without matching

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1) Prob Acquisition	1.000									
(2) ESG	-0.018***	1.000								
(3) ESG Combined	-0.022***	0.962***	1.000							
(4) EBIT Margin	0.004	0.028***	0.032***	1.000						
(5) EBIT Growth	-0.010*	-0.030***	-0.025***	0.023***	1.000					
(6) ROE	0.036***	-0.007	-0.008	0.003	0.009*	1.000				
(7) P/E	-0.014**	-0.017***	-0.016***	0.005	-0.001	-0.001	1.000			
(8) Dividend/Equity	0.010*	0.021***	0.016***	-0.008	0.001	0.007	-0.001	1.000		
(9) Dividend Growth	-0.006	0.003	0.001	0.000	0.001	0.000	-0.001	-0.002	1.000	
(10) Market to Book	0.001	0.010*	0.009*	-0.032***	0.000	0.001	0.003	0.150***	-0.008	1.000
(11) Asset Turnover	0.013**	-0.013**	-0.011*	0.005	0.010*	-0.001	-0.008	0.014***	0.007	0.021***
(12) Sales Growth 2Y	-0.010*	-0.012**	-0.007	-0.002	0.037***	0.005	0.002	-0.007	0.001	0.005
(13) Sales Growth 3Y	-0.030***	-0.007	-0.005	-0.009*	0.009	0.003	-0.003	-0.003	0.023***	0.004
(14) Current Ratio	-0.005	-0.074***	-0.062***	-0.004	-0.001	-0.006	-0.007	-0.004	0.020***	-0.003
(15) Tangibility	0.032***	-0.030***	-0.037***	-0.020***	0.011**	0.005	0.030***	0.003	0.006	-0.004
(16) LT Debt to Assets	0.771***	-0.012**	-0.018***	0.005	-0.009*	0.016***	-0.012**	0.016***	-0.004	-0.005
(17) Interest Coverage	-0.004	-0.007	-0.007	-0.010*	0.003	0.000	0.000	0.000	-0.001	-0.001
(18) Debt to Equity	0.012**	0.014**	0.008	-0.004	0.003	0.019***	0.011**	0.678***	0.001	0.149***
(19) Cash Flow/Assets	0.001	-0.002	-0.001	-0.005	0.006	0.002	0.002	0.007	0.000	0.013**
(10) Market Cap	-0.021***	0.436***	0.378***	0.031***	-0.008	0.007	-0.006	0.018***	-0.008	0.029***

Variables	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)
(1) Prob Acquisition	1.000									
(2) ESG										
(3) ESG Combined										
(4) EBIT Margin										
(5) EBIT Growth										
(6) ROE										
(7) P/E										
(8) Dividend/Equity										
(9) Dividend Growth										
(10) Market to Book										
(11) Asset Turnover	1.000									
(12) Sales Growth 2Y	0.004	1.000								
(13) Sales Growth 3Y	0.003	0.048***	1.000							
(14) Current Ratio	-0.019***	0.015***	0.011**	1.000						
(15) Tangibility	-0.089***	-0.011**	0.007	-0.138***	1.000					
(16) LT Debt to Assets	-0.012**	-0.008	-0.031***	-0.016***	0.042***	1.000				
(17) Interest Coverage	0.020***	0.001	0.004	0.002	-0.001	-0.004	1.000			
(18) Debt to Equity	-0.019***	-0.005	-0.002	-0.059***	0.034***	0.054***	-0.005	1.000		
(19) Cash Flow/Assets	0.074***	0.006	0.002	-0.002	0.037***	0.002	0.015***	-0.013**	1.000	
(10) Market Cap	-0.080***	0.028***	0.017***	-0.083***	0.005	-0.008	0.012**	0.014***	0.015***	1.000

***, ** and * denote significance at the 1%, 5% and 10% levels, respectively.

Table C.4: Correlation Matrix of Takeover Probability with matching

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1) Prob Acquisition	1.000									
(2) ESG	-0.021**	1.000								
(3) ESG Combined	-0.031***	0.972***	1.000							
(4) EBIT Margin	0.004	0.043***	0.045***	1.000						
(5) EBIT Growth	-0.015*	-0.021**	-0.016*	0.039***	1.000					
(6) ROE	0.036***	-0.010	-0.012	0.005	0.012	1.000				
(7) P/E	-0.032***	-0.019**	-0.019**	0.004	0.013	-0.002	1.000			
(8) Dividend/Equity	0.016*	0.010	0.006	-0.010	0.001	0.008	-0.002	1.000		
(9) Dividend Growth	-0.008	0.010	0.007	0.005	-0.023***	0.000	-0.001	-0.007	1.000	
(10) Market to Book	0.007	0.032***	0.029***	-0.078***	-0.013	0.001	0.006	0.175***	-0.002	1.000
(11) Asset Turnover	0.018**	0.022***	0.021**	0.008	0.001	-0.002	-0.024***	0.016**	0.004	0.029***
(12) Sales Growth 2Y	-0.022**	-0.017**	-0.014*	0.011	0.035***	0.013	0.001	-0.009	-0.003	0.001
(13) Sales Growth 3Y	-0.033***	0.007	0.007	-0.014*	-0.028***	0.004	-0.004	0.001	0.034***	0.004
(14) Current Ratio	-0.012	-0.079***	-0.070***	-0.006	0.003	-0.010	0.002	0.006	0.040***	0.000
(15) Tangibility	0.040***	-0.040***	-0.047***	-0.002	0.014*	0.007	0.026***	-0.005	0.011	-0.028***
(16) LT Debt to Assets	0.769***	-0.016*	-0.028***	0.007	-0.013	0.015*	-0.027***	0.023***	-0.006	-0.006
(17) Interest Coverage	-0.009	-0.027***	-0.026***	0.001	0.005	0.000	0.001	-0.001	-0.001	0.003
(18) Debt to Equity	0.022***	0.015*	0.010	-0.005	0.003	0.025***	0.025***	0.685***	0.004	0.188***
(19) Cash Flow/Assets	0.011	0.008	0.009	-0.023***	0.011	0.005	-0.016*	0.005	0.000	0.039***
(10) Market Cap	-0.038***	0.368***	0.338***	0.073***	-0.003	0.015*	-0.010	-0.008	0.001	0.065***
Variables	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)
(1) Prob Acquisition										
(2) ESG		1.000								
(3) ESG Combined		0.043***	1.000							
(4) EBIT Margin		-0.037***	0.014*	1.000						
(5) EBIT Growth		-0.155***	0.001	0.011	1.000					
(6) ROE		-0.015*	-0.016*	-0.023***	-0.138***	1.000				
(7) P/E		-0.004	0.010	0.005	0.036***	-0.009	1.000			
(8) Dividend/Equity		0.004	0.000	0.005	-0.016*	0.009	-0.002	1.000		
(9) Dividend Growth		0.004	0.000	-0.065***	0.029***	0.079***	-0.011	0.009	1.000	
(10) Market to Book		0.004	0.000	-0.065***	0.038***	0.015*	0.009	-0.036***	0.009	1.000
(11) Asset Turnover		0.009	0.000	-0.075***	0.049***	-0.016*	0.010	0.020**	0.057***	1.000
(12) Sales Growth 2Y		0.004	0.000		-0.007					
(13) Sales Growth 3Y		0.004	0.000							
(14) Current Ratio		-0.037***	0.000							
(15) Tangibility		-0.155***	0.011							
(16) LT Debt to Assets		-0.015*	-0.034***							
(17) Interest Coverage		-0.004	0.005							
(18) Debt to Equity		-0.022***	-0.003							
(19) Cash Flow/Assets		0.093***	0.005							
(10) Market Cap		-0.064***	0.017**							

***, ** and * denote significance at the 1%, 5% and 10% levels, respectively.

Appendix D

Takeover Probability Regression Results

Table D.1: Regression Analysis of ESG and ESG Combined scores on Takeover Probability without matching

	<i>Dependent variable: Takeover probability</i>	
	(1)	(2)
ESG/ESG Combined	0.003 (0.005)	0.004 (0.005)
EBIT Margin	0.004** (0.002)	0.004** (0.002)
EBIT Growth	-0.020*** (0.006)	-0.020*** (0.006)
ROE	0.000*** (0.000)	0.000*** (0.000)
P/E	-0.045 (0.063)	-0.046 (0.063)
Dividend/Equity	0.027*** (0.009)	0.027*** (0.009)
Dividend Growth	-0.006 (0.017)	-0.006 (0.017)
Market to Book	0.014*** (0.003)	0.014*** (0.003)
Asset Turnover	0.574*** (0.082)	0.573*** (0.083)
Sales Growth 2Y	-0.004 (0.005)	-0.004 (0.005)
Sales Growth 3Y	-0.009** (0.004)	-0.009** (0.004)
Current Ratio	0.128 (0.106)	0.128 (0.106)
Tangibility	-0.008 (0.155)	-0.007 (0.154)
LT Debt to Assets	0.088*** (0.002)	0.088*** (0.002)
Interest Coverage	-0.003 (0.005)	-0.003 (0.005)

APPENDIX D. TAKEOVER PROBABILITY REGRESSION RESULTS

Debt to Equity	-0.261*** (0.018)	-0.261*** (0.019)
Cash Flow to Assets	0.178*** (0.061)	0.177*** (0.061)
Market Cap	-0.169** (0.073)	-0.168** (0.072)
Year FE	Yes	Yes
Industry FE	Yes	Yes
Pseudo R-Squared	0.839	0.839
Chi-Squared Statistic	2946***	2947***

Note: ***, ** and * denote significance at the 1%, 5% and 10% levels, respectively.

Appendix E

ESG Coverage Summary Statistics

Table E.1: *Descriptive Statistics of ESG coverage 2 years by group*

Variable	N	Mean	St.Dev.	Min	Max
ESG Coverage 2 years = 0					
Financial Buyer	710	0.048	0.214	0	1
Serial Bidder	710	0.497	0.500	0	1
Bidder Assets	710	6.302	1.826	-7.547	11.417
Bidder CapEx	710	0.065	0.098	0	1.158
Bidder Asset Turn.	710	0.883	0.830	0	7.71
Target ESG Cov 1Y	710	0.024	0.153	0	1
Target Assets	710	4.785	1.888	-9.282	10.446
Bidder Deal Size	710	387.672	10282.200	0	273205.53
Deal Premium	710	2299.917	59400.577	-100	1578350
ESG Coverage 2 years = 1					
Financial Buyer	682	0.044	0.205	0	1
Serial Bidder	682	0.664	0.473	0	1
Bidder Assets	682	7.721	1.614	2.161	13.263
Bidder CapEx	682	0.061	0.079	0	0.774
Bidder Asset Turn.	682	0.764	0.624	0	4.294
Target ESG Cov 1Y	682	0.035	0.184	0	1
Target Assets	682	5.625	1.808	-0.265	11.264
Bidder Deal Size	682	0.622	5.045	0	129.753
Deal Premium	682	324.147	7155.525	-100	186764.07

Table E.2: Correlation Matrix of ESG Coverage

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
(1) ESG Coverage 1Y	1.000										
(2) ESG Coverage 2Y	0.681***	1.000									
(3) Financial Buyer	0.008	-0.010	1.000								
(4) Serial Bidder	0.114***	0.169***	-0.029	1.000							
(5) Bidder Assets	0.331***	0.380***	0.056**	1.000							
(6) Bidder CapEx	-0.006	-0.023	-0.047*	-0.015	1.000						
(7) Bidder Asset Turn.	-0.067**	-0.081***	0.031	-0.078***	0.027	1.000					
(8) Target ESG Cov 1Y	0.065**	0.033	0.165***	-0.015	0.126***	-0.167***	1.000				
(9) Target Assets	0.197***	0.222***	0.076***	0.031	0.569***	-0.042	-0.019	1.000			
(10) Bidder Deal Size	-0.020	-0.026	-0.006	-0.032	-0.209***	0.000	0.000	-0.005	1.000		
(11) Deal Premium	-0.022	-0.023	-0.007	-0.035	-0.014	-0.006	0.006	-0.005	0.003	1.000	

***, ** and * denote significance at the 1%, 5% and 10% levels, respectively.